2024 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 25-1

Texas A&M AgriLife and Research and Extension Center of Lubbock
1102 E Drew St
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Friends and members of Lamesa Cotton Growers:

Texas A&M AgriLife would like to thank Lamesa Cotton Growers for their long-dedicated support of the ongoing research at the AG-CARES facility near Lamesa, TX. Without this support much of the accomplishment of our research and extension programs would not be possible. Additionally, this research location has allowed for the continuation of long-term studies and those effects on future production. 2024 was again a trying time for agriculture. Rainfall was sporadic at best and was followed by an almost unprecedented heat wave for three weeks in August. This resulted in lower-than-expected yields for the 2024 growing season.

Our research and extension programs continue to focus on key areas of crop production for Southern High Plains Producers. These include:

Water-Use Efficiency
Soil Health and Cover Crop Management
Soil Fertility and Nutrient Management
Cotton Variety and Germplasm Evaluations
Root-Knot Nematode Management
Weed Management

These areas address the needs of our clientele and answers from this research will be important to the long-term sustainability of agriculture production for the region. We would like to thank Dr. Wayne Keeling for his leadership of the AG-CARES facility. Thanks to all of the faculty and staff for their dedication to maintaining research at AG-CARES.

The Texas A&M AgriLife Research and Extension Center again would like to thank the Lamesa Cotton Growers for their support and their current officers: David Zant – President, Kirk Tidwell – Vice-President, and Glen Phipps – Secretary.

Todd Baughman
Center Director
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BASF
Bayer CropScience
Corteva
Cotton, Inc. – State Support Program
Dawson County Commissioners Court
Nichino America
PhytoGen Cotton Seed
Syngenta Crop Protection

2024 Rainfall
AG-CARES

January

24	0.20
total	0.20
YTD	0.20

February

11	0.40
total	0.40
YTD	0.60

March

1	1
17	0.7
21	0.3
total	2.00
YTD	2.60

April

9	0.8
26	0.8
total	1.60
YTD	4.20

May

1	0.50
11	0.50
16	0.50
31	0.80
total	2.30
YTD	6.50

June

10	0.30
20	0.30
total	0.60
YTD	7.10

July

4	0.30
total	0.30
YTD	7.40

August

total	0.00
YTD	7.40

September

1	2.85
2	1.35
total	4.20
YTD	11.60

October

total	0.00
YTD	11.60

November

2	2.40
total	2.40
YTD	14.00

December

total	0.00
YTD	14.00

TITLE:

Cotton variety performance (continuous cotton, conventional tillage) as affected by low-energy precision application (LEPA) irrigation levels at AG-CARES, Lamesa, TX, 2024.

AUTHORS:

Wayne Keeling – Professor
Justin Spradley – Research Assistant
Mark Stelter – Research Associate

MATERIALS AND METHODS:

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

Planting Date: May 16

Varieties: DP 2143NR B3XF
FM 2498 GLT

Herbicides:	Treflan 24 oz/A	2/21/24
	Caparol 24 oz/A	5/17/24
	Roundup 32 oz/A + Liberty 43 oz/A + Warrant 48 oz/A	6/22/24
	Roundup 32 oz/A + Liberty 43 oz/A	8/01/24

Fertilizer: 85-0-0

Irrigation:

	Low	Base	Base Plus
Preplant/Emergence	3.8”	3.8”	3.8”
In-season	5.6”	7.3”	9.4”
Total	9.4”	11.1”	13.2”

Harvest Date: October 31

RESULTS AND DISCUSSION:

Two varieties, DP 2143 B3XF (nematode-resistant) and FM 2498 GLT (nematode susceptible) were compared with three levels of deficit irrigation in continuous cotton/conventional tillage system. Over the last 2 years, yields were much below average due to excessive heat and little to now rainfall during the growing season (Table 1). When averaged across irrigation levels, higher yields were produced with FM 2498 GLT compared to DP 2143NR B3XF. Yields were higher with the base + irrigation, but not different between low and base treatments. Loan values were higher for DP 2143NR B3XF and were highest for the base + irrigation level. Highest gross revenues ($/A) were produced with FM 2498 GLT.

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 (5.6)**	**Base (7.3)**	**Base Plus (9.4)**	**Average**
		------------------ lbs/A------------------		
DP 2143NR B3XF	239	256	374	**290 B**
FM 2498 GLT	270	336	571	**392 A**
Average	**254 B**	**296 B**	**472 A**	**--**
		------------------ ¢/lb------------------		
DP 2143NR B3XF	46.50	44.12	50.68	**47.10 A**
FM 2498 GLT	43.28	42.52	45.77	**43.86 B**
Average	**44.89 AB**	**43.32 B**	**48.23 A**	**--**
		------------------ $/A------------------		
DP 2143NR B3XF	113	113	190	**139 B**
FM 2498 GLT	118	143	260	**173 A**
Average	**116 B**	**128 B**	**225 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, 2024.

AUTHORS:

Wayne Keeling – Professor
Justin Spradley – Research Assistant
Mark Stelter – Research Associate

MATERIALS AND METHODS:

Plot Size:	4 rows by 300-700 feet, 3 replications
Planting Date:	May 16
Varieties:	DP 2143NR B3XF FM 2498 GLT

Herbicides:	Roundup 32 oz/A + Panther 2 oz/A	3/20/24
	Roundup 32 oz/A	4/12/24
	Caparol 48 oz/A	5/17/24
	Roundup 32 oz/A + Liberty 43 oz/A + Warrant 48 oz/A	6/24/24
	Roundup 32 oz/A + Liberty 43 oz/A	8/01/24

Fertilizer: 85-0-0

Irrigation:

	Low	Base	Base Plus
Preplant/Emergence	3.8”	3.8”	3.8”
In-season	5.6”	7.3”	9.4”
Total	9.4”	11.1”	13.2”

Harvest Date: October 31

RESULTS AND DISCUSSION:

Two varieties DP 2143NR B3XF and FM 2498 GLT were compared across three deficit – irrigation levels in a continuous cotton/rye cover crop system. Rye was planted in November 2023 after cotton was harvested and terminated on April 12. Over the last 2 years, yields have been much below average due to excessive heat and little to no growing season rain fall. When averaged across irrigation levels, similar yields were produced with the two varieties (Table 1). When averaged across varieties yields were highest with the base + irrigation level. Cotton loan values were highest for DP 2143NR B3XF and for the base + irrigation level. Gross revenues ($/A) were similar for the two varieties.

Table 1. Effects 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 (5.6)**	**Base (7.3)**	**Base Plus (9.4)**	**Average**
		------------------lbs/A------------------		
DP 2143NR B3XF	138	188	302	**209 A**
FM 2498 GLT	121	219	431	**257 A**
Average	**129 B**	**203 B**	**366 A**	**--**
		------------------¢/lb------------------		
DP 2143NR B3XF	48.05	50.58	52.27	**50.30 A**
FM 2498 GLT	42.33	45.32	47.98	**45.21 B**
Average	**45.19 B**	**47.95 AB**	**50.13 A**	**--**
		------------------$/A------------------		
DP 2143NR B3XF	67	96	158	**107 A**
FM 2498 GLT	51	100	203	**118 A**
Average	**59 B**	**98 B**	**181 A**	**--**

TITLE:

Cotton variety performance (wheat-cotton rotation) as affected by low-energy precision application (LEPA) irrigation levels at AG-CARES, Lamesa, TX, 2024.

AUTHORS:

Wayne Keeling – Professor
Justin Spradley – Research Assistant
Mark Stelter – Research Associate

MATERIALS AND METHODS:

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

Planting Date: May 16, wheat planted November 2022, harvested June 2023

Varieties: DP 2143NR B3XF
FM 2498 GLT

Herbicides:

Roundup 32 oz/A + Panther 2 oz/A	4/4/24
Caparol 24 oz/A	5/17/24
Roundup 32 oz/A + Liberty 22 oz/A + Warrant 48 oz/A	6/24/24
Roundup 32 oz/A + Liberty 22 oz/A	8/01/24

Fertilizer: 85-0-0

Irrigation:

	Low	Base	High
Preplant/Emergence	3.8”	3.8”	3.8”
In-season	5.6”	7.3”	9.4”
Total	9.4”	11.1”	13.2”

Harvest Date: October 31

RESULTS AND DISCUSSION:

Two cotton varieties including DP 2143NR B3XF and FM 2498 GLT were planted under three deficit – irrigation levels in wheat-cotton rotation. Wheat was harvested in June 2023 and stubble was maintained without tillage until cotton planting in May 2024. Similar yields were produced with the two varieties and highest yields with the base + irrigation level (Table 1). Cotton loan values were higher for DP 2143NR B3XF and similar across irrigation levels. Gross revenues ($/A) were similar for the 2 varieties and highest for the base + irrigation treatment.

When comparing across the three cropping systems, cotton lint yields were reduced 34% with the terminated rye cover crop system compared to continuous cotton/conventional tillage and increased 11% with the wheat-cotton rotation (Table 2).

Table 1. Effects of varieties and irrigation level on cotton lint yield (lbs/A), loan value (¢/lb), and gross revenue ($/A) in a wheat cotton rotation in 2024.

	In-season Irrigation Levels (inches)			
Variety	**Low (5.6)**	**Base (7.3)**	**Base Plus (9.4)**	**Average**
		------------------ lbs/A------------------		
DP 2143NR B3XF	273	340	468	**360 A**
FM 2498 GLT	346	324	519	**396 A**
Average	**309 B**	**332 B**	**494 A**	**--**
		------------------ ¢/lbs------------------		
DP 2143NR B3XF	51.65	51.10	51.43	**51.39 A**
FM 2498 GLT	43.85	44.33	51.30	**46.49 B**
Average	**47.75 A**	**47.72 A**	**51.37 A**	**--**
		------------------ $/A------------------		
DP 2143NR B3XF	142	174	241	**186 A**
FM 2498 GLT	152	142	265	**186 A**
Average	**147 B**	**158 B**	**253 A**	**--**

Table 2. Effects of cropping systems and irrigation level on cotton lint yield averaged across two varieties in 2024.

	In-season Irrigation Levels			
Variety	**Low (5.6)**	**Base (7.3)**	**Base Plus (9.4)**	**Average**
		------------------ lbs/A------------------		
Continuous Cotton-Conv Tillage (>30 yr)	254	296	472	**341**
Continuous Cotton-Rye Cover	129	203	366	**224 (-34%)**
Wheat-Cotton rotation	309	332	494	**378 (+11%)**
Average	**231**	**210**	**444**	**--**

TITLE:

Effect of long-term cropping systems (continuous cotton with and without a terminated cover and winter wheat/summer fallow/cotton), irrigation and variety on root-knot nematode density at AG-CARES, Lamesa, TX, 2024.

AUTHORS:

Terry Wheeler - Professor

MATERIALS AND METHODS

In 2014, a large plot cropping system trial was initiated. In Pie 9 a continuous cotton with a terminated rye cover and minimum to no tillage (CCcov) was compared to Pie 8 and Pie 7, which were in a cotton/winter wheat/summer fallow rotation (CW). In 2017 an additional system was added in Pie 1, with continuous cotton and no cover crop (conventional tillage, CCtil). In each Pie, a replication consisted of at least two varieties differing in their susceptibility to root-knot nematode (S = susceptible, PR = partially resistant, HR = highly resistant), and three irrigation rates (base 1.0B, 30% below base irrigation 0.7B, and 30% above base irrigation 1.3B). There were three replications of each treatment within a Pie. In the fall, typically September, the large plots would be soil sampled, and the soil assayed for root-knot nematodes (RK/500 cm^3 soil). Analyses of these nematode densities were LOG_{10} transformed to normalize the counts. So, the comparisons were for the impact of cropping system (CCcov, CW, CCtil) and variety type (S, PR, R) on fall density of root-knot nematodes.

RESULTS AND DISCUSSION

The highly resistant varieties had lower root-knot nematode densities than the susceptible or partially resistant varieties in 5 of the 6 years tested (Table 1). The highly resistant variety from 2014 to 2016 was PHY 417 WRF. In 2022 – 2024, the highly resistant variety was DP 2141NR B3XF or DP 2143NR B3XF. The partially resistant varieties had lower root-knot nematode densities than the susceptible varieties in 2018 – 2020. The partially resistant varieties during 2018-2020 included ST 4946GLB2 and PHY 350 W3FE. There was no significant irrigation rate by variety rating interactions, meaning that these differences were consistent across irrigation rates.

The cropping systems affected root-knot nematode densities. Since the highly resistant varieties greatly reduced root-knot nematode density, the analyses were conducted each year on cropping systems across the susceptible and partially resistant varieties. In 2014, the first year of the systems trial, the nematode densities were similar across both the continuous cotton (CCcov) and cotton rotated with winter wheat and summer fallow (CW) (Table 2). From 2015 to 2019, root-knot nematode density was higher for the continuous cotton systems (cover and no cover) than for the cotton/wheat/summer fallow rotation for all irrigation rates. In 2020, there were no significant differences between cropping systems at each of the irrigation rates. From 2022 to 2024, the root-knot nematode density in the continuous cotton with terminated rye cover tended to be lower than the other cropping systems.

Table 1. Effect of variety rating on root-knot nematode density.

	Variety rating for root-knot nematode		
Year	Susceptible	Partial resistance	High resistance
2014	3,074 a[1]	1,732 a	60 b
2015	1,640 a	1,752 a	733 a
2016	941 a	1,663 a	82 b
2017	6,131 a	2,890 a	
2018	17,514 a	4,594 b	
2019	8,756 a	1,475 b	
2020	4,655 a	978 b	
2022	5,895 a		47 b
2023	1,113 a		770 b
2024	1,126 a		7 b

[1]Means with the same letter for that year were not significantly different between variety ratings. A LOG_{10} transformation was applied to root-knot nematodes/500 cm^3 soil for each plot, for the analyses.

Table 2. Effect of cropping system on root-knot nematode density.

Year	IRR[2] = 1.3B			IRR = 1.0B			IRR = 0.7B		
	CCcov	CCtil	CW	CCcov	CCtil	CW	CCcov	CCtil	CW
2014	2,504 a[1]		3,733 a	2,778 a		2,906 a	624 a		531 a
2015	**4,164 a**		**582 b**	1,800 a		849 a	**2,564 a**		**329 b**
2016	**1,798 a**		**409 b**	**2,973 a**		**516 b**	**2,747 a**		**93 b**
2017	**11,435 a**	**6,880 a**	**872 b**	**11,283 a**	**8,344 a**	**144 b**	**3,483 a**	**5,069 a**	**1,837 b**
2018	**34,549 a**	**5,475 a**	**1,196 b**	**15,147 a**	**4,520 a**	**600 b**	**51,509 a**	**11,731 a**	**128 b**
2019	**10,271 a**	**7,040 a**	**1,420 b**	**7,587 a**	**2,540 a**	**1,067 b**	**5,947 a**	**1,610 a**	**117 b**
2020	5,595 a	7,152 a	2,610 a	1,517 a	4,091 a	3,250 a	597 a	1,144 a	117 a
2022	**940 b**	**5,623 a**	**21,903 a**	**1,077 b**	**2,133 ab**	**3,693 a**			
2023	2,253 a	5,213 a	107 a	267 a	1,320 a	293 a	0 a	560 a	0 a
2024	490 a	4,093 a	903 a	117 a	860 a	3,097 a	290 a	280 a	0 a

[1]Means followed by the same letter, within a year and irrigation rate, are not significantly different (*P*=0.05). Analyses were for each year/irrigation rate combination.

[2]Irrigation rate (IRR) of 1.3B was 30% above the base irrigation rate (the rate that could be maintained for all the planted wedges in the circle), 1.0B was the base irrigation rate, and 0.7B was 30% below the base irrigation rate.

TITLE: Impact of Long-term Cover Cropping on Cotton Yield, AG-CARES, Lamesa, TX 2024

AUTHORS:
Joseph Burke – Assistant Professor
Katie Lewis – Professor
Robert Fielding – Research Technician
Wayne Keeling – Professor

MATERIALS AND METHODS:

Location:	AG-CARES, Lamesa, TX
Plot Size:	8 rows by 270 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; 21 November 2019; 4 December 2020; 19 November 2021; 21 November 2022; and 28 November 2023
Termination:	10 April 2015; 11 March 2016; 3 April 2017; 27 March 2018; 9 April 2019; 27 March 2020; 9 April 2021; 27 April 2022; 5 April 2023; and 28 March 2024
Cotton	
Planting Dates:	13 May 2015; 24 May 2016; 5 May 2017; 15 May 2018; 19 May 2019; 18 May 2020; 12 May 2021 and replanted 7 July 2021; 16 May 2022; 16 May 2023; and 17 May 2024
Cotton Harvest:	28 October 2015; 22 November 2016; 7 November 2017; 19 November 2018; 28 October 2019; 31 October 2020; 22 November 2021; 15 November 2022; 8 November 2023; and 6 November 2024
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; 2021, DP 1646 B2XF planted at 53,000 seeds/acre, replanted to DP 1820 B2XF at 53,000 seeds/acre; 2022-2024, DP 1646 B2XF planted at 53,000 seeds/acre.
Fertility:	120 lb N/A as 32-0-0 applied through the pivot in 4 applications of 30 lb N/A (2020); 65 lb N/A applied as 32-0-0 through pivot (2021); 90 lb N/A applies as 32-0-0 through pivot in 3 applications of 30 lb N/A (2022-2024)
Rainfall:	12.4” (2015); 13” (2016); 10.5” (2017); 6” (2018); 10.9” (2019); 6.7” (2020); 15.11” (2021); 1.4” (2022); 11.0” (2023); and 7.9” (2024)
Irrigation:	7.1” (2015); 5.1” (2016); 8.0” (2017); 11.6” (2018); 10.8” (2019); 11.4” (2020); 0.75” (2021), no additional irrigation following cotton replanting on 7 July 2021; 8.4” (2022); 6.8” (2023); and 4.5” (2024)

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, 21 November 2019, 4 December 2020, 19 November 2021, 21 November 2022, and 28 November 2023 and were chemically terminated 10 April 2015, 11 March 2016, 3 April 2017, 27 March 2018, 9 April 2019, 27 March 2020, 9 April 2021, 27 April 2022, 5 April 2023, and 28 March 2024 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, 18 May 2020 (DP 1747 NR B2XF and DP 1646 B2XF), 12 May 2021 (DP 1747 NR B2XF and DP 1646 B2XF) at a seeding rate 53,000 seed/acre. Cotton was hailed out at a total loss on 26 June 2021 and replanted 7 July 2021 to DP 1822 B2XF. Cotton was harvested on 28 October 2015, 22 November 2016, 7 November 2017, 19 November 2018, 28 October 2019, 31 October 2020, 17 November 2021, 15 November 2022, 8 November 2023, and 6 November 2024. After cotton harvest the no-till plots were drilled with cover.

RESULTS AND DISCUSSION:

Cover Crop Herbage Mass Production

Herbage mass was not significantly different between no-till with rye cover and no-till with mixed cover crop treatments in 2016, 2018, 2020, 2021, or 2022 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 years evaluated 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. Herbage production in 2021 was severely limited by reduced winter precipitation and fewer heat units in the 2020-2021 growing seasons. In 2022, herbage mass production was again significantly reduced compared to the 2015-2020 historical averages due to significant drought during the 2021-2022 growing season. Herbage mass was not collected in 2023.

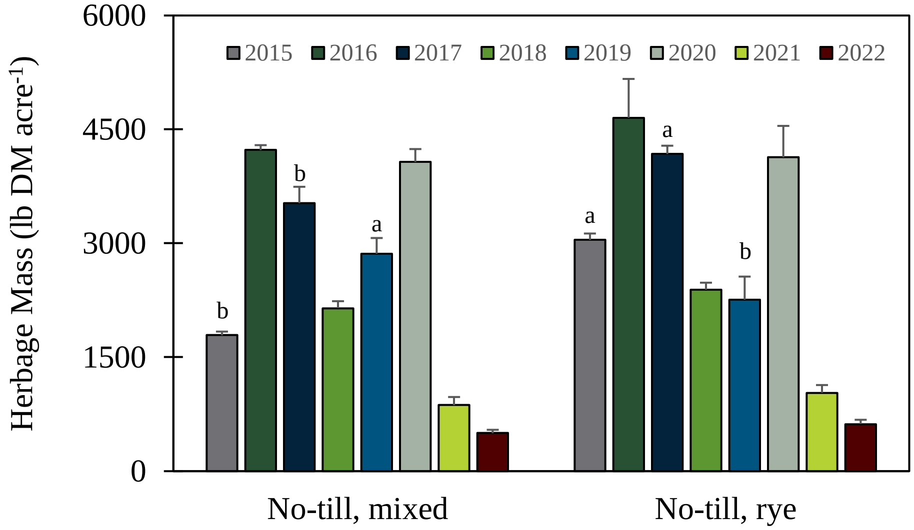

Figure 1. Herbage mass (dry matter, DM) of rye and mixed cover crops harvested in 2015, 2016, 2017, 2018, 2019, 2020, 2021, and 2022 with the no-till treatments at Lamesa, TX. Bars represent standard error of the sample mean. Mean values with the same letter within year are not significantly different 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, except 2022, but were significantly reduced when cotton was planted in terminated rye cover compared to the conventional tillage treatment in 2016, 2017, and 2022. Despite the late planting date, there was no difference in cotton lint yield in 2021 with the no-till cover crop treatments generally producing greater lint than the CT system. In 2022, cotton lint yield was greatest in the CT compared to both no-till cotton systems. There were no yield differences observed in 2023. While the cotton lint yields in the no-tillage rye and mixed species cover followed a decreasing trend we have observed since 2020, yields in the CT system remained consistent to the yields observed in 2015-2016 and 2018-2020 which is likely caused by weed pressure in the no-tillage plots.

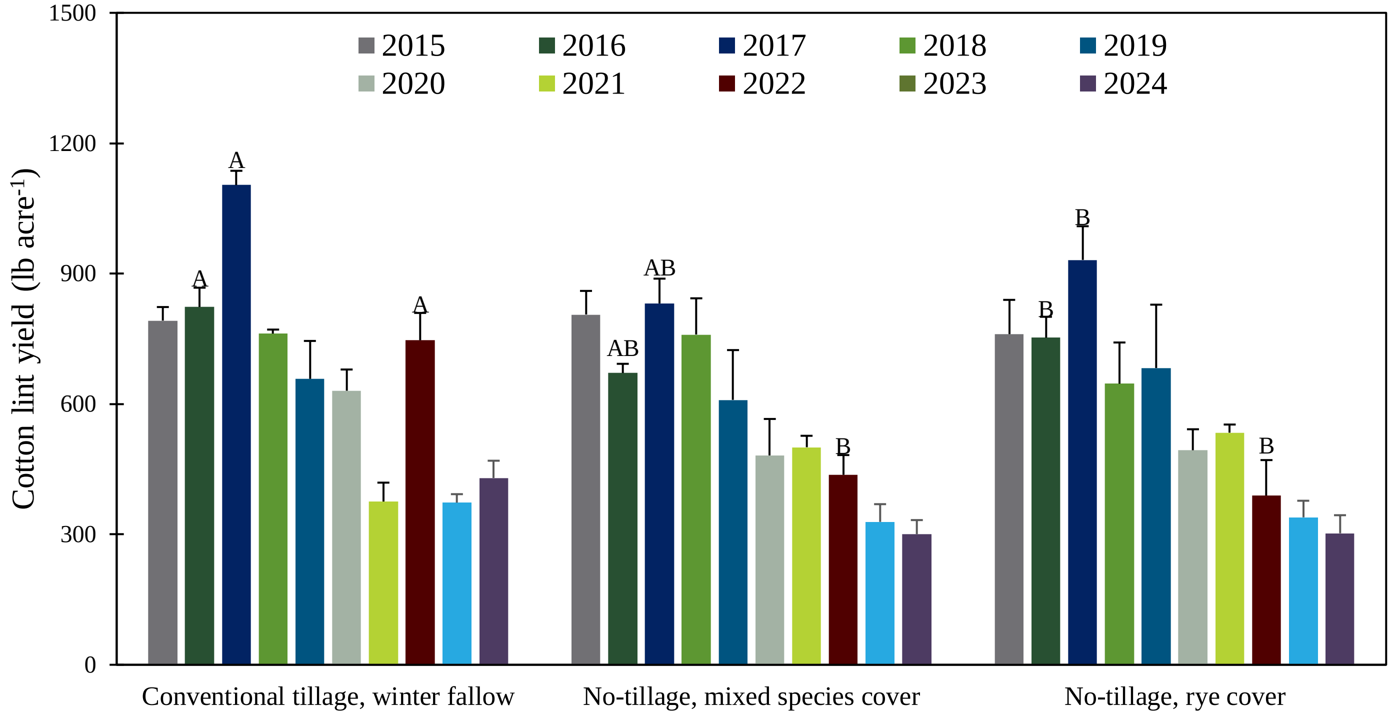

Figure 2. Lint yield with conventional tillage (CT), no-till with rye cover, and no-till with mixed cover treatments in Lamesa, TX for 2015, 2016, 2017, 2018, 2019, 2020, 2021, 2022, 2023, and 2024. Bars represent standard error of the sample mean. Mean values within year with the same letter are not significantly different at $P < 0.05$.

TITLE:

Cropping system impact on soil carbon at AG-CARES, Lamesa, TX, 2024.

AUTHORS:

Katie Lewis – Professor
Nick Boogades – PhD Student
Joseph Burke – Assistant Professor
Christopher Cobos – Senior Research Associate
Wayne Keeling – Professor

METHODS:

Cropping systems

Cropping systems included conventionally-tilled, winter fallow (Conv, standard practice); no-till rye (*Secale cereale*) cover crop (NT CC, regenerative practice); no-till cotton-wheat-fallow rotation (C'24 in cotton phase, WF'24 in fallow/wheat phase, regenerative practice).

Carbon Dioxide Emissions

Carbon dioxide (CO_2) emissions were determined via an automated chamber system consisting of a Gamet GT 5000 Terra portable gas analyzer and a LICOR 8200s Smart Chamber. The chamber system was deployed in the field on top of PVC collars placed roughly 5 inches in the ground. Measurement duration was 8 minutes with a 2-minute rest period in between collars to allow the system to return to atmospheric gas concentrations. The increase in CO_2 concentration over time was converted to flux rate using the ideal gas law.

Soil Carbon

Soil organic carbon (SOC) content was determined via combustion analysis from 100 mg of air-dried soil. Permanganate oxidizable carbon (POXC) content was determined by the method described by Weil et al. (2003).

RESULTS AND DISCUSSION:

Carbon Dioxide Emissions

Carbon dioxide emissions followed trends from previous years where NT CC flux was significantly greater than both Conv and C'24, which were not different from each other, and WF'24 had significantly lower fluxes than all other systems. In all systems, fluxes were greatest when plants were actively growing in the field. In the early spring, only NT CC and WF'24 have or recently had actively growing roots, causing increased heterotrophic respiration and root respiration, resulting in greater flux rates compared to Conv and C'24. After cotton planting in May, flux rapidly increased in Conv and C'24 as active root growth restarted. In early June, wheat harvest in WF'24 caused fluxes to rapidly fall and remain low throughout the remainder of the year as the field was idle. Although C'24 and NT CC systems are similar, with both receiving additional carbon (C), cumulative CO_2 fluxes were significantly different between the two systems. This is likely due to the near year long fallow period from 2023-2024 where this system was idle, resulting in low microbial activity which took longer to rebound when soil temperatures increased and irrigation resumed, compared to NT CC.

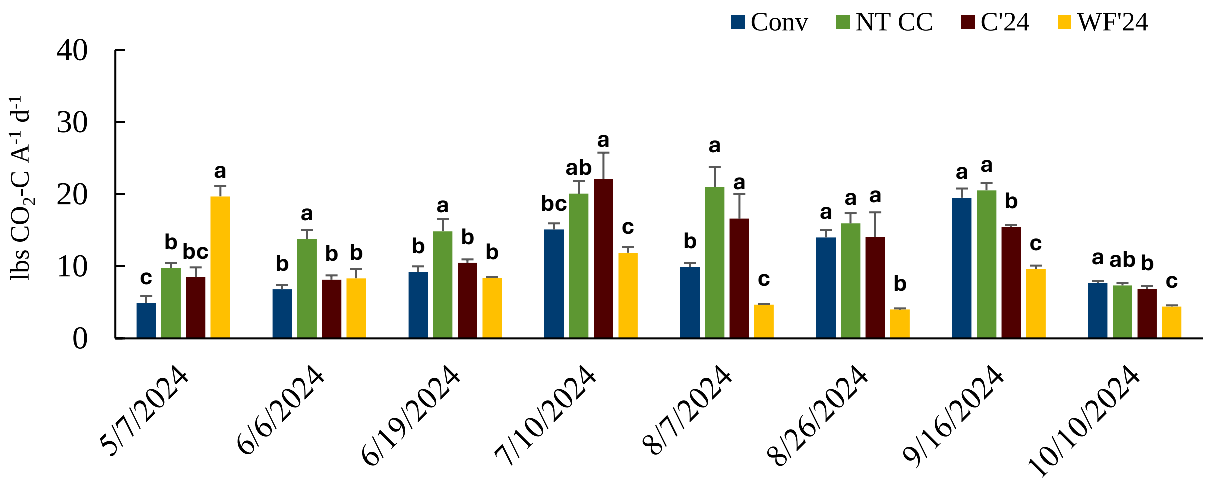

Figure 1. Daily soil CO_2-C flux rate in lbs CO_2-C $acre^{-1}day^{-1}$, by cotton production system from 7 May 2024 to 10 October 2024. Bars with different letters within sampling date are not significantly different ($p<0.1$). Error bars are standard errors.

Soil Carbon

The NT CC and CWF systems at this research site have been in place for roughly 13 years while the Conv system has been in place for 20+ years, so data presented represents effects of long-term system implementation. Since implementation, the regenerative systems have significantly increased SOC in the upper 0-4" of the soil profile. Permanganate oxidizable carbon was significantly increased in the regenerative systems, especially at the upper 0-4" depth. Permanganate oxidizable carbon in all systems was greatest when plants were actively growing. This increase in POXC likely helped drive increased CO_2 flux during cotton and cover crop growth. NT CC was able to significantly increase SOC compared to Conv despite having greater CO_2 emissions, while C'24 increased SOC despite a long idle period with no active plant growth.

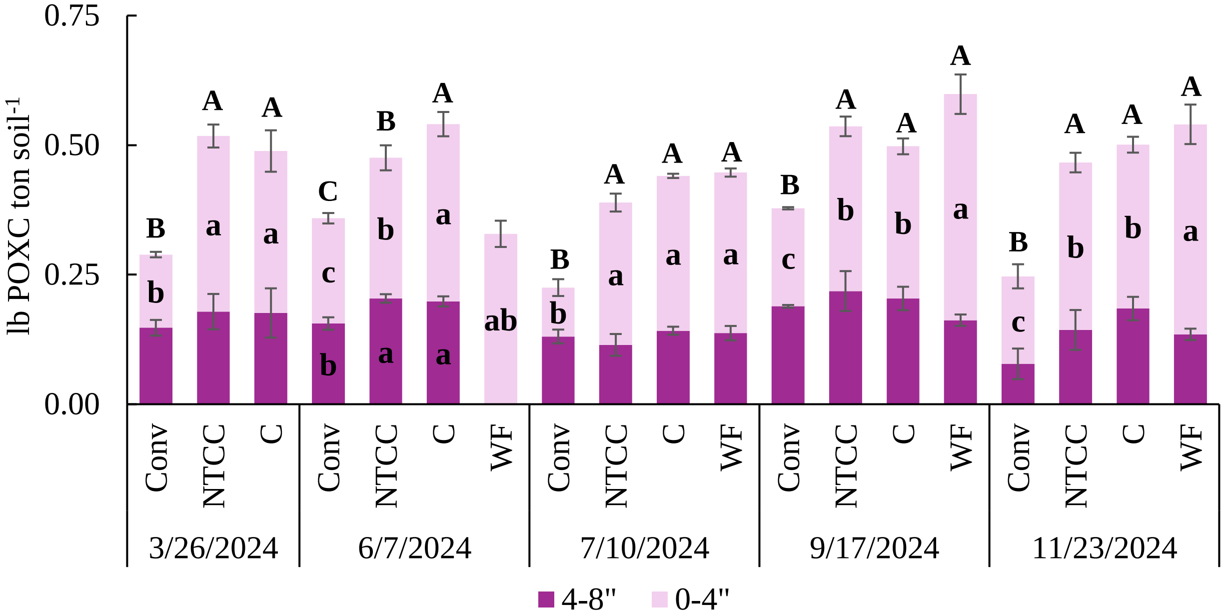

Figure 2. Average POXC (lb ton soil^{-1}) by system from 0-4" and 4-8". Lower case letters indicate significant differences between systems within respective depths, within sampling date. Upper case letters indicate significant differences of total 0-8" profile between systems, within sampling date ($p<0.05$). Error bars are standard errors.

TITLE:
Cover crop termination timing impacts on soil and plant parameters at AG-CARES, Lamesa, TX, 2024.

AUTHORS:
Christopher Cobos – Sr. Research Associate
Nicholas Boogades – Student Assistant
Joseph A. Burke – Assistant Professor
Gurjinder Baath – Assistant Professor
Sumantra Chatterjee – Post-Doctoral Research Associate
Paul B. DeLaune – Professor
Katie L. Lewis - Professor

ABSTRACT:
Cover crop termination timings can have large impacts on the amount of soil coverage, nutrient availability, and stored soil moisture in a system. Producers in semi-arid regions must gamble the possibility of increased soil infiltration and reduced soil water evaporation against the potential of decreased soil water from a cover crop; in the SHP, success is dependent on irrigation capacity and precipitation. Cover crops are traditionally terminated eight weeks prior to cotton planting across the region. This termination timing can limit the available biomass accumulation and groundcover in semi-arid regions. The objective of this study is to reevaluate the termination timings by reducing the eight week fallow period and observe how delayed termination affects cover crop biomass accumulation, soil water availability, cotton nitrogen uptake, soil carbon/nitrogen cycling, and cotton lint yield. Our research was conducted at the Agricultural Complex for Advanced Research and Extension Systems in Lamesa, TX. The study was initiated in 2023. At this site, we evaluated four cover crop termination timings (8, 6, 4, and 2 weeks prior to cotton planting) in a continuous cotton system with a winter rye cover crop (30 lbs ac^{-1} planting rate) and reduced tillage (NTCC). All plots were deficit-irrigated at two different irrigation levels, base (60% ET replacement) and low (30% ET replacement). Small unmanned aerial systems (sUAS) were used to observe plant physiological parameters across all plots via a multispectral sensor. Flights were taken at 8, 6, 4, and 2 weeks from cotton planting and at key cotton growth stages (pinhead square, full bloom, and first cracked boll). Volumetric water content (θ) was determined at soil depth (0-10 cm, 10-30 cm, 30-60 cm, and 60-90 cm) at each 2-week timing interval from cotton planting (8, 6, 4, and 2 weeks from cotton planting) and at cotton planting in year one of the study. Soil moisture measurements were collected every two weeks in the system from March 2024 to November 2024 with a field-calibrated neutron probe in year two. Cover crop growth followed a polynomial growth curve in both 2023 and 2024, decreasing 6 weeks prior to cotton planting. In 2024, cover crop plots terminated 8 and 4 weeks prior to cotton planting were not significantly different from each other and were significantly greater than plots terminated 6 and 2 weeks prior to cotton planting. Year one of the study showed no significant differences in cotton lint yield between treatments. Year two of the study showed a general decrease in cotton lint yield as cover crop termination timing was delayed closer to cotton planting. Long-term yield data will be needed to evaluate the effects of cover crop termination timing in our semi-arid environments.

INTRODUCTION:

The Southern High Plains (SHP) of Texas represents an agricultural hub of all major Texas agricultural commodities. However, the SHP dominates in cotton production, producing approximately 30% of the annual U.S. cotton acres. The region historically derived its expansion of cotton production acres from groundwater withdrawal of the Ogallala Aquifer and plentiful irrigation across the semi-arid region. Through decades of irrigation usage and little aquifer recharge, the SHP now produces a majority of its cotton production in dryland systems. With an increasingly arid environment and decreasing irrigation supply, the conservation of soil and water resources is paramount across the region. Previous research shows that regenerative agricultural (RA) practices can improve soil water conservation in cotton production systems with no negative decreases in cotton lint yield. However, regional limitations can exist when applying these RA practices in large-scale production systems.

Here we define regenerative agriculture in the context of the SHP as the *continued capacity of agricultural systems to function in a changing climate that supports soil health, communities, economic output, environmental sustainability, and resilience to the outside threats of those outcomes*. Within the capacity of this definition, our core values for regenerative agriculture are to 1) *maintain economic viability of the system*, 2) *optimize soil water conservation*, 3) *minimize soil disturbance*, 4) *maintain soil surface coverage*, 5) *incorporate a living root in the soil for as long as possible*, and 6) *minimize the global climate change effects derived from agricultural practices*. Regenerative practices relevant to the region and associated core values include the implementation of ***cover crops***, crop rotations, conservation tillage, and livestock integration. Cover crop termination timings can have large impacts on the amount of soil coverage, nutrient availability, and stored soil moisture in a system. Producers in semi-arid regions must gamble the possibility of increased soil infiltration and reduced soil water evaporation against the potential of decreased soil moisture; in the SHP, success is dependent on irrigation capacity and precipitation. *Optimizing termination timings for semi-arid regions and in deficit-irrigation/dryland systems is critical for the success of regenerative practices across this large agricultural region.*

MATERIALS AND METHODS:

Field experiments were conducted at the Agricultural Complex for Advanced Research and Extension Systems (AG-CARES) near Lamesa, TX (32°46’22”N, 101°56’18”W). The soil is classified as an Amarillo fine sandy loam (fine-loamy, mixed, superactive, thermic Aridic Paleusalfs; Lewis et al., 2018; USDA-NRCS, 2016). Amarillo soil is a benchmark series for the SHP and covers approximately 315,995 ha across western Texas (Lewis et al., 2018; USDA-NRCS, 2016). The evaluated cropping system was a no-till continuous cotton system with a single species (rye, *Secale cereal;* 30 lbs ac^{-1} planting rate) cover crop (NTCC). Cover crop termination timings occurred 8, 6, 4, and 2 weeks prior to cotton planting (May 15^{th}) in both years. A no-cover crop control was implemented, with the cover crop being terminated >12 weeks prior to cotton planting each year. Weed pressure was controlled across all systems to mitigate the affect weed growth would have on nutrient availability and soil water dynamics. The field was irrigated using Low Energy Precision Application (LEPA) irrigation and received approximately 60 % evapotranspiration replacement as supplemental irrigation during the growing seasons when irrigation capacity was able to meet crop demand (base irrigation) and 30% evapotranspiration replacement in the low irrigation treatment. All treatments were replicated within irrigation level and arranged as a split-plot design with the irrigation level as the main plot and cover crop termination timings as the subplot. All plots were 8-rows wide and 40 ft in length.

In year one, the volumetric water content (θ) was determined at soil depth (0-10 cm, 10-30 cm, 30-60 cm, and 60-90 cm) at each 2-week timing interval from cotton planting (8, 6, 4, and 2 weeks from cotton planting) and at cotton planting from deep core soil samples. In year two, aluminum access tubes (8-cm inner diameter) were installed into the center of each plot and measurements were conducted to a depth of 105 cm in 15-cm increments. Soil water was monitored biweekly using a field calibrated CPN 503 neutron probe (InstroTek Inc., Raleigh, NC) for volumetric water content (VWC) beginning in March 2024 and running through the duration of the experiment unless field conditions did not allow entry (Pabuayon et al., 2019; Alfonso et la., 2020, Burke et al., 2021). The access tubes were constructed with a removable top piece (60 cm length) allowing most of the access tube to remain in the field during tillage events (CT), planting, and harvesting. The VWC for each depth was multiplied by the depth increment (15 cm) to determine soil water content (mm).

Cover crop biomass was collected from the field prior to every termination timing treatment and collected in 1 ft^2 area blocks with three sub-samples per plot. Biomass was weighed, dried in an indoor oven at 60°C for five days and re-weighed to determine lbs/ac dry biomass in each system at time of cover termination. Canopy coverage was determined using Canopeo, utilizing pictures taken approximately 1-meter above the soil surface at each biomass collection event. Small unmanned aerial systems (sUAS) were used to observe plant physiological parameters across all plots via a multispectral sensor capturing 6 separate bands of light per photo (RGB, red [630-690 nm], green [510-580 nm], blue [450-510 nm], red edge [670-760 nm], and NIR [700-1,200 nm]). Flights were taken at or as close to solar noon as permissible with a minimum vertical and horizontal image overlap of 80% to ensure total mapping area coverage. Flights were taken at 8, 6, 4, and 2 weeks from cotton planting and at key cotton growth stages (pinhead square, full bloom, and first cracked boll). Autonomous flights with guidance from GPS with Inertial Measurement Unit (IMU) sensors onboard were performed with flight paths preprogrammed in advance. Images acquired from the UAS platform will be postprocessed using the Structure from Motion (SfM) photogrammetry algorithms to derive high density 3D point clouds and fine resolution 2D orthorectified image mosaic. A Digital Surface Model (DSM), which represents the highest elevation of objects on the ground, will be generated from 3D point cloud data at the same spatial resolution as the orthomosaic image. A Digital Terrain Model (DTM) will be created from 3D point cloud acquired on bare ground. Crop Height Model will be generated from subtracting DTM from DSM for each flight to acquire agronomic data. Canopy volume will be calculated as the sum of pixels classified as canopy multiplied by the height of each individual canopy pixel. Features related to the canopy volume expansion pattern may also be extracted from time-series measurements, including maximum canopy volume expansion rate, time of the maximum canopy volume expansion rate, and duration of half maximum canopy volume expansion rate. Canopy volume estimates will be correlated with herbage mass collected on the ground (from the same dates) to quantify whole-plot biomass.

RESULTS AND DISCUSSION:

Cover crop biomass was planted shortly after cotton harvest in both years of the study (November 2022 and 2023). Data collection started 12 weeks prior to cotton planting and was collected in 2-week intervals until cotton planting in both 2023 and 2024 (12 weeks: 2/23/2023, 2/20/2024; 10 weeks: 3/8/2023, 3/7/2024; 8 weeks: 3/19/2023, 3/22/2024; 6 weeks: 4/5/2023, 4/3/2024; 4 weeks: 4/20/2023, 4/17/2024; 2 weeks: 5/3/2023, 4/30/2024; cotton planting: 5/16/2023, 5/15/2024). Cover crop biomass in both years shows a polynomial growth curve in lbs ac^{-1} of dry matter produced, decreasing significantly 6 weeks prior to cotton planting (Figure 1). However, biomass before and after the 6 week period shows increased cover crop growth during these times. Canopy coverage follows the same trend as cover crop biomass in both 2023 and 2024, decreasing significantly 6 weeks prior to cotton planting (Figure 2).

Soil water was measured extensively throughout that cover crop termination timing treatments and the cotton growing season. At time of cotton planting, the no-cover control had the greatest amount of stored soil water in the system across the measured soil profile (Figure 4). The treatments terminated 6 and 2 weeks prior to cotton planting had the least amount of available soil water at time of cotton planting. Cover crop plots terminated 8 and 4 weeks prior to cotton planting were significantly greater than those terminated at 6 and 2 weeks and were not significantly different from each other. These results indicate that an additional 4 weeks of cover crop growth from 8 weeks prior to cotton planting did not negatively deplete soil water. Irrigation timing will have a critical affect on the available soil water. Irrigation timings were standardized across all treatments to follow regional producer best management practices. Irrigation started approximately 6 weeks prior to cotton planting. Year two of the study showed a general decrease in cotton lint yield as cover crop termination timing was delayed closer to cotton planting. Soil nutrient analyses will need to be completed before a treatment affect can be determined. Potential for nitrogen-immobilization is likely in plots terminated closer to cotton planting. This study will continue into a third year and all soil and plant analyses completed before we can elucidate how cover crop termination timings impact cotton lint yield, soil water availability, soil carbon and nitrogen cycling, and cotton nitrogen-use efficiency.

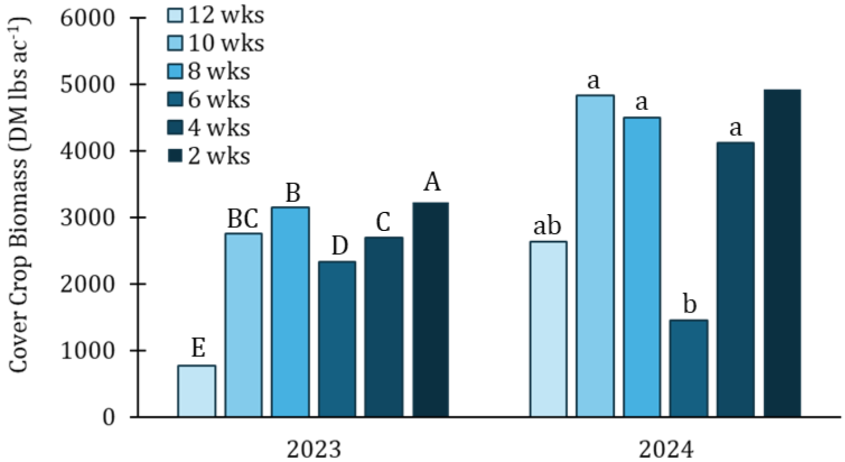

Figure 1 (above): Cover crop biomass in lbs ac^{-1} of dry matter from 12 weeks prior to cotton planting to 2 weeks prior to cotton planting in 2023 and 2024 for the base irrigation systems. Mean values with the same letter are not significantly different at $P < 0.01$.

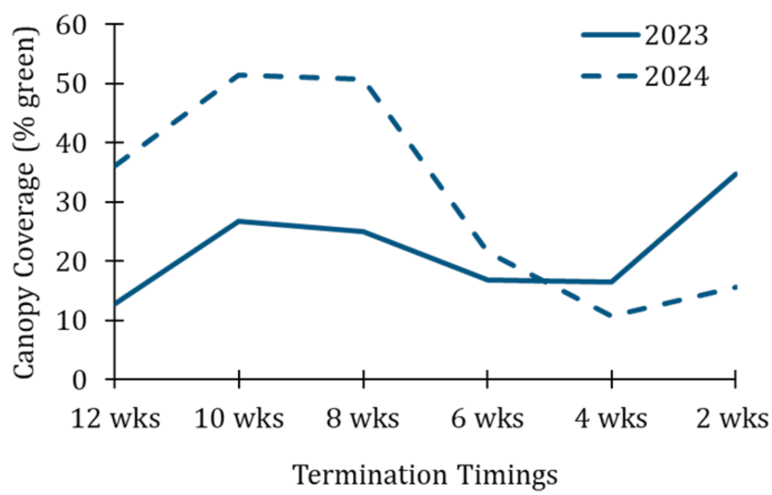

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Figure 2 (above): Canopy coverage in % green pixel cover obtained from Canopeo from 12 weeks prior to cotton planting to 2 weeks prior to cotton planting in 2023 and 2024 for the base irrigation systems.

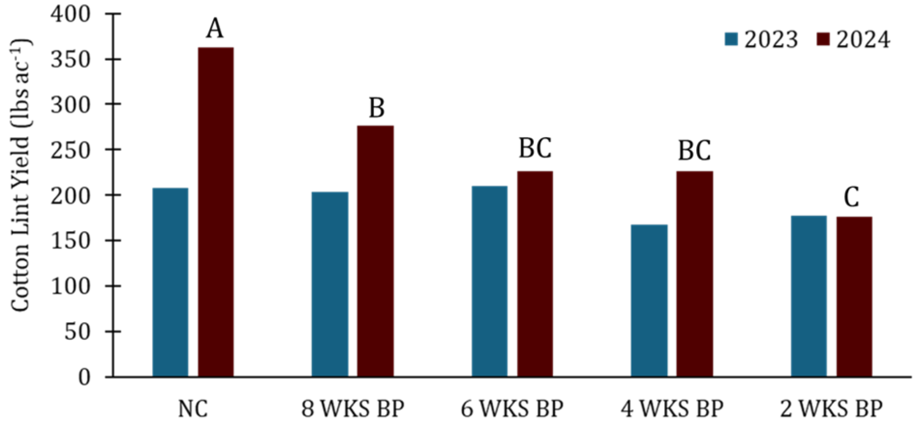

Figure 3 (above): Cotton lint yields in pounds/acre for continuous cotton with no-tillage and winter rye cover crop with base irrigation levels (Base; 60% estimated ET replacement) in 2023 and 2024. Mean values with the same letter are not significantly different at P < 0.01.

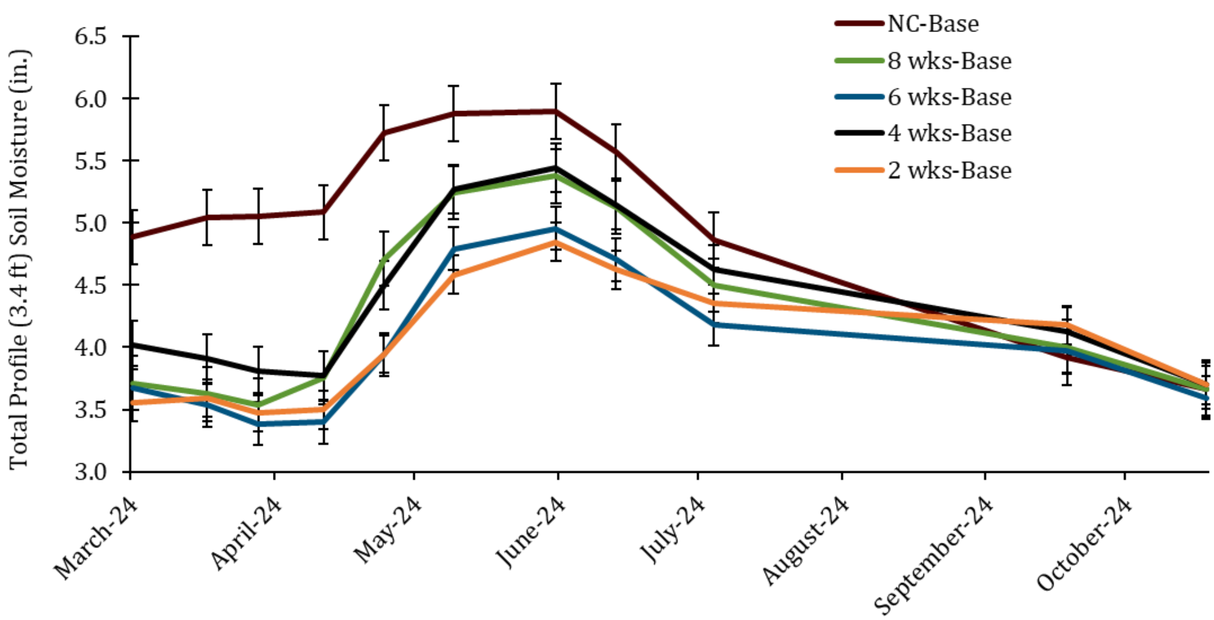

Figure 4 (above): Total profile (3.4 ft.) soil moisture (in.) no-tillage, rye cover (NT CC) with a base irrigation (60% ET replacement) level from March 2024 to September 2024. Moisture readings were taken approximately every two weeks in all systems. Error bars represent standard error of the mean.

TITLE:
Optimizing regenerative agricultural cotton systems in semi-arid environments at AG-CARES, Lamesa, TX, 2024.

AUTHORS:
Christopher Cobos – Sr. Research Associate
Nicholas Boogades – Student Assistant
Joseph A. Burke – Assistant Professor
J. Wayne Keeling – Professor
Katie L. Lewis - Professor

ABSTRACT:
Water availability and sustainability are essential to the continued agricultural production of the U.S. Great Plains. The Southern High Plains (SHP), located in the semi-arid southern portion of the Great Plains, produces approximately 30% of the U.S. annual cotton production. The continued unsustainable withdrawal of the Ogallala Aquifer for irrigation, paired with the potential increase in annual mean temperature due to climate change puts the future agricultural viability of the region at risk. Our objective was to evaluate the water dynamics of regenerative agricultural cotton cropping systems in semi-arid environments compared to conventional cotton agroecosystems. Conserving water inputs throughout the year can slightly offset the decreasing irrigation availability in deficit-irrigated semi-arid systems, potentially increasing the success and sustainability of regenerative practices. Our research was conducted at the Agricultural Complex for Advanced Research and Extension Systems in Lamesa, TX. At this site, we evaluated three different cropping systems: continuous cotton with a winter fallow and conventional tillage (CONV), continuous cotton with a winter rye cover crop and reduced tillage (NTCC), and a cotton-wheat rotation with an 11-month fallow between wheat harvest and cotton planting with reduced tillage (CWF). Cropping systems were deficit-irrigated at two different irrigation levels, base (60% ET replacement) and low (30% ET replacement). Soil moisture measurements were collected every two weeks from May 2022 to September 2024 with a field-calibrated neutron probe. Results indicate greater soil water conservation in both the NTCC and CWF systems compared to the CONV system from 2022-2024 with increased cotton lint yields in 2022 and 2023 with CWF systems.

INTRODUCTION:
Here we define regenerative agriculture (RA) in the context of the SHP as the continued capacity of agricultural systems to function in a changing climate that supports soil health, communities, economic output, environmental sustainability, and resiliency to the outside threats of those outcomes. Within the capacity of this definition, our core values for regenerative agriculture are to 1) maintain economic viability of the system, 2) optimize soil water conservation, 3) minimize soil disturbance, 4) maintain soil surface coverage, 5) incorporate a living root in the soil for as long as possible, and 6) minimize the global climate change effects derived from agricultural practices. Regenerative practices relevant to the region and associated core values include the implementation of cover crops, crop rotations, conservation tillage, and livestock integration.

For the Southern Great Plains of Texas, RA represents a natural progression in conservation and sustainability. RA encompasses a broader theme of sustainability that includes community-level longevity and economic viability concurrent with environmental conservation. Inherent in the success of regenerative practices are regional and temporal specificity; optimal RA practices will need to be prescriptive across time and at the field-scale. Regenerative practices must always aim to protect the two most vital agricultural resources in the SGP: soil and water. Evaluating the success of RA practices must include a multidisciplinary approach to mitigate current and future risks for producers. However, the ability of RA practices to conserve soil water is essential in their long-term success and sustainability. Further research is needed in optimizing these systems for increasing soil water conservation as the region transitions into an increasingly arid environment with depleting irrigation capacities.

Previous work has demonstrated that no-tillage with cover crops increases and maintains soil moisture during active cotton growth in the semi-arid SHP (Burke et al., 2021) with no decline in gross margins (Lewis et al., 2018). This challenges farmers' perceptions of these conservation systems and combats the negative affiliations (reduced soil moisture from cover crops in semi-arid environments, reduction in yields and gross margins in conservation systems) of their implementation. The need for more research in soil-water conservation for cotton production systems in the semi-arid SHP is evident. The preservation of soil water with no change in yield could potentially allow producers to save irrigation inputs during the growing season while implementing conversation practices in semi-arid agroecosystems. Our objective was to quantify the amount of water saved using conservation tillage and cover crops in semi-arid cotton production systems compared to conventional continuous cotton systems. The purpose was to increase producer adoption of conservation systems by reducing irrigation inputs to increase both water and economic sustainability on a regional scale.

MATERIALS AND METHODS:

Field experiments were conducted at the Agricultural Complex for Advanced Research and Extension Systems (AG-CARES) near Lamesa, TX (32°46'22"N, 101°56'18"W). The soil is classified as an Amarillo fine sandy loam (fine-loamy, mixed, superactive, thermic Aridic Paleusalfs; Lewis et al., 2018; USDA-NRCS, 2016). Amarillo soil is a benchmark series for the SHP and covers approximately 315,995 ha across western Texas (Lewis et al., 2018; USDA-NRCS, 2016). In 2020, experimental plots established in 2014 at the Lamesa site were used to expand the project and are located on a 0.8 km diameter center pivot separated into nine equivalent wedges, each consisting of a different cropping system. The center pivot encompasses eight spans of 48 rows (1.02 m centers) $span^{-1}$. All treatments were replicated within wedges and arranged as a split-plot design with the cropping system as the main plot and irrigation levels as the subplot. The following cropping systems were evaluated at the Lamesa site: (1) continuous cotton with conventional tillage at base irrigation level (60% estimated ET replacement); (2) continuous cotton with conventional tillage at low irrigation level (irrigation to achieve adequate stands with ≤ 76 mm. of early season irrigation, otherwise dryland cropping system); (3) continuous cotton with no-tillage and winter rye (*Secale cereal*) cover crop at base irrigation level (60% estimated ET replacement); (4) continuous cotton with no-tillage and winter rye (*Secale cereal*) cover crop at low irrigation level (irrigation to achieve adequate stands with ≤ 76 mm. of early season irrigation, otherwise dryland cropping system); (5) cotton – wheat – summer cover (60% sudangrass [*Sorghum drummondii*] and 40% cowpea [*Vigna unguiculata* L.] seeded at 45 kg ha^{-1}) rotation with no-tillage at base irrigation level only (60% estimated ET replacement); (6) cotton – wheat – fallow with no-tillage at base irrigation level (60% estimated ET replacement) and (7) cotton – wheat – fallow with no-tillage at low irrigation level (irrigation to achieve adequate stands with ≤ 76 mm. of early season irrigation, otherwise dryland cropping system). Wheat will be planted following cotton harvest with a summer cover mix planted into wheat stubble following wheat harvest in system (5) only. Systems (5), (6), and (7) will be replicated on two wedges with alternating wheat/cotton planting years to allow a cotton crop to be grown at all times during the duration of the study.

Soil water was monitored biweekly using a field calibrated CPN 503 neutron probe (InstroTek Inc., Raleigh, NC) for volumetric water content (VWC) beginning in April 2022 and running through the duration of the experiment unless field conditions did not allow entry (Pabuayon et al., 2019; Alfonso et la., 2020, Burke et al., 2021). Aluminum access tubes (8-cm inner diameter) were installed into the center of each plot and measurements were conducted to a depth of 105 cm in 15-cm increments. The access tubes were constructed with a removable top piece (60 cm length) allowing most of the access tube to remain in the field during tillage events (CT), planting, and harvesting. The VWC for each depth was multiplied by the depth increment (15 cm) to determine soil water content (mm).

RESULTS AND DISCUSSION:

Long-term soil water monitoring reveals trends in soil water conservation early in the cotton growing season and at time-of-planting in RA systems compared to conventionally tilled, continuous cotton agroecosystems with winter fallow (CONV). The continuous cotton, no-tillage system with a winter Rye cover crop (NTCC) shows decreased water across the soil profile early in the Spring before cotton planting compared to CONV. However, after the cover crop is terminated approximately eight weeks prior to cotton planting, soil water in the NTCC system quickly recharges equal to or greater than the CONV system at time of cotton planting. The cotton-wheat-fallow (CWF) rotation shows consistent trends in soil water use and recharge across both cropping timelines: cotton in ’22 & ’24 and cotton in ’23. Both systems show the greatest total profile soil moisture at the start of their respective cotton planting season due to the extended fallow period with wheat stubble. Alternatively, the cotton-wheat-fallow rotations show the least amount of soil water across all treatments during peak wheat growth, prior to wheat harvest.

Figure 2 depicts the volumetric soil water content across all treatments from May 2022 to September 2024. The NTCC systems show decreased soil water at the shallow depth compared to the CONV systems but quickly recharge the soil profile after cover crop termination and with the addition of deficit irrigation. Further, the NTCC system acquires greater soil water than the CONV system at cotton planting and the soil moisture is sustained greater across the profile throughout the cotton growing season. The CWF systems show significant soil water recharge deeper in the soil profile after wheat harvest, allowing for significant soil water availability at the start of the cotton growing season. Soil water availability remained low in the CWF system after the wheat harvest, limiting the success of establishing the summer cover crop in the cotton-wheat-summer cover systems.

Cotton lint yield (Figure 3) shows increased cotton lint yield in CWF in 2022 and 2023 compared to both the CONV and NTCC systems. In 2023, the NTCC system significantly outyielded the CONV system as well. There were no significant differences in cotton lint yield across all systems in 2024. Mid-season drought in 2023 and 2024 decreased cotton lint yields across all systems, potentially decreasing treatment differences in 2024.

The implementation of RA practices in semi-arid deficit-irrigation cotton production systems shows increased soil moisture capture and storage as well increased cotton lint yields across three drought years in the SHP. Benefits of soil water conservation can likely be attributed to improved soil water infiltration and percolation in RA practices that replace the conventionally tilled winter fallow period with active Rye or Wheat cover. Increased soil water conservation, especially in the CWF system, correlates with increased cotton lint yields. However, benefits of the CONV system may provide lower but more stable yields over time. The benefits of these RA practices cannot be fully evaluated until a full economic assessment is conducted across all three cropping systems.

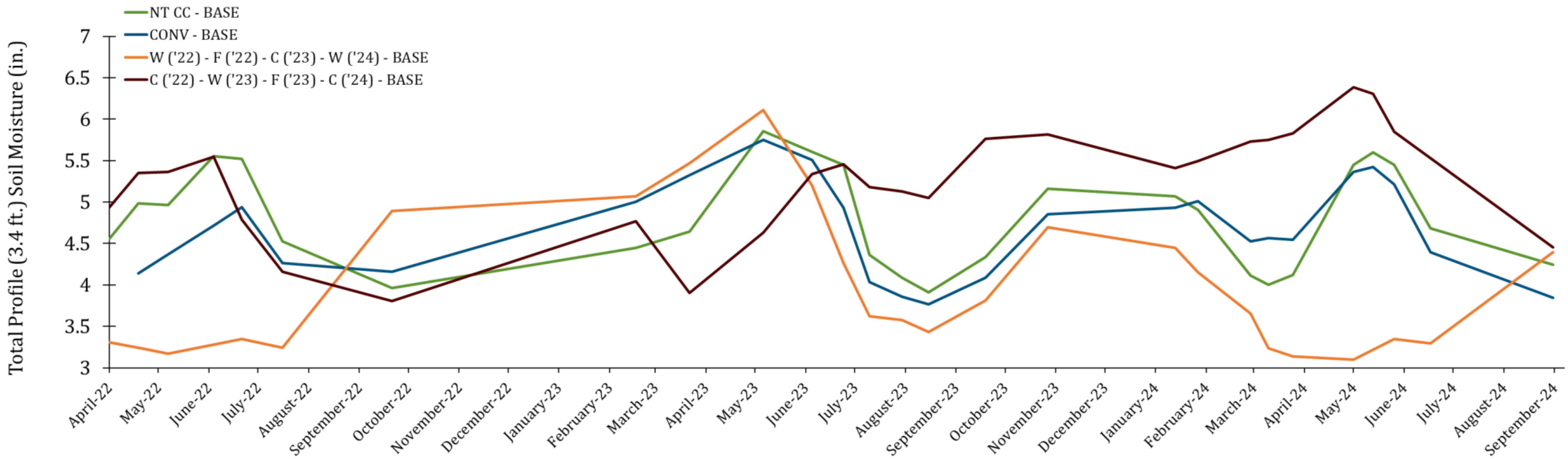

Figure 1: Total profile (3.4 ft.) soil moisture (in.) for conventional tillage, winter fallow (CONV); no-tillage, rye cover (NT CC); and cotton-wheat-fallow rotations (Cotton in ’22 & ’24; Cotton in ‘23) with a base irrigation (60% ET replacement) level from April 2022 to September 2024. Moisture readings were taken approximately every two weeks in all systems.

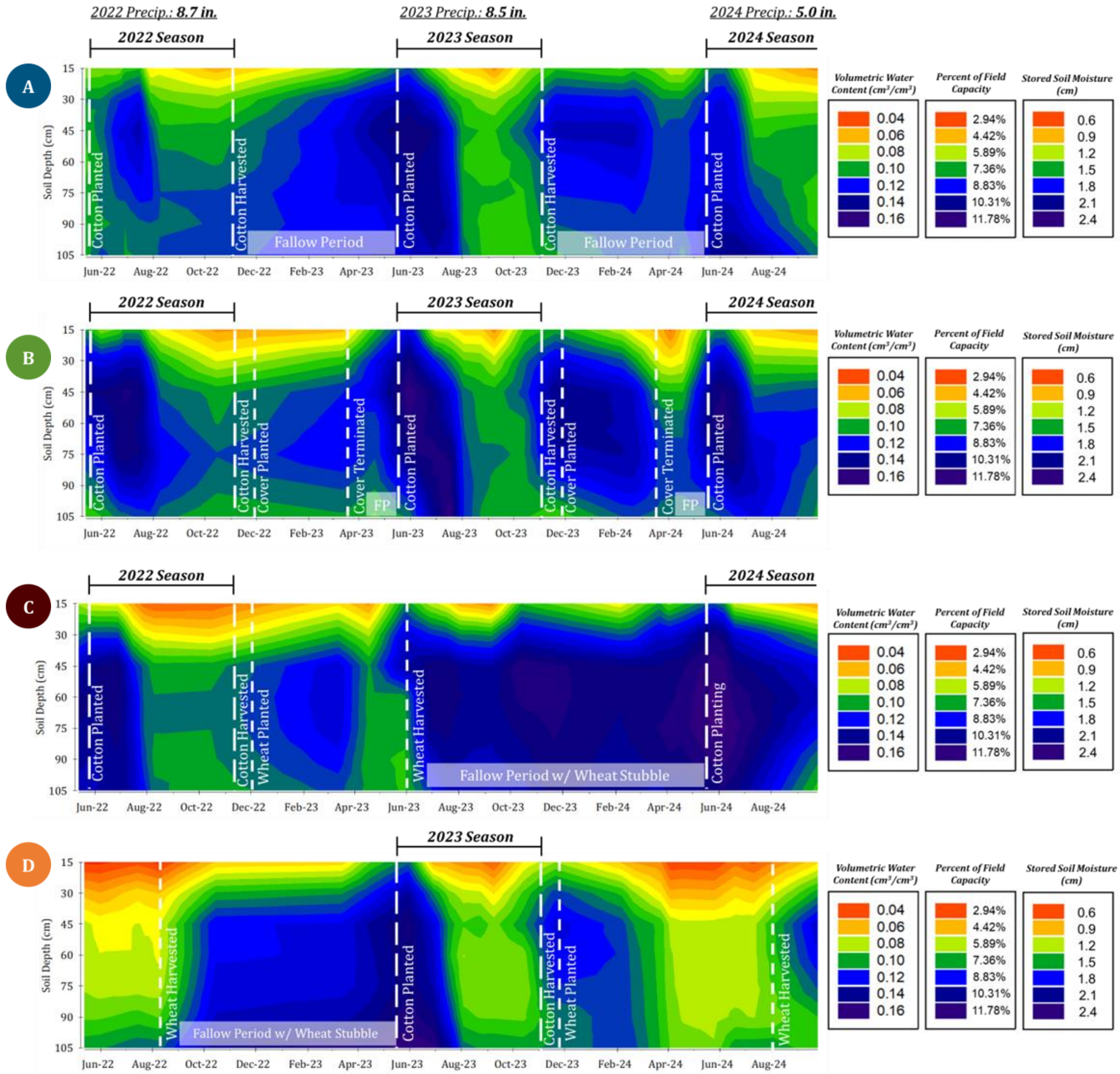

Figure 2 (above): Volumetric water content (VWC; cm3/cm3) at soil depth (cm) for conventional tillage, winter fallow (A); no-tillage, rye cover (B); and cotton-wheat-fallow rotations (Cotton in ’22 & ’24- C; Cotton in ‘23-D) with a base irrigation (60% ET replacement) from May 2022 to October 2024. Red coloration indicates less VWC while purple coloration indicates greater VWC. Figure legend shows equivalent stored soil moisture (cm) and the percent of field capacity (%).

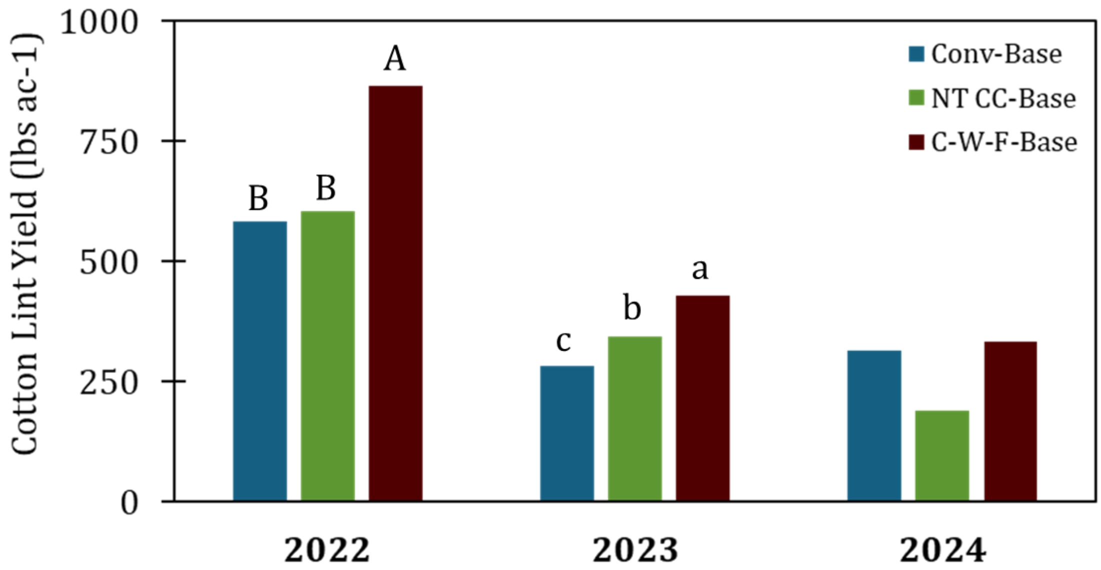

Figure 3 (above): Cotton lint yields in pounds/acre for continuous cotton with conventional tillage and winter fallow (Conv), continuous cotton with no-tillage and winter rye cover crop (NT CC), and cotton– wheat–fallow with no-tillage (C-W-F) with base irrigation levels (Base; 60% estimated ET replacement) in 2022, 2023, and 2024. Mean values with the same letter are not significantly different at $P < 0.01$.

TITLE:

Results of the National Cotton Variety Standards Trial at AG-CARES, Lamesa, TX, 2024.

AUTHORS:

Carol M. Kelly – Assistant Professor, Cotton Breeder
Valerie M. Morgan – Research Specialist
Reagan Heinrich – Research Associate

MATERIALS AND METHODS:

Test:	National Cotton Variety Standards, pivot irrigated – low level	
Planting Date:	May 15th	
Design:	Randomized complete block, 4 replications	
Plot Size:	2-row plots, 24ft	
Planting Pattern:	Solid	
Herbicide:	Treflan 24 oz/A	02/21/2024
	Dual 20 oz/A	06/29/2024
Fertilizer:	85-0-0	
Irrigations:	Total: 9.4”	
Harvest Date:	October 15th	

RESULTS AND DISCUSSION:

The National Standards trial was planted at the low-level irrigation site at AG-CARES as a part of a long standing, twenty location, national variety testing program. Texas A&M AgriLife Research in Lubbock, in conjunction with the AG-CARES location in Lamesa, provides an important service to seed companies, researchers, and producers in small-plot replicated performance trials. This service allows varieties from different companies and seed developers to be tested together by an independent source. The small plot replicated trials are intended to evaluate the genetic performance of lines independent of biotechnology traits, so the trials are managed as conventional varieties as opposed to utilizing herbicide or insecticide systems. Every effort is made to minimize the effects of insect and weed pressure. This same trial was also planted at an irrigated location in Lubbock as another High Plains location included in the National Cotton Variety Testing program.

Lint yield is determined by the stripper-harvested plot weight and pulled lint percent. 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. Seed index is the weight in grams of 100 fuzzy seeds.

Every three years, varieties are selected by the National Cotton Variety Testing Committee as standards in U.S. cotton production. The eight currently selected varieties from six seed brands were submitted for small plot trials at two Texas High Plains locations, including the low-level irrigation trial at AG-CARES in Lamesa, Texas. The AG-CARES location only received a total of 8.03 inches from May through December. Additionally, the High Plains was historically hot during the summer months with little cool down in the evenings. Higher temperatures continued through September and October, delaying the first freeze into mid-November. Cotton fiber quality and yields were impacted by the consistent heat, despite selection of variety or production practices.

Participating brands of the trial included Deltapine, Armor, Dyna-Gro, Stoneville, NexGen, and FiberMax, each entering commercial varieties intended to represent various production regions across the United States. The growing regions represented by varieties in the trials spanned from the far west to the far east United States, including North Carolina, Texas, and Tennessee. Deltapine entered three of the eight varieties and each of the other brands had a single entry. Of the eight entries, seven contained the B3XF technology package. The FiberMax variety represented the GLT technology package (Table 1).

The average yield of the trial was 288 pounds of lint per acre under water limited conditions. Yields ranged from 213 pounds of lint per acre to 345, with a least significant difference of 86 pounds. The highest yielding variety was Deltapine 2012 B3XF with a fiber length of 1 inch, matching the trial mean, and a fiber bundle strength of 22.8 grams per tex. There was not a significant yield difference between Deltapine 2012 B3XF and the 5 varieties, ranked two through six in terms of high yield. Those varieties are FiberMax 2498GLT, Deltapine 2127 B3XF, Dyna-Gro 3519 B3XF, Deltapine 2239 B3XF and Armor 9371 B3XF. There was a significant yield difference between the top performers and Stoneville 5091B3XF and NexGen 4936 B3XF. Cotton fiber length (as measured by HVI) ranged from 0.95 inches to 1.07 inches with a mean of 1 inch. Fiber bundle strength ranged from 21.0 grams per tex. to 25.9 grams per tex. The average fiber strength was 23.5 grams per tex. (Table 1). Plant height ranged from 22 inches to 18 inches and storm tolerance was between 3 and 6. Relative maturity, taken on September 18th, was between 59 percent open bolls and 84 percent open bolls per plot (Table 1).

Table 1. Yield, agronomic, and fiber property data from the low water national standards variety performance trial at the AG-CARES farm, Lamesa 2024.

		Agronomic data								Fiber quality data						
		Lint%		Boll	Seed	Seed per	% Open		Storm							Color
Designation	Yield	Picked	Pulled	Size	Index	Boll	18-Sep	Height	Rating	Mic	Length	Unif	Strength	Elong	Leaf	Grade
DP 2012 B3XF	345	35.2	25.0	3.3	7.5	26.2	79	21	4	3.3	1.00	75.9	22.8	4.8	2	11-1,1-3
FM 2498GLT	314	38.7	27.1	3.6	8.3	24.7	68	20	5	3.6	1.03	77.9	25.0	5.3	2	11-2,11-3,11-4
DP 2127 B3XF	303	41.1	29.5	3.6	7.4	26.7	59	22	6	4.0	0.95	77.4	22.3	5.1	1	11-1
DG 3519 B3XF	298	35.7	24.6	2.9	7.0	23.4	78	20	5	3.0	1.01	76.9	25.8	5.6	2	11-1,11-2,21-1
DP 2239 B3XF	295	39.0	27.7	3.2	7.1	25.0	75	19	6	3.4	1.01	76.4	23.4	5.3	2	11-3,12-1
ARMOR 9371 B3XF	289	40.0	28.8	3.5	7.5	26.1	73	20	6	3.6	0.99	76.1	22.3	5.3	2	11-1,11-3
ST 5091B3XF	247	36.2	25.8	3.5	7.2	29.0	80	21	4	3.0	0.95	74.5	21.0	5.0	2	11-1,11-3
NG 4936 B3XF	213	33.0	24.3	3.4	8.3	25.9	84	18	3	3.0	1.07	77.7	25.9	5.7	2	11-1,11-4,12-1
Mean	288	37.4	26.6	3.4	7.5	25.9	74	20	5	3.4	1.00	76.6	23.5	5.2	1	
c.v.%	24.5	1.8	2.8	7.9	8.0	11.2	13.0	12.6	24.6	5.9	2.0	0.9	4.3	2.4	22.1	
LSD 0.05	86	0.8	0.9	0.3	0.7	3.5	12	3	1	0.2	0.02	0.8	1.2	0.2	0.5	

TITLE:

Results of the Irrigated, Base Level, Cotton Variety Performance Trial at AG-CARES, Lamesa, TX, 2024

AUTHORS:

Carol M. Kelly – Assistant Professor, Cotton Breeder
Valerie M. Morgan – Research Specialist
Reagan Heinrich – Research Associate

MATERIALS AND METHODS:

Test:	Cotton Variety Performance Trial, pivot irrigated- base level	
Planting Date:	May 14th	
Design:	Randomized complete block, 3 replications	
Plot Size:	2-row plots, 24ft.	
Herbicide:	Treflan 24 oz/A	02/21/2024
	Dual 20 oz/A	06/29/2024
Fertilizer:	85-0-0	
Irrigations:	Total: 11.1”	
Harvest Date:	October 16th	

RESULTS AND DISCUSSION:

The Texas A&M AgriLife Research in Lubbock and the AG-CARES location in Lamesa, provide an important service to producers and commercial seed companies through fee-based, field evaluation of commercial and pre-commercial cotton varieties in replicated small plot trials. This service allows for the unbiased, third-party comparison of varieties, intended for the public analysis of performance in an environment similar to most local commercial production. This small plot trial is managed with conventional practices so the evaluations of the performance of these varieties can be independent of biotechnology traits. Every effort is made to minimize the effects of insect and weed pressure. The same varieties are tested in four other locations across the Southern High Plains, including the base level irrigation site at AG-CARES.

Lint yield is determined by the stripper-harvested plot weight and pulled lint percent. Boll size and pulled and picked lint percent are determined from a random 50-boll sample obtained from the 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. Seed index is the weight in grams of 100 fuzzy seeds.

Thirty-five cotton varieties and experimental breeding lines from 6 different brands were submitted for small plot variety trials at five locations, including the base irrigation location at AG-CARES in Lamesa, TX. In July and August, temperatures were considerably higher than average for the area with increased heat through the summer nights. The average temperature remained higher than expected through September and October, delaying the area's first freeze until mid-November. The AG-CARES location received a total of 8.01 inches of rainfall from May through November. A total of 11.1 acre inches of pivot irrigation was applied through the season. The increased heat with no nightly reprieve led to negative impacts to the overall quality and production of the crop, despite production practices and variety or germplasm selection.

Brownfield Seed and Delinting had three commercial entries and Seed Source Genetics had two commercial entries. BASF entered five FiberMax varieties and three pre-commercial lines, and two Stoneville commercial varieties. PhytoGen entered 14 commercial varieties and a pre-commercial breeding line. Bayer entered five Deltapine commercial varieties (Table 2). There were multiple technology packages represented in the trial, however five entries did not include a technology package. There were 14 entries representing W3FE technology and nine representing the AXTP technology. Other technology packages represented in the trial were AX, W3E1, B3XF, and B3XTF (Table 2).

The average yield under base irrigation was 707 pounds of lint per acre and the trail yield ranged from 526 pounds to 956 pounds. The highest yielding variety was FiberMax 765AX with a fiber length of 1.10 inches and strength of 29.5 grams per tex. There was not a significant yield difference between FiberMax 765AX and FiberMax 823AXTP at 855 pounds and PhytoGen 332W3FE at 850 pounds (Table 2). The average relative maturity of plots, taken on September 18th, had 78 percent open bolls. Cotton fiber properties were impacted by the consistent heat of the season. Fiber length ranged from 1.11 inches and 0.99 inches with an average of 1.06 inches. The average fiber strength was reduced for the year at 28.5 grams per tex. Plant height ranged from 27 inches to 37 inches (Table 2).

Table 2. Yield, agronomic, and fiber property data from the base water uniform cotton variety performance trial at the AG-CARES farm, Lamesa 2024.

		Agronomic data								Fiber quality data					
		Lint%		Boll	Seed	Seed per	% Open	Storm							Color
Designation	Yield	Picked	Pulled	Size	Index	Boll	18-Sep	Rating	Height	Mic	Length	Unif	Strength	Elong	Leaf	Grade
FM 765AX	956	38.8	28.9	4.6	8.5	30.6	86	5	32	3.9	1.10	80.3	29.5	5.6	3	11-1,11-2
FM 823AXTP	855	39.6	29.1	4.1	8.5	26.8	88	6	29	4.4	1.07	80.1	29.2	6.1	2	11-1,21-1
PHY332W3FE	850	40.1	30.2	4.3	8.3	28.6	79	6	34	4.5	1.09	80.4	29.4	6.2	2	11-4,12-2
PHY390W3FE	825	41.1	29.1	3.9	7.9	26.4	84	7	29	4.1	1.05	79.0	28.2	5.7	2	11-2
SSG UA 222	808	38.3	29.8	4.5	9.7	27.0	75	5	30	4.6	1.08	80.7	29.3	6.6	3	11-2,21-1
ST 6000AXTP	780	40.6	30.1	4.7	8.6	28.4	59	4	35	4.4	1.09	81.2	32.0	5.8	2	11-1,11-2
BX 2511AXTP	778	39.2	28.8	4.6	8.7	29.7	83	5	31	3.7	1.08	79.6	27.0	4.7	2	11-2
FM 868AXTP	777	39.8	29.2	4.9	10.1	27.2	81	6	34	4.4	1.06	80.7	30.6	5.8	2	11-2
DP 2335 B3XF	761	41.1	30.5	4.7	9.6	27.2	60	5	37	4.3	1.07	79.3	28.8	5.1	2	11-2
PHY415W3FE	754	40.0	28.9	4.0	8.7	24.7	70	6	34	4.5	1.08	80.9	31.1	6.1	3	21-1,21-3
PHY480W3FE	739	41.6	29.9	4.3	8.2	28.2	78	6	34	4.4	1.06	81.4	30.9	6.8	2	11-2,11-3
PHY250W3FE	737	39.2	27.5	3.8	8.6	25.3	89	7	33	4.2	1.04	78.6	27.0	5.7	3	11-2,21-1
DP 2239 B3XF	725	42.4	30.8	4.2	7.8	28.6	78	6	35	4.7	1.06	80.0	26.1	5.7	2	11-1
DP 2317 B3TXF	703	41.0	29.9	3.8	7.3	29.1	73	5	36	4.4	1.09	79.8	26.9	5.1	1	11-1
BX 2512AXTP	702	40.1	28.1	4.3	8.8	26.6	81	5	32	5.2	1.10	81.1	29.4	5.1	2	11-2
FM 814AXTP	694	42.3	30.1	4.2	8.8	25.3	89	5	31	4.4	1.02	79.7	25.7	5.4	2	11-1,11-2
PHY411W3FE	688	42.3	30.5	3.7	8.0	24.0	78	6	34	4.9	0.99	80.1	27.2	6.3	2	11-1
PX1127D245-04W3FE	681	35.5	25.3	3.5	7.9	25.2	93	7	29	4.0	1.09	80.8	29.4	5.4	3	11-2,21-1
BSD 4X	678	38.0	27.8	4.8	10.1	28.2	73	6	33	4.1	1.04	79.0	26.9	5.6	2	11-1
ST 5931AXTP	672	40.7	28.8	4.9	9.6	27.0	54	5	36	4.4	1.09	80.9	30.2	6.1	2	11-2,21-1
PHY137W3E1	664	38.9	27.4	3.8	8.1	26.2	79	5	32	3.9	1.08	80.8	31.9	6.5	3	21-1,21-3
FM 757AXTP	663	39.0	29.1	4.2	8.2	28.7	84	5	31	4.3	1.11	78.2	27.3	5.0	2	11-2,12-1
PHY360W3FE	662	39.0	28.3	3.8	7.7	27.8	86	6	32	4.3	1.06	78.9	24.9	5.4	3	11-2
PHY210W3FE	660	39.4	26.6	3.8	8.3	25.2	94	7	27	4.2	1.02	78.6	26.7	5.4	2	11-1,11-2
DP 2349NR B3XF	657	42.9	30.9	4.1	8.1	26.0	61	6	37	5.0	1.02	80.0	27.6	5.6	1	11-1,11-2
PHY475W3FE	657	37.2	27.2	4.0	8.2	28.1	76	6	35	4.5	1.03	79.0	27.9	6.1	2	11-3
BSD 9X	652	37.0	27.2	4.6	9.5	28.8	74	5	34	4.6	1.03	80.1	28.4	5.7	2	11-1
PHY205W3FE	651	37.4	25.3	3.5	9.0	22.2	93	7	28	3.9	1.02	79.8	28.8	5.4	3	11-2,11-3
DP 2436NR B3TXF	648	40.9	28.0	3.7	8.4	23.1	63	4	32	4.4	1.11	81.2	32.5	6.9	2	11-2,21-1
PHY443W3FE	648	40.4	27.7	4.2	8.9	25.8	81	6	34	4.5	1.03	79.4	28.3	5.9	3	21-3,31-3
PHY400W3FE	645	40.6	28.6	3.8	8.1	24.8	79	7	28	4.1	1.05	79.7	28.0	6.0	3	21-1,21-3
Ton Buster Magnum	617	35.4	25.6	4.2	9.5	27.0	84	5	31	4.0	1.01	77.6	24.5	5.4	2	11-1
PHY136W3E1	612	39.9	28.5	3.9	7.6	28.1	63	6	31	4.4	1.07	80.1	30.0	6.7	2	11-2,11-4
SSG UA 248	609	35.3	26.0	4.1	9.5	26.0	89	5	29	4.1	1.11	79.4	29.2	6.1	2	11-1,21-2
BX 2556AXTP	526	36.4	26.8	4.3	8.5	28.6	69	5	36	4.4	1.07	79.3	28.3	5.2	2	11-2,21-1
Mean	707	39.4	28.4	4.1	8.6	26.8	78	5	32	4.3	1.06	79.9	28.5	5.8	2	
c.v.%	14.5	2.0	3.1	4.7	5.5	5.2	12.7	12.3	6.9	5.7	2.3	1.1	3.7	1.7	27.5	
LSD 0.05	120	1.3	1.5	0.3	0.8	2.4	12	1	3	0.4	0.04	1.4	1.8	0.2	1	

TITLE:

Results of the Irrigated, Low Level, Cotton Variety Performance Trial at AG-CARES, Lamesa, TX, 2024

AUTHORS:

Carol M. Kelly – Assistant Professor, Cotton Breeder
Valerie M. Morgan – Research Specialist
Reagan Heinrich – Research Associate

MATERIALS AND METHODS:

Test:	Cotton Variety Performance Trial, pivot irrigated- low level	
Planting Date:	May 16th	
Design:	Randomized complete block, 4 replications	
Plot Size:	2-row plots, 24ft.	
Herbicide:	Treflan 24 oz/A	02/21/2024
	Dual 20 oz/A	06/29/2024
Fertilizer:	85-0-0	
Irrigations:	Total: 9.4”	
Harvest Date:	October 15th	

RESULTS AND DISCUSSION:

The Texas A&M AgriLife Research in Lubbock and the AG-CARES location in Lamesa, provide an important service to producers and commercial seed companies through fee-based, field evaluation of commercial and pre-commercial cotton varieties in replicated small plot trials. This service allows for the unbiased, third-party comparison of varieties, intended for the public analysis of performance in an environment similar to most local commercial production. This small plot trial is managed with conventional practices so the evaluations of the performance of these varieties is independent of biotechnology traits. Every effort is made to minimize the effects of insect and weed pressure. The same varieties are tested in five locations across the Southern High Plains, including the limited irrigation site at AG-CARES.

Lint yield is determined by the stripper-harvested plot weight and pulled lint percent. 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. Seed index is the weight in grams of 100 fuzzy seeds.

Thirty-five cotton varieties and experimental breeding lines from 6 different brands were submitted for small plot variety trials at five locations, including the low irrigation location at AG-CARES in Lamesa, TX. In July and August, temperatures were considerably higher than average for the area with increased heat through the summer nights. The average temperature remained higher than expected through September and October, delaying the area's first freeze until mid-November. The AG-CARES location received a total of 8.01 inches of rainfall from May through November. A total of 9.4 acre inches of pivot irrigation was applied through the season. The increased heat with no nightly reprieve led to negative impacts to the overall quality and production of the crop, despite production practices and variety or germplasm selection.

Brownfield Seed and Delinting had three commercial entries and Seed Source Genetics had two commercial entries. BASF entered five FiberMax varieties and three pre-commercial lines, and two Stoneville commercial varieties. PhytoGen entered 14 commercial varieties and a pre-commercial breeding line. Bayer entered five Deltapine commercial varieties (Table 3). There were multiple technology packages represented in the trial, however five entries did not include a technology package. There were 14 entries representing W3FE technology and nine representing the AXTP technology. Other technology packages included in the trial were AX, W3E1, B3XF, and B3XTF (Table 3).

Average yield for the trial under limited irrigation was 331 pounds of lint per acre with a 76 pound least significant difference. FiberMax 814AXTP and FiberMax 765AX each had the highest yield at 488 pounds of lint per acre. Deltapine 2436NR B3TXF was not significantly different than the top yielding lines with 415 pounds of lint per acre (Table 3). Fiber strength ranged from 21.9 grams per tex. to 30.1 grams per tex. with an average of 25.8 grams per tex. Deltapine 2436NR B3TXF had the greatest fiber strength of the trial. Fiber length peaked at 1.08 inches (Table 3). Deltapine 2239 B3XF had the lowest leaf grade of the trial. Plant height averaged 22 inches and storm tolerance had an average of 5 throughout the trial. Relative maturity was measured as percentage of open bolls in each plot on September 17th. This maturity rating ranged from 55 percent open bolls to 94 percent open bolls with an average of 77 percent (Table 3).

Table 3. Yield, agronomic, and fiber property data from the low water uniform cotton variety performance trial at the AG-CARES farm, Lamesa 2024.

		Agronomic data								Fiber quality data						
		Lint%		Boll	Seed	Seed per	% Open	Storm								Color
Designation	Yield	Picked	Pulled	Size	Index	Boll	17-Sep	Rating	Height	Mic	Length	Unif	Strength	Elong	Leaf	Grade
FM 814AXTP	488	39.0	27.3	3.9	8.3	26.0	82	5	24	3.5	1.04	78.8	25.1	5.4	2	11-2,21-3
FM 765AX	488	39.1	28.5	4.1	8.6	27.0	90	5	24	3.5	1.08	79.5	28.6	5.8	2	11-1,11-3,11-4
DP 2436NR B3TXF	415	37.9	25.8	3.3	7.4	25.4	57	3	21	3.6	1.08	78.4	30.1	6.6	2	11-1,12-1,12-2
FM 757AXTP	408	37.2	27.3	3.9	7.6	29.3	78	5	22	3.7	1.06	77.0	24.0	5.0	2	11-1,11-4,21-1
DP 2317 B3TXF	408	36.8	26.0	3.2	6.9	25.6	78	3	23	3.9	1.03	78.6	23.9	5.3	2	11-1
DP 2239 B3XF	383	39.5	28.9	4.0	7.1	30.7	80	5	24	3.9	1.05	78.0	24.8	5.7	1	11-1
PHY415W3FE	376	37.2	25.4	3.0	8.0	21.5	85	6	21	3.3	1.03	78.4	26.6	6.1	2	11-4,22-1,22-2
DP 2335 B3XF	372	38.7	26.7	3.8	7.7	27.6	55	6	26	3.5	1.02	77.6	24.6	5.3	2	11-1
BX 2512AXTP	367	37.9	26.9	3.9	7.7	28.8	81	5	22	4.2	1.05	78.6	25.0	5.1	2	11-2,11-3
DP 2349NR B3XF	362	40.3	28.7	3.5	7.2	26.5	64	5	27	4.3	0.98	77.8	24.0	5.6	2	11-2,11-3
PHY205W3FE	358	35.0	22.6	3.2	7.7	24.4	88	6	18	3.1	1.00	77.7	25.9	5.6	2	11-1,11-4,12-1
FM 868AXTP	338	38.9	27.5	4.1	8.5	28.1	88	5	24	3.5	1.04	78.3	26.3	5.9	2	12-1,12-2,21-3
PHY250W3FE	333	34.3	22.6	3.2	7.8	24.2	87	5	21	3.1	1.02	77.7	24.8	5.7	2	11-1,11-2,12-1
BX 2556AXTP	329	35.8	26.1	3.7	8.0	25.8	84	6	24	4.0	1.04	78.3	27.5	5.4	2	11-1,21-1
PHY332W3FE	325	35.2	24.2	3.4	7.7	25.5	65	5	24	3.6	1.02	78.4	25.5	6.0	2	11-3,11-4
PHY400W3FE	318	38.2	25.4	2.9	7.4	22.1	75	8	20	3.3	0.97	76.4	24.5	6.0	2	11-3,11-4
PHY480W3FE	318	38.9	26.9	3.5	7.6	25.6	67	6	23	3.6	1.00	78.4	26.5	6.8	2	11-2,11-3,11-4
PHY137W3E1	312	35.9	25.2	3.3	7.6	25.5	60	4	25	3.6	1.04	80.1	29.4	6.6	2	11-4,22-1
FM 823AXTP	311	36.5	25.4	3.6	7.9	26.4	97	5	21	3.4	1.04	78.8	27.4	5.9	2	11-1,21-1
BSD 9X	304	33.6	23.8	3.6	8.2	27.1	73	4	22	3.5	1.01	77.0	25.0	5.7	2	11-1
PHY390W3FE	302	35.3	24.0	2.8	6.7	24.0	87	7	19	3.0	0.97	75.5	23.0	5.8	2	11-4,21-1
ST 5931AXTP	299	37.1	26.1	4.4	8.5	29.2	68	4	23	3.5	1.06	79.0	26.7	6.0	2	11-2,11-4,21-1
PHY411W3FE	293	38.9	28.5	3.3	6.5	26.8	78	5	22	3.9	0.97	77.6	24.5	6.0	2	11-1,11-3
PHY210W3FE	292	39.5	26.0	3.4	7.8	24.5	94	6	18	3.5	1.05	79.4	27.5	5.2	2	11-4,21-1
PHY360W3FE	292	37.5	26.1	3.4	6.9	27.5	87	5	21	3.7	1.03	77.3	24.0	5.3	3	11-1,12-2
Ton Buster Magnum	291	33.9	24.1	3.8	8.5	27.7	70	6	24	3.3	0.98	77.2	23.6	5.5	2	11-1,12-1
PX1127D245-04W3FE	288	33.0	22.1	2.8	7.0	24.2	77	6	22	3.2	1.04	77.5	25.9	5.5	2	11-1,11-4
BSD 4X	286	34.8	24.2	3.8	8.6	27.6	70	6	20	3.2	0.95	76.1	21.9	5.4	2	11-1
PHY136W3E1	279	39.8	27.7	3.4	7.4	25.9	62	6	23	3.7	1.01	77.6	25.6	6.6	2	11-3,12-2,21-3
SSG UA 222	279	33.9	24.9	3.8	8.6	26.9	72	5	21	3.4	1.04	77.7	26.4	6.3	3	11-1,11-2,11-4
PHY443W3FE	269	40.8	28.3	3.7	8.2	25.5	77	5	23	3.8	0.99	77.3	25.9	6.0	2	12-2,22-1
PHY475W3FE	258	35.4	25.2	3.3	7.5	25.1	63	5	24	4.1	0.99	78.0	25.9	6.1	2	11-1,11-4
SSG UA 248	255	32.9	23.5	3.4	8.6	24.7	82	4	22	3.4	1.05	76.7	26.5	6.2	2	11-1,11-3,12-1
BX 2511AXTP	225	37.8	26.8	4.0	8.6	26.0	80	8	21	3.3	1.08	78.9	27.0	4.9	2	11-1,11-2,12-1
Mean	331	37.0	25.9	3.5	7.8	26.1	77	5	22	3.6	1.03	77.9	25.8	5.8	2	
c.v.%	16.8	2.4	3.9	10.1	6.3	8.2	1.2	19.3	9.3	8.8	2.70	1.4	5.8	3.2	19.3	
LSD 0.05	76	1.2	1.4	0.5	0.7	2.9	14	1	3	0.4	0.04	1.4	2.0	0.2	1	

ST 6000AXTP Dropped due to poor stand

TITLE:

Results of the Root-Knot Nematode (RKN) Cotton Variety Performance Trial at AG-CARES, Lamesa, TX, 2024

AUTHORS:

Carol M. Kelly – Assistant Professor, Cotton Breeder
Valerie M. Morgan – Research Specialist
Reagan Heinrich – Research Associate

MATERIALS AND METHODS:

Test:	Root-Knot Nematode Variety, Pivot Irrigated- high level	
Planting Date:	May 9th	
Design:	Randomized complete block, 4 replications	
Plot Size:	2-row plots, 24ft	
Herbicide:	Treflan 24 oz/A	02/21/2024
	Dual 20 oz/A	06/29/2024
Fertilizer:	32-0-0	
Irrigations:	Total: 13.2"	
Harvest Date:	October 16th	

RESULTS AND DISCUSSION:

Root-knot nematodes are a prevalent pathogen on the Texas High Plains and significantly damaging in cotton production. The field at AG-CARES provides an opportunity to evaluate commercial, pre-commercial and public breeding material for production under pressure of root-knot nematodes (RKN). The cotton breeding program at Texas A&M AgriLife offers a fee-based testing service to evaluate, without bias, varieties from various sources, providing producers access to independently generated performance data in production circumstances that mimic commercial production challenges, including RKN pressure.

Lint yield is determined by the stripper-harvested plot weight and pulled lint percent. 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. Seed index is the weight in grams of 100 fuzzy seeds.

The 2024 RKN trial consisted of 37 commercial varieties and pre-commercial breeding lines sourced from four different seed brands. The trial was planted at the AG-CARES research farm in a location with known RKN presence (Table 4). The trial was planted on May 9th. The growing season on the High Plains was dry with temperatures remaining abnormally high through the July and August days and nights. September and October temperatures continued to be higher than expected, delaying the first annual freeze into mid-November. The increased heat with no nightly reprieve led to negative impacts to the overall quality and production of the crop, despite production practices or variety. The trial was pivot irrigated at the highest possible water rate well capacity would allow, applying a total of 13.2 acre-inches during the growing season. Weed management persisted throughout the summer. A 50 – boll sample was hand harvested from each plot followed by stripper harvest on October 16th. Boll samples were ginned on a 10-saw research gin, with burr extractor and lint cleaners, and samples of fiber were taken to the Fiber and Biopolymer Research Institute with Texas Tech University for HVI analysis.

Of the 37 entries tested, five did not show symptoms of root knot damage (Table 4). Yields ranged from 945 pounds of lint per acre to 604 pounds of lint per acre. The highest yielding variety, FiberMax FM 765AX, had an above average length at 1.07 inches, 80.0% uniformity and a fiber bundle strength of 28.0 grams per tex. (Table 4). Cotton fiber length ranged from 0.97 inches to 1.10 inches with a test average of 1.05 inches. Fiber strength ranged from 22.6 grams per tex. to 28.8 grams per tex with a test average of 25.7 grams per tex. Storm tolerance ranged from 3 to 8 with an average rating of 5. On September 18th, relative maturity was estimated with percent of open bolls in each plot. The average maturity for this trial was at 88% per plot (Table 4). Plant height, a trait often impacted by nematode presence, ranged from 24 inches to 35 inches (Table 4).

Table 4. Yield, agronomic, and fiber property data from the high water root-knot nematode cotton variety performance trial at the AG-CARES farm, Lamesa 2024.

		Agronomic data								Fiber quality data							Root-knot nematode		
		Lint%		Boll	Seed	Seed per	% Open	Storm								Color		Log10	
Designation	Yield	Picked	Pulled	Size	Index	Boll	18-Sep	Rating	Height	Mic	Length	Unif	Strength	Elong	Leaf	Grade	RK	(RK+1)	waller
FM 765AX	945	38.4	28.7	4.1	7.8	28.0	91	6	29	3.7	1.07	80.0	28.0	5.7	3	11-1	3910	3.41	abc
PHY480W3FE	901	38.7	27.7	3.8	8.4	24.6	86	6	31	3.8	1.03	79.8	25.8	6.4	2	11-1,11-3	73	1.08	g-j
23R9915B3TXF	897	39.4	29.7	3.8	7.6	26.6	97	5	31	3.8	1.06	79.5	24.7	5.1	3	11-1,11-2	2195	2.41	a-g
PX1140F330-04W3FE	894	37.9	27.9	3.8	8.1	24.7	83	5	31	4.1	1.05	79.2	25.6	6.2	3	11-2,21-1	25	0.50	ij
PX1150F357-04W3FE	888	40.1	29.3	4.0	8.0	26.3	73	5	34	4.1	1.00	80.0	26.4	6.8	3	11-1,11-2	1130	1.64	e-i
PX1150F361-04W3FE	883	37.6	28.0	3.5	8.3	23.0	83	6	29	3.9	1.08	80.2	26.4	6.1	3	11-4,21-3	30	0.52	ij
PX1140F329-04W3FE	851	38.1	27.4	3.5	8.1	23.5	78	6	31	3.7	1.03	78.0	23.3	6.1	3	11-2	98	0.65	hij
PX1126F267-04W3FE	835	38.6	28.0	3.7	9.0	23.0	81	5	28	4.2	1.05	80.2	28.4	5.8	3	11-2,21-1	0	0.00	j
PHY411W3FE	833	41.2	29.7	3.2	6.5	25.4	89	6	30	4.0	0.97	78.9	24.0	5.8	3	11-1	25	0.50	j
PHY400W3FE	823	39.1	28.1	3.3	7.7	23.6	88	7	25	3.7	1.01	77.6	23.7	5.7	2	11-1	1540	3.12	a-d
BX 2556AXTP	805	37.7	29.6	4.5	8.5	29.2	89	6	33	3.9	1.10	79.1	27.2	5.6	3	11-2,21-1	5198	3.65	a
PHY443W3FE	805	39.2	28.0	3.9	8.0	26.6	88	5	30	3.9	1.02	78.4	24.9	5.8	2	11-1,11-3	68	1.45	f-i
PX1140F331-04W3FE	800	38.3	27.8	3.5	8.4	22.6	86	6	32	4.0	1.06	80.1	25.6	6.0	4	11-2,21-1	1105	1.43	f-j
PHY475W3FE	787	37.1	27.0	3.8	8.1	26.7	83	5	30	4.2	1.02	79.0	25.9	6.2	3	11-2,11-3	0	0.00	j
PX1126F263-04W3FE	777	38.3	27.4	4.1	8.5	26.3	85	6	29	3.6	1.05	79.1	25.7	6.0	3	11-1,12-2	55	0.99	g-j
PHY390W3FE	776	38.1	27.2	3.3	7.5	24.1	93	7	24	3.6	1.01	77.7	24.5	5.8	3	11-1,11-2	2798	3.26	a-d
PX1130F309-04W3FE	773	38.5	28.5	3.5	7.5	25.8	83	6	31	3.9	1.03	79.7	26.3	6.0	2	11-2,11-3	163	1.12	f-j
DP 2335 B3XF	758	39.6	29.1	3.8	7.4	27.5	86	5	32	3.7	1.05	78.4	24.0	5.3	2	11-1	9355	3.63	a
DP 2143NR B3XF	757	37.9	27.5	4.0	8.6	25.5	74	4	34	4.6	1.09	80.2	27.0	5.7	2	11-1,11-3	0	0.00	j
ST 5931AXTP	750	40.1	30.5	5.2	10.0	28.1	81	5	33	3.9	1.07	79.6	26.0	5.9	2	11-1,11-2	2018	1.40	f-j
FM 814AXTP	747	39.0	29.4	4.4	8.2	29.2	97	6	28	3.7	1.07	79.3	26.0	5.5	3	11-1,11-3	5963	3.59	ab
PX1127D245-04W3FE	716	35.2	25.4	3.7	7.7	27.4	96	6	28	3.7	1.08	79.3	26.7	5.6	4	21-1	520	2.11	c-g
FM 823AXTP	711	36.9	27.7	3.7	7.8	27.2	98	6	26	3.4	1.07	79.2	27.4	5.8	2	11-1	4215	3.44	abc
FM 757AXTP	709	38.8	29.6	4.4	7.8	30.7	98	5	26	3.9	1.09	78.6	24.8	5.2	2	11-1,11-3	5785	3.62	a
PX1150F360-04W3FE	708	35.8	26.4	3.8	8.0	26.9	85	5	30	3.2	1.07	78.0	26.0	6.2	3	21-1,22-1	0	0.00	j
PHY332W3FE	690	37.3	26.2	3.4	7.5	25.0	81	6	31	3.3	1.01	76.2	22.6	6.0	3	11-2,12-1	175	1.63	e-i
DP 2436NR B3TXF	689	38.7	27.5	3.6	7.2	26.3	86	4	32	3.6	1.09	78.0	27.2	6.7	2	11-3,12-1	2540	3.11	a-d
PHY137W3E1	686	35.2	25.1	3.8	7.9	26.8	86	5	30	3.6	1.09	80.3	26.7	6.3	3	21-3	2403	3.05	a-e
ST 6000AXTP	684	41.2	30.6	4.2	7.9	27.2	88	5	32	4.0	1.06	79.8	28.8	6.0	2	11-1	4105	3.52	abc
PHY136W3E1	679	39.6	28.9	3.7	7.5	26.8	91	6	28	3.9	1.03	77.9	24.0	6.2	3	11-1,11-3	5135	2.12	c-g
BX 2512AXTP	658	37.8	27.9	4.2	8.1	28.4	95	5	29	4.3	1.07	79.3	24.7	5.2	2	11-1	0	0.00	j
DP 2349NR B3XF	650	40.3	29.6	3.4	7.2	25.5	81	5	36	4.2	0.99	78.3	22.9	5.4	2	11-1,11-3	673	2.18	b-g
BX 2511AXTP	634	38.1	28.7	4.0	7.9	28.6	97	6	29	3.2	1.10	78.5	25.7	5.1	2	11-3	3070	3.11	a-d
ST 5855AXTP	631	40.6	30.6	4.5	7.9	29.1	94	5	29	3.9	1.05	78.7	26.7	5.9	2	11-1	4038	3.49	abc
FM 868AXTP	627	34.8	24.6	4.1	8.9	26.0	93	5	30	3.3	1.07	78.4	27.5	5.8	3	12-1	385	1.85	d-i
PHY205W3FE	616	36.1	25.4	3.7	7.7	27.5	99	8	24	3.6	1.00	78.6	24.2	5.5	3	11-1	483	2.54	a-f
ST 4833AXTP	604	34.9	25.6	3.9	8.0	27.8	93	3	35	3.7	1.09	79.4	25.0	5.3	3	11-1,12-1	403	1.96	d-h
Mean	756	38.2	28.0	3.8	7.9	26.4	88	5	30	3.8	1.05	79.0	25.7	5.8	2		1883	1.95	
c.v.%	8.5	1.8	2.8	6.6	3.9	6.0	6.1	12.2	6.3	5.1	2.3	1.2	4.8	2.0	20				
LSD 0.05	75	1.2	1.3	0.4	0.5	2.7	6	1	2	0.3	0.04	1.6	2.1	0.2	1			1.43	

TITLE:

Small plot variety trial in a root-knot nematode infested field, at AG-CARES, Lamesa, TX, 2024.

AUTHORS:

Terry Wheeler – Professor
Robert Ballesteros – Research Associate
Sia Muhulkar – Technician II
Desabian Bossett – Agricultural Worker

MATERIALS AND METHODS:

Plot size:	2-rows by 35 feet, 3 replications at 1.3B irrigation
Planting date:	May 9
Nematode sampling:	August 15
Harvest date:	October 31

RESULTS AND DISCUSSION:

Stands were excellent at this site for most entries (Table 1). There were two nematode susceptible varieties included in this test, Armor 9371 B3XF, which averaged a high root-knot nematode density (11,780/500 cm^3 soil), and DP 2127 B3XF, which averaged a moderate root-knot nematode density (3,787/500 cm^3 soil). All other entries were either varieties with known partial or high resistance to root-knot nematodes, or experimental lines where the companies asked us to test them in root-knot nematode fields and may have resistance. The highest yielding entries were experimental lines from Phytogen (PX1140F331-04, PX1126F263-04, PX1130F309-04, PX1150F360-04, and PX1140F330-04) which averaged 719 to 845 lbs of lint/acre. The highest yielding variety was PHY 415 W3FE, which averaged 710 lbs of lint/acre (Table 1). Loan values ranged from ¢42.55/lb to ¢55.60/lb (ST 6000AXTP) (Table 1). Those entries with lower loan values tended to have short fiber length (Table 2).

Table 1. Effect of root-knot (RK) nematode on cotton cultivars in a variety test near Lamesa.

Variety	Plants/ Foot row	RK[1]/ 500 cm^3 soil	LOG_{10} (RK+1)	Lint Yield (lbs/a)	Turnout (%)	Lint X Loan ($/acre)	Loan Value (¢/lb)	RK[2] rating
PX1140F331-04	2.96	180	1.28	**845**	0.287	**416.16**	49.25	R
PX1126F263-04	2.95	0	0.00	**821**	0.279	322.73	45.38	R
PX1130F309-04	2.73	38	0.54	**766**	0.293	398.49	52.00	R
PX1150F360-04	3.04	60	0.60	**746**	0.272	383.49	51.43	R
PX1140F330-04	3.01	0	0.00	719	0.283	372.62	51.80	R
PHY 415 W3FE	2.74	510	0.83	710	0.269	245.49	51.38	R
PX1126F267-04	2.98	97	1.36	697	0.258	378.20	54.30	R
PHY 400 W3FE	2.75	325	2.43	687	0.287	301.45	43.90	R
PX1150F357-04	2.78	30	0.52	679	0.283	341.20	50.25	R
PHY 443 W3FE	2.59	13	0.43	676	0.295	364.97	48.28	R
PHY 475 W3FE	2.31	0	0.00	647	0.254	326.54	49.88	R
FM 814AXTP	2.48	1,200	2.79	638	0.288	299.25	46.88	PR
PX1150F361-04	3.04	25	0.50	635	0.266	311.94	49.15	R
FM 868AXTP	2.64	1,070	2.33	632	0.275	336.72	53.25	PR
Armor 9371 B3XF	2.33	11,780	3.55	606	0.306	289.41	47.73	S
PHY 332 W3FE	3.14	13	0.43	592	0.256	296.90	50.18	R
PHY 205 W3FE	2.87	600	2.02	585	0.251	266.47	45.55	R
BX2512AXTP	2.00	115	0.67	582	0.294	312.42	53.65	R
AMX21T212XF	2.21	5,010	2.69	578	0.246	308.07	53.33	UNK
DP 2141NR B3XF	2.53	30	0.52	577	0.271	292.13	50.60	R
BX2557AXTP	2.52	1,773	2.12	574	0.307	304.24	53.05	UNK
ST 6000AXTP	2.11	1,923	2.11	571	0.294	317.48	55.60	PR
DP 2436NR B3TXF	2.05	253	1.62	567	0.255	291.72	51.45	R
ST 5931AXTP	2.61	1,965	1.75	562	0.288	295.16	52.55	R
DP 2127 B3XF	2.16	3,327	2.41	532	0.295	227.43	42.75	S
AMX12572B3TXF	1.20	1,800	2.03	530	0.288	246.45	46.50	UNK
BX2556AXTP	1.94	1,255	2.07	528	0.257	314.36	50.95	UNK
DP 2349NR B3XF	2.33	360	1.43	527	0.294	246.00	46.68	R
ST 5855AXTP	2.16	5,830	2.85	506	0.317	261.43	51.70	UNK
ST 4833AXTP	2.78	245	1.74	504	0.254	254.08	50.38	R
BX2511AXTP	1.91	1,558	2.32	502	0.281	253.58	50.48	UNK
PX1127D245-04	2.83	0	0.00	501	0.229	213.03	42.55	R
DP 2143NR B3XF	2.66	0	0.00	499	0.267	267.62	53.63	R
AMX12506XF	1.94	6,725	3.62	447	0.262	247.82	55.40	UNK
Prob>F	0.001	0.001	0.001	0.001	0.001	0.001	0.009	
MSD[3] (0.05)	0.48		1.89	126	0.018	61.13	8.01	

[1]RK is root-knot nematode eggs + 2nd stage juveniles.
[2]R is resistant (either 1 or 2 genes, homozygous in the variety), PR is typically 1 resistant gene in a subset of the population, S is susceptible, UNK is unknown.
[3]Minimum significant differences between varieties at *P*=0.05.

Table 2. Fiber properties for a variety test near Lamesa.

Variety	Micro-naire	Length (“)	Unif-ormity	Strength (g/tex)	Elon-gation	Rd	+b	Leaf
AMX12506XF	3.65	1.14	79.35	28.45	6.0	79.5	9.4	4.0
AMX12572B3TXF	4.12	1.01	78.15	25.60	6.1	81.0	8.9	3.5
AMX21T212XF	3.49	1.11	79.95	30.95	5.8	81.4	8.9	4.0
Armor 9371 B3XF	3.94	1.02	78.10	24.35	5.7	81.7	9.4	3.0
BX2511AXTP	3.32	1.09	77.70	27.80	5.1	81.3	9.6	3.5
BX2512AXTP	4.64	1.07	78.20	27.20	5.2	81.8	9.9	3.0
BX2556AXTP	3.75	1.03	75.65	26.25	5.6	79.6	9.0	4.5
BX2557AXTP	4.32	1.05	79.10	27.80	5.6	83.8	8.5	2.0
DP 2127 B3XF	4.26	0.98	77.45	23.75	5.7	81.5	9.6	2.5
DP 2141NR B3XF	4.80	1.03	77.45	27.20	5.8	80.9	9.3	3.0
DP 2143NR B3XF	4.49	1.08	79.20	28.90	5.9	80.3	9.8	3.0
DP 2349NR B3XF	4.40	1.02	78.15	26.10	5.7	80.0	10.0	2.5
DP 2436NR B3TXF	3.68	1.07	76.90	29.25	7.0	78.9	10.2	3.5
FM 814AXTP	3.37	1.04	78.50	26.50	5.4	79.9	10.0	3.5
FM 868AXTP	3.81	1.08	78.60	29.45	6.2	79.7	9.9	3.5
PHY 205 W3FE	3.26	1.02	77.45	28.10	5.6	79.7	9.2	4.0
PHY 332 W3FE	3.58	1.07	79.35	27.35	6.3	79.4	10.0	3.0
PHY 400 W3FE	3.42	1.00	77.00	26.10	6.0	80.0	9.6	4.0
PHY 415 W3FE	3.76	1.05	79.15	27.85	6.3	78.4	9.8	4.0
PHY 443 W3FE	3.95	0.99	78.85	26.20	6.0	80.1	9.7	3.0
PHY 475 W3FE	3.88	1.02	77.50	27.70	6.2	80.9	9.5	3.0
PX1126F263-04	3.64	0.99	77.40	27.00	6.3	80.0	9.7	3.5
PX1126F267-04	3.99	1.07	80.50	30.55	6.0	80.7	8.7	3.5
PX1127D245-04	2.88	1.05	77.25	27.20	5.6	80.4	8.7	5.0
PX1130F309-04	3.93	1.05	79.40	28.50	6.1	80.4	9.6	3.5
PX1140F330-04	3.94	1.05	78.70	28.30	6.2	78.8	9.2	4.0
PX1140F331-04	4.25	1.02	77.50	28.15	6.3	78.6	9.2	4.0
PX1150F357-04	4.08	1.03	79.70	28.85	7.0	79.9	8.9	4.0
PX1150F360-04	3.97	1.06	79.15	29.00	6.3	78.3	9.1	4.5
PX1150F361-04	3.78	1.02	77.80	27.45	6.4	78.2	9.4	4.0
ST 4833AXTP	3.32	1.11	79.60	27.35	5.3	79.5	9.9	3.5
ST 5855AXTP	3.68	1.05	78.25	28.20	6.0	82.0	9.6	3.0
ST 5931AXTP	3.69	1.07	78.20	27.65	6.2	81.2	9.1	4.0
ST 6000AXTP	3.77	1.10	79.90	30.60	5.9	80.3	9.7	3.5
Prob>F	0.001	0.008	0.038	0.001	0.001	0.001	0.001	0.001
MSD[1] (0.05)	0.38	0.08	3.08	2.75	0.2	1.2	0.7	1.2

[1]Minimum significant differences between varieties at *P*=0.05.

TITLE:

Performance of Deltapine varieties as affected by subsurface drip irrigation levels at AG-CARES, Lamesa, TX, 2024.

AUTHORS:

Wayne Keeling – Professor
Justin Spradley – Research Assistant
Mark Stelter – Research Associate

MATERIALS AND METHODS:

Plot Size: 4 rows by 32 feet, 4 replications

Planting Date: May 20

Varieties:

23R9128B3TXF	23R9915B3TXF
24R4542XF	24R4544XF
24R4947XF	24R6827B3TXF
DP 2123B3XF	DP 2335B3XF
DP 2436NRB3TXF	DP 2522NRB3TXF
DP 2525B3XF	DP 2541B3XF

Herbicides:

Roundup 32 oz/A + Panther 2 oz/A	3/22/24
Caparol 24 oz/A + Gramoxone 22 oz/A	5/21/24
Liberty 43 oz/A + Roundup 32 oz/A + Warrant 48 oz/A	6/21/24
Liberty 43 oz/A + Roundup 32 oz/A	7/25/24

Fertilizer: 85-35-0

Irrigation:

	Dry	Low	Base	High
Preplant/Emergence	0.0”	3.8”	3.8”	3.8”
In-season	0.0”	6.3”	9.6”	11.0”
Total	0.0”	10.1”	13.4”	14.8”

Harvest Date: October 17

RESULTS AND DISCUSSION:

Six experimental and six commercial Deltapine varieties were compared under dryland and three levels of subsurface drip irrigation. In-season irrigation levels were 6.3, 9.6, and 11.0 in/A applied. When averaged across varieties, yields ranged from 642 to 931 lb/A with increased irrigation inputs (Table 1). When averaged across irrigation levels, lint yields ranged from 545 to 776 lbs/A for the twelve entries.

Cotton fiber quality as measured by loan value (¢/A) trended to higher levels as irrigation increased, ranging from 47.56 to 52.94 ¢/lb. Highest loan value resulted with DP 2436NR B3TXF. Gross revenues ($/A) increased with increased irrigation level and were highest with an experimental variety 24R4947XF.

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

Variety	In-season Irrigation Levels (inches)				Average
	Dryland (0.0)	Low (6.3)	Base (9.6)	High (11.0)	
		---------------- lbs/A----------------			
23R9128B3TXF	277	651	766	880	**644 CD**
23R9915B3TXF	282	558	821	930	**648 CD**
24R4542XF	351	757	900	910	**729 AB**
24R4544XF	280	593	856	971	**675 BCD**
24R4947XF	286	703	929	1186	**776 A**
24R6827B3TXF	250	570	857	901	**645 CD**
DP 2123B3XF	307	705	765	972	**687 BC**
DP 2335B3XF	250	676	790	946	**666 CD**
DP 2436NRB3TXF	230	638	912	958	**684 BC**
DP 2522NRB3TXF	271	515	570	824	**545 E**
DP 2525B3XF	245	562	767	896	**618 D**
DP 2541B3XF	285	777	785	800	**662 CD**
Average	**276 D**	**642 C**	**810 B**	**931 A**	**--**
		------------------¢/lb----------------			
23R9128B3TXF	48.75	52.50	53.00	53.50	**51.94 B**
23R9915B3TXF	44.50	47.25	51.25	52.75	**48.94 C**
24R4542XF	50.25	52.25	52.00	53.25	**51.94 B**
24R4544XF	52.75	54.00	50.75	49.75	**51.81 B**
24R4947XF	51.25	53.50	53.00	53.00	**52.69 B**
24R6827B3TXF	46.50	50.50	54.25	55.00	**51.56 B**
DP 2123B3XF	46.75	54.00	52.75	54.00	**51.88 B**
DP 2335B3XF	41.00	47.50	51.50	52.75	**48.19 CD**
DP 2436NRB3TXF	53.00	55.00	55.00	55.25	**54.56 A**
DP 2522NRB3TXF	43.00	45.75	50.50	50.25	**47.38 D**
DP 2525B3XF	50.25	53.00	53.00	53.50	**52.44 B**
DP 2541B3XF	42.75	51.00	51.50	52.25	**49.38 C**
Average	**47.56 C**	**51.35 B**	**52.38 AB**	**52.94 A**	**--**
		------------------$/A--------------			
23R9128B3TXF	135	344	406	474	**340 CDE**
23R9915B3TXF	126	265	420	490	**325 E**
24R4542XF	176	397	470	482	**382 AB**
24R4544XF	149	321	436	486	**348 BCDE**
24R4947XF	147	378	494	632	**413 A**
24R6827B3TXF	118	291	466	494	**342 CDE**
DP 2123B3XF	145	380	404	527	**364 BCD**
DP 2335B3XF	103	326	409	498	**334 DE**
DP 2436NRB3TXF	122	350	498	526	**374 BC**
DP 2522NRB3TXF	117	237	292	415	**265 F**
DP 2525B3XF	124	299	408	485	**329 DE**
DP 2541B3XF	122	396	402	414	**334 DE**
Average	**132 D**	**332 C**	**425 B**	**493 A**	**--**

TITLE:

Performance of PhytoGen varieties at AG-CARES, Lamesa, TX, 2024.

AUTHORS:

Wayne Keeling – Professor
Justin Spradley – Research Assistant
Mark Stelter – Research Associate

MATERIALS AND METHODS:

Plot Size:	4 rows by 32 feet, 4 replications		
Planting Date:	May 13		
Varieties:	PHY136W3FE	PHY137W3FE	
	PHY205W3FE	PHY210W3FE	
	PHY250W3FE	PHY332W3FE	
	PHY360W3FE	PHY390W3FE	
	PHY400W3FE	PHY411W3FE	
	PHY415W3FE	PHY443W3FE	
	PHY475W3FE	PHY480W3FE	
	PX1126F263-04W3FE	PX1126F267-04W3FE	
	PX1127D245-04W3FE	PX1130F309-04W3FE	
	PX1140D329-04W3FE	PX1140F330-04W3FE	
	PX1140F331-04W3FE	PX1150F357-04W3FE	
	PX1150F360-04W3FE	PX1150F361-04W3FE	
	DP1820B3XF	DP1822XF	
	FM2498GLT		
Herbicides:	Roundup 32 oz/A + Panther 2 oz/A		3/20/24
	Roundup 32 oz/A		4/12/24
	Liberty 43 oz/A + Warrant 48 oz/A		6/21/24
Fertilizer:	85-35-0		
Irrigation:			
		Base	
	Preplant/Emergence	3.8”	
	In-season	9.6”	
	Total	13.4”	
Harvest Date:	October 21		

RESULTS AND DISCUSSION:

Phytogen commercial and experimental varieties and three other commercial varieties were compared under subsurface drip irrigation and planted on May 13. Approximately 9.6” of irrigation was applied during the growing season but yields were disappointingly low. Cotton lint yields averaged 642 lbs/A and ranged from 380 to 795 lbs/A (Table 1). Loan values averaged 47.68 ¢/lb and were low due to high micronaire and low strength discounts. Gross revenues ($/A) averaged $307/A and ranged from $191 to $402/A.

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

Variety	**Lint yield (lbs/A)**	**Loan value (¢/lb)**	**Gross revenue ($/A)**
PHY136W3FE	568 CDE	48.75 ABCDE	277 BCDE
PHY137W3FE	687 ABCD	49.08 ABCDE	337 ABCD
PHY205W3FE	591 BCD	43.43 DE	257 DE
PHY210W3FE	669 ABCD	48.48 ABCDE	324 ABCD
PHY250W3FE	578 CDE	43.93 CDE	254 DE
PHY332W3FE	693 ABCD	47.93 ABCDE	332 ABCD
PHY360W3FE	599 ABCD	43.75 DE	262 DE
PHY390W3FE	600 ABCD	43.00 DE	258 DE
PHY400W3FE	625 ABCD	49.30 ABCDE	308 ABCD
PHY411W3FE	597 ABCD	45.23 ABCDE	270 BCDE
PHY415W3FE	720 ABCD	52.45 ABC	378 A
PHY443W3FE	713 ABCD	44.93 ABCDE	320 ABCD
PHY475W3FE	521 DE	49.85 ABCDE	260 DE
PHY480W3FE	700 ABCD	47.50 ABCDE	333 ABCD
PX1126F263-04	636 ABCD	49.25 ABCDE	313ABCD
PX1126F267-04	643 ABCD	50.50 ABCD	325 ABCD
PX1127D245-04	583 BCDE	41.38 E	241 DE
PX1130F309-04	694 ABCD	46.98 ABCDE	326 ABCD
PX1140F329-04	732 ABC	46.20 ABCDE	338 ABCD
PX1140F330-04	784 AB	50.70 ABCD	397 A
PX1140F331-04	795 A	50.55 ABCD	402 A
PX1150F357-04	636 ABCD	48.75 ABCDE	310 ABCD
PX1150F360-04	677 ABCD	53.18 A	360 ABC
PX1150F361-04	685 ABCD	53.45 A	366 AB
DP1820B3XF	380 E	50.28 ABCD	191 E
DP1822XF	608 ABCD	44.68 BCDE	272 BCDE
FM2498GLT	606 ABCD	43.85 CDE	266 CDE
Average	**642**	**47.68**	**307**

TITLE: Evaluation of Cotton Planting Systems in the Texas High Plains at AG-CARES, Lamesa, TX, 2024

AUTHORS:
Dr. Ken Legé – Assistant Professor & Extension Cotton Specialist
Dr. Brendan Kelly – Associate Professor
Rebekah Ortiz-Pustejovsky – Extension Assistant & PhD Student
Dr. Brooke Shumate – Graduate Extension Assistant

MATERIAL AND METHODS:

Plot Size: 8 rows x 40 ft. - 4 replications
Planting Date: 5/09/2024
Varieties: PHY205W3FE
PHY411W3FE
Herbicide:
2/20/2024 Treflan - 1.5 pts/Ac
4/12/2024 Roundup - 32oz/Ac & Panther - 2 oz/Ac
5/10/2024 Caparol - 1.5pt/Ac
6/11/2024 Roundup - 32oz/Ac, Liberty - 32oz/Ac, & Warrant - 3 pt/Ac
Fertilizer: 50-34-0
Irrigation: 1 in. per week 6/20 – 8/30 (~10 in. total irrigation)
Harvest Date: 10/14/2024

WEATHER:

Month	Avg High Temp (°F)	Avg Low Temp (°F)	DD60 (95°F max)	Rain (in.)
May	90.0	61.2	342.1	0.67
Jun	96.2	71.5	665.5	0.77
Jul	94.0	70.0	655.5	0.94
Aug	98.1	71.9	709.5	0.03
Sep	86.1	61.3	408.0	2.48
Oct	89.6	54.3	166.0	0.00
Total			2946.6	4.89

RESULTS AND DISCUSSION:

Increasing production challenges on the Southern High Plains have forced growers to adopt variable farming practices. This study aims to better understand the impact of wider row spacing, decreased seeding rates, and differences in variety determinacy on cotton lint yield and fiber quality. A small plot trial was planted on May 9th and harvested October 14th. The trial was conventionally tilled and bedded. All agronomic practices were typical for the region and herbicide applications are listed above. Preliminary results from the first year of a three-year study indicated no significant differences by interactions. However, 80 in row spacing significantly increased lint yield (lbs./planted Ac), strength (g/tex), and loan value ($/lb.) compared to 40 in conventional row spacing. The shorter season, more determinate variety (PHY205W3FE) significantly increased lint yield on the land and planted basis (lbs./Ac), length (in.), leaf grade, and loan value ($/lb.). These results suggest a shorter season variety and wider row spacing may benefit growers yield on a planted basis and loan value in a season with a warmer-than-average fall evidenced by heat units received in September and October and with low rainfall. However, multiple years are required to better understand the impact of row spacing, seeding rate, and variable varieties.

Table 1. *Effects of seeding rate, row spacing, and variety on cotton turnout (%), lint yield (lbs./Ac), MIC, length (in.), strength (g/tex), color grade, leaf grade, and loan value ($/lb.).*

Seeding Rate (seeds/ft)	Row Spacing (in.)	Variety	Seeding Rate (seeds/ft) X Row Spacing (in.)	Seeding Rate (seeds/ft) X Variety	Row Spacing (in.) X Variety	Seeding Rate (seeds/ft) X Row Spacing (in.) X Variety	Turnout (%)	Lint Yield (lbs./ land Ac)	Lint Yield (lbs./ planted Ac)	MIC	Length (in.)	Strength (g/tex)	Color Grades	Leaf Grade	Loan Value ($/lb.)
2							33.67	551	850	4.77	1.03	26.3		4.1	0.4466
4							31.49	583	896	4.70	1.03	26.3		4.3	0.4500
	40						31.68	522	523 B	4.68	1.01 A	25.6 B		4.2	0.4210 B
	80						33.48	611	1223 A	4.80	1.05 B	26.9 A		4.1	0.4756 A
		PHY205W3FE					33.99	639 A	967 A	4.42 B	1.05 A	26.4		4.4 A	0.4701 A
		PHY411W3FE					31.17	495 B	778 B	5.05 A	1.01 B	26.1		3.9 B	0.4265 B
			2,40				33.15	504	504	4.75	1.01	25.5		4.1	0.4106
			2,80				34.19	598	1195	4.80	1.05	27.1		4.0	0.4826
			4,40				30.20	541	541	4.60	1.01	25.7		4.3	0.4314
			4,80				32.77	625	1250	4.80	1.04	26.8		4.3	0.4686
				2,PHY205W3FE			33.47	606	917	4.49	1.04	26.4		4.5	0.4672
				2,PHY411W3FE			33.87	496	782	5.05	1.01	26.1		3.6	0.4260
				4,PHY205W3FE			34.51	672	1018	4.36	1.05	26.4		4.4	0.4731
				4,PHY411W3FE			28.46	494	774	5.04	1.01	26.1		4.1	0.4269
					40,PHY205W3FE		33.50	620	620	4.27	1.03	25.8		4.4	0.4531
					40,PHY411W3FE		29.85	424	425	5.08	0.99	25.4		4.0	0.3889
					80,PHY205W3FE		34.48	657	1314	4.58	1.06	27.0		4.5	0.4871
					80,PHY411W3FE		32.48	565	1131	5.02	1.03	26.8		3.8	0.4641
						2,40,PHY205W3FE	33.15	588	588	4.42	1.02	25.5	41, 41, 42, 42	4.5	0.4353
						2,40,PHY411W3FE	33.15	420	420	5.08	0.99	25.4	41, 41, 41, 41	3.8	0.3859
						2,80,PHY205W3FE	33.79	623	1246	4.56	1.06	27.3	41, 41, 31, 41	4.5	0.4991
						2,80,PHY411W3FE	34.60	572	1144	5.03	1.04	26.8	41, 41, 41, 41	3.5	0.4661
						4,40,PHY205W3FE	33.85	653	653	4.12	1.04	26.1	41, 31, 31, 31	4.3	0.4710
						4,40,PHY411W3FE	26.56	429	429	5.09	0.98	25.4	41, 41, 31, 41	4.3	0.3919
						4,80,PHY205W3FE	35.18	691	1383	4.60	1.05	26.8	41, 41, 41, 41	4.5	0.4751
						4,80,PHY411W3FE	30.37	559	1118	5.00	1.03	26.9	41, 41, 41, 41	4.0	0.4620
Mean							32.58	567	873	4.74	1.03	26.3		4.2	0.4483
R-square							0.3028	0.4564	0.8776	0.7047	0.6917	0.4022		0.3912	0.4726
CV (%)							15.89	21.95	19.30	6.0	2.19	4.40		15.45	11.41
Prob>F															
2 4							0.2460	0.4712	0.4474	0.4852	0.8583	0.9880		0.4181	0.8525
40 80							0.3345	0.0564	0.0001	0.2401	0.0002	0.0041		0.7857	0.0066
PHY205W3FE PHY411W3FE							0.1378	0.0037	0.0045	0.0001	0.0002	0.4805		0.0218	0.0250
2,40 2,80 4,40 4,80							0.6814	0.9171	0.8789	0.4777	0.3078	0.5377		0.7857	0.3453
2,PHY205W3FE 2,PHY411W3FE 4,PHY205W3FE 4,PHY411W3FE							0.0926	0.4492	0.3726	0.5560	0.5313	0.9639		0.1831	0.8928
40,PHY205W3FE 40,PHY411W3FE 80,PHY205W3FE 80,PHY411W3FE							0.6573	0.2496	0.9175	0.0755	0.2367	0.7744		0.4181	0.2678
2,40,PHY205W3FE 2,40,PHY411W3FE 2,80,PHY205W3FE 2,80,PHY411W3FE 4,40,PHY205W3FE 4,40,PHY411W3FE 4,80,PHY205W3FE 4,80,PHY411W3FE							0.8220	0.8803	0.6546	0.3481	0.4013	0.4805		0.7857	0.5004

**Fisher's LSD letters denote significance of each parameter by main effect. Values highlighted in green are significantly larger.*

TITLE:

Effect of planting date on yield and fiber quality of Deltapine varieties at AG-CARES, Lamesa, TX, 2024.

AUTHORS:

Wayne Keeling – Professor
Justin Spradley – Research Assistant
Mark Stelter – Research Associate

MATERIALS AND METHODS:

Plot Size:	4 rows by 200 feet		
Planting Date:	May 1, May 15, May 29, June 14		
Varieties:	DP 2317 B3TXF	DP 2349NR B3XF	
	DP 2328 B3TXF	DP 2414 B3TXF	
	DP 2335 B3XF	DP 2436 B3TXF	
Herbicides:	Roundup 32 oz/A + Panther 2 oz/A		6/24/24
	Caparol 24 oz/A		5/17/24
	Roundup 32 oz/A + Liberty 22 oz/A + Warrant 48 oz/A		6/24/24
	Roundup 32 oz/A + Dicamba 16 oz/A		7/03/24
Fertilizer:	75-0-0		
Irrigation:		Base	
	Preplant/Emergence	3.8”	
	In-season	7.3”	
	Total	11.1”	
Harvest Date:	Planting dates 1-3 harvested October 23		
	Fourth planting date harvested October 29		

RESULTS AND DISCUSSION:

Six Deltapine varieties were planted on four dates (May 1, May 15, May 29, and June 14). Irrigation was applied similarly across all four dates during the growing season. Wheat was grown in the plot area in 2023 with stubble maintained with no-tillage. When averaged across varieties, highest cotton lint yields were produced with the May 1 and June 14 planting dates. Lower yields were produced with the May 15 and May 29 dates, with no evident pattern (Table 1). When averaged across planting dates the highest yielding varieties included DP 2317 B3TXF, DP 2328 B3TXF, and DP 2335 B3XF. Highest loan values were achieved with the June 14 planting date due to longer staple lengths. Gross revenues ($/A) were related to yield and were highest for the May 1 and June 14 dates (Table 1). Previous trials conducted in 2022 and 2023 resulted in highest yields with the later planting dates. All three years have been hot and dry with the September rainfall and above average heat unit accumulation which favored later plantings.

Table 1. Effects of planting date and Deltapine varieties on cotton lint yield (lbs/A), loan value (¢/lb), and gross revenue ($/A) in a wheat cotton rotation in 2024.

	Planting Date				
Variety	**May 1**	**May 15**	**May 29**	**June 14**	**Average**
		------------------ lbs/A------------------			
DP 2317 B3TXF	705	688	751	808	**738 AB**
DP 2328 B3TXF	735	759	735	692	**730 ABC**
DP 2335 B3XF	816	723	633	987	**790 A**
DP 2349NR B3XF	799	636	469	824	**682 BC**
DP 2414 B3TXF	778	706	584	795	**716 BC**
DP 2436 B3TXF	778	656	550	661	**661 C**
Average	**769 AB**	**695 BC**	**620 C**	**794 A**	**--**
		------------------ ¢/lb------------------			
DP 2317 B3TXF	50.80	45.95	51.65	58.03	**51.61 A**
DP 2328 B3TXF	52.80	42.95	53.50	57.55	**51.70 A**
DP 2335 B3XF	51.90	43.60	51.58	57.63	**51.18 AB**
DP 2349NR B3XF	48.33	43.23	47.85	57.63	**49.26 B**
DP 2414 B3TXF	49.88	45.10	53.25	57.65	**51.47 AB**
DP 2436 B3TXF	50.63	52.85	52.43	50.90	**51.70 A**
Average	**50.72 B**	**45.61 C**	**51.71 B**	**56.56 A**	**--**
		------------------ $/A------------------			
DP 2317 B3TXF	359	316	387	469	**383 A**
DP 2328 B3TXF	388	326	393	398	**376 AB**
DP 2335 B3XF	423	315	327	569	**408 A**
DP 2349NR B3XF	386	275	224	474	**340 B**
DP 2414 B3TXF	395	319	311	458	**371 AB**
DP 2436 B3TXF	390	347	288	337	**340 B**
Average	**390 AB**	**316 C**	**322 BC**	**451 A**	**--**

TITLE: Impact of Zinc Fertilization in Alkaline Soil of the Texas Southern High Plains at AG-CARES, Lamesa, TX 2024

AUTHORS:
Katie Lewis – Professor
Wayne Keeling – Professor

MATERIALS AND METHODS:

Location:	AG-CARES, Lamesa, TX
Plot Size:	4 rows by 40 ft, 40” row spacing
Design:	Randomized complete block with 5 replications
Planting Date:	4 May 2023; 13 May 2024
Cotton Harvest:	20 October 2023; 21 October 2024
Variety:	DP 2141NR B3XF
Base Fertility:	90-0-0 in 2023; and 75-40-0 in 2024
Irrigation:	4.9” (preplant) and 10.6” (in-season) in 2023
	3.8” (preplant) and 9.6” (in-season) in 2024

Zinc fertilizer was applied in the form of TraFix Zn (1 qt/A), KickStand Zn (7% in 2023 and 9% in 2024; 1 qt/A)), or Axilo Zn (0.5 lb/A) with each applied side-dress (SD) at pinhead square (PHS) or foliar at PHS, PHS+21 d, or first flower (FF) + 10 d. In 2024, the foliar application at FF + 10 d was omitted due to limited response. All applications were made at 10 gal/A carrier volume.

RESULTS AND DISCUSSION:
Zinc concentrations at the 0-6” ranged from 0.3 ppm to 0.6 ppm, which, according to Waypoint Analytical (Memphis, TN), is below the critical range, indicating a likelihood of response to an application of Zn. A more alkaline pH (7.8 average) can contribute to limited Zn availability and greater possibility of a response to a Zn application.

Cotton lint yield in 2023 and 2024 responded to Zn application, with the Axilo Zn providing a more consistent response than the other two formulations (Figure 1). In 2023, the foliar application of Axilo Zn (1 lb/A) at PHS resulted in a significant response, while in 2024, this treatment and the SD application increased lint yield compared to the control. A positive lint yield response to the KickStand Zn 9% formulation was also observed. Both Axilo and KickStand Zn fertilizers are an EDTA chelated Zn formulations, with Axilo having a slightly smaller particle size, which may aid in plant uptake. Trafix is a unique Zn chelation that tends to perform better in wetter and cooler climates which explains the limited response in our semi-arid environment. Closer attention should be given to Zn and other micronutrients in semi-arid alkaline soil limited in micronutrient availability.

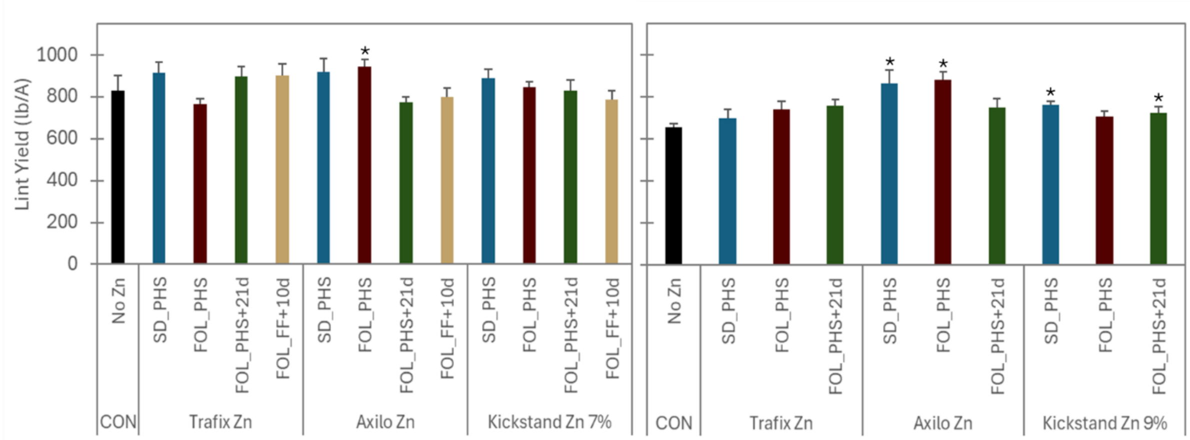

Table 1. Cotton lint yield in 2023 (left) and 2024 (right) and the effects of Zn fertilizer applied side-dress (SD) at pinhead square (PHS) or foliar at PHS, PHS+21d, or first flow (FF)+10d (only applied in 2023). All treatments and the control (CON) with no Zn received base fertility described above. Stars (*) above bars represent a significant response of a treatment to the control.

TITLE:

Effect of preemergence and postemergence herbicides on cotton in sandy soils at AG-CARES, Lamesa, TX, 2024.

AUTHORS:

Wayne Keeling – Professor
Justin Spradley – Research Assistant
Mark Stelter – Research Associate

MATERIALS AND METHODS:

Plot Size:	4 rows by 30 feet, 4 replications	
Planting Date:	May 16	
Application Dates:	PRE - May 17 POST (cotyledon) – June 5	
Variety:	FM 868 AXTP	
Herbicides:	Roundup 32 oz/A + Panther 2 oz/A	3/20/24
Fertilizer:	85-0-0	
Irrigation:		

	Base
Preplant/Emergence	3.8”
In-season	9.6”
Total	13.4”

RESULTS AND DISCUSSION:

Preemergence herbicide treatments were applied following planting and postemergence treatments were applied at the cotyledon stage. Preemergence treatments included Axant ISO, Caparol, Reflex, and tank-mixes of Axant ISO with Caparol or Reflex, and Caparol +Reflex. Postemergence (POST) treatments included Axant ISO at two rates and Caparol at two rates. Injury ratings made prior to POST applications showed no injury from either Axant ISO rate or Caparol at 24 oz/A. Less than 7% injury resulted from Caparol at 48 oz/A or 2X rate (Table 1).

No injury was observed with Axant ISO at either rate applied PRE or POST at any evaluation date. Increasing rates of Reflex PRE increased cotton injury level to as much as 63%. Caparol POST, as expected, injured cotton 55-90% as rate increased. Results from this trial indicate that Axant ISO is a safe PRE or POST treatment for sandy soils, as is the recommended Caparol rate (24 oz/A). These results, as in previous tests, indicate that Reflex can injure cotton when applied PRE on sandy soils.

Table 1. Effects of preemergence and postemergence herbicides on cotton growth.

Treatment	Injury (%)[1]			
	June 4	June 12	June 20	July 3
	---------------------------------- PRE ----------------------------------			
Axant ISO (3 oz)	0.0 C	0.0 D	0.0 C	0.0 C
Axant ISO (6 oz)	0.0 C	0.0 D	0.0 C	0.0 C
Caparol (24 oz)	0.0 C	0.0 D	0.0 C	0.0 C
Caparol (48 oz)	6.7 C	1.7 D	0.0 C	0.0 C
Reflex (16 oz)	18.3 B	10.0 D	8.3 C	6.7 C
Reflex (32 oz)	43.3 A	63.3 B	53.3 B	40.0 B
Axant ISO (3 oz) + Caparol (24 oz)	1.7 C	0.0 D	0.0 C	0.0 C
Axant ISO (3 oz) + Reflex (16 oz)	8.3 C	8.3 D	5.0 C	3.3 C
Caparol (24 oz) + Reflex (16 oz)	18.3 B	13.3 D	5.0 C	3.3 C
	--------------------------------- POST ---------------------------------			
Axant ISO (3 oz)	0.0 C	0.0 D	0.0 C	0.0 C
Axant ISO (6 oz)	0.0 C	0.0 D	0.0 C	0.0 C
Caparol (24 oz)	0.0 C	41.7 C	55.0 B	30.0 B
Caparol (48 oz)	0.0 C	86.7 A	99.0 A	95.0 A

[1]0=no injury, 100=complete kill

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, 2024.

AUTHORS:

Megha Parajulee – Professor, Faculty Fellow, and Regents Fellow
Surendra Gautam – Senior Research Associate
Raju Sapkota – Research Assistant
Wayne Keeling - Professor

MATERIALS AND METHODS:

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

Planting Date: May 16 (terminated rye cover)

Varieties: DP 2143NR B3XF
FM 2498 GLT

Herbicides:

Roundup 32 oz/A + Panther 2 oz/A	3/20/24
Roundup 32 oz/A	4/12/24
Caparol 48 oz/A	5/17/24
Roundup 32 oz/A + Liberty 43 oz/A + Warrant 48 oz/A	6/24/24
Roundup 32 oz/A + Liberty 43 oz/A	8/01/24

Fertilizer: 85-0-0

Irrigation:

	Low	Base	Base Plus
Preplant/Emergence	3.8”	3.8”	3.8”
In-season	5.6”	7.3”	9.4”
Total	9.4”	11.1”	13.2”

Treatments: Four insect simulation treatments included

1. Uninfested control
2. Fleahopper Simulated Damage
3. Lygus Simulated Damage
4. Fleahopper - Lygus Sequential Simulated Damage

Simulated damage consisted of manual removal of 100% squares three weeks into squaring (July 18) to time cotton fleahopper susceptible stage *(fleahopper simulation*), removal of 20% bolls (September 10) from the top 1/3rd of the plant when the crop was at near cut-out *(Lygus simulation),* and removal of pre-flower squares followed by removal of 20% small bolls near crop cut-out *(fleahopper - Lygus sequential simulation)*.

Harvest date: October 22 (hand-harvested)

Effect of manual removal of fruits at early-stage (cotton fleahopper simulation), late-stage (Lygus simulation), and early and late sequentially (fleahopper – Lygus sequential simulation) was evaluated on two cotton cultivars, DP2143NR B3XF and FM2498 GLT, as influenced by two irrigation (low and high) water levels. The ‘low’ and ‘high’ water treatments were set up as ‘base’±2” with ~4” irrigation water discriminating the two water levels in the study. Thus, the experiment comprised of two water levels, two cultivars, and four simulated fruit loss events [control, pre-flower 100% square loss mimicking the cotton fleahopper injury-induced loss, 20% small bolls (<3 cm diameter) loss mimicking the Lygus boll injury-induced small fruit abortion at cut-out, and square removal followed by boll removal], replicated three times, totaling 48 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 (333 lb/acre) compared to that in ‘low’ water regime (103 lb/acre). Lint yield was abnormally low in 2024 due to prolonged drought during the growing season. While both cultivars produced near identical lint yield under low irrigation regime (100 and 105 lb/A for FM2498 GLT and DP2143NR B3XF, respectively), FM2498 GLT performed slightly better under full irrigation production system (351 lb/A) compared to DP2143NR B3XF (314 lb/A) (Fig. 1). Nevertheless, the insect simulation treatments showed characteristic treatment differences, although the pattern was similar between low and high irrigation treatments (Fig. 2). That is, cotton fleahopper and Lygus simulations marginally reduced lint yield in both irrigation conditions but not significantly. The sequential infestations of cotton fleahoppers and Lygus reduced lint yield the most compared to cotton fleahopper or Lygus simulated treatment singly. The effect of insect simulation treatment was more pronounced under full irrigation production system (Fig. 2), indicating a greater pest risk at high irrigation production regime for sequential infestations of cotton fleahoppers and Lygus.

The effect of insect injury simulation was generally similar in both cultivars; however, DP2143NR B3XF (control: 263 lb/A vs FH-Lygus sequential simulated damage: 201 lb/A) appeared to be more tolerant to sequential infestation of cotton fleahopper and Lygus than FM2498 GLT [control: 263 lb/A vs FH-Lygus sequential simulated damage: 163 lb/A) (Fig. 3) and the effect was more pronounced under full irrigation production condition [control: 128 lb/A vs FH-Lygus sequential simulated damage: 62 lb/A) (Fig. 4). That is, DP2143NR B3XF significantly compensated for fruit loss due to sequential simulated insect infestations under high irrigation regime while FM2498 GLT suffered a significant lint yield loss under the same scenario. The simulated cotton fleahopper and Lygus sequential damage under low irrigation reduced 82 and 66 lb/A for FM2498 GLT and DP2143NR B3X, respectively, while the lint yield reduction under high irrigation regime was 135 and 40 lb/A, respectively, for the two cultivars. Nevertheless, both cultivars exhibited similar responses for single or sequential infestations under low irrigation regime (Fig. 4).

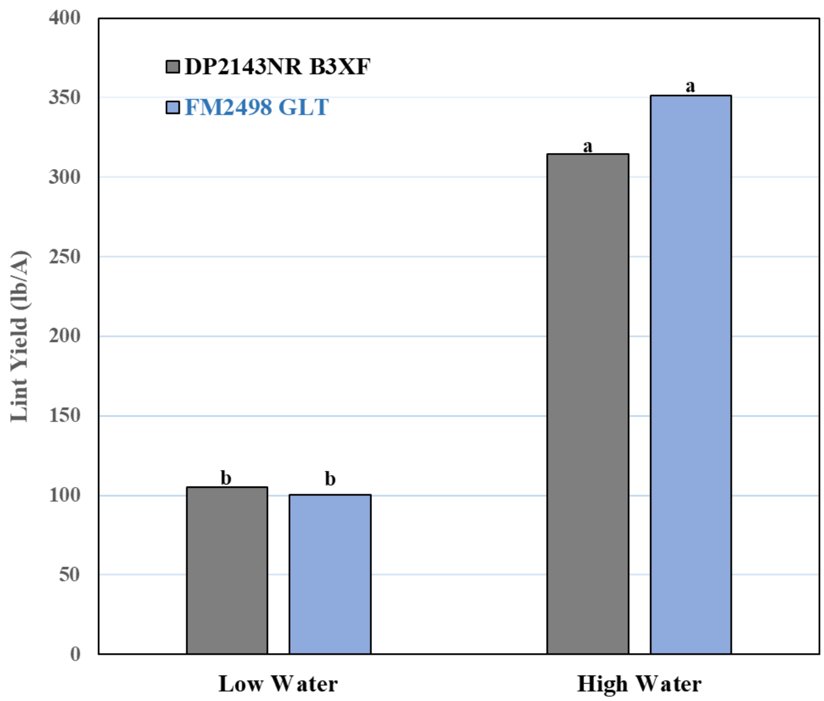

Figure 1. Average lint yield of DP2143NR B3XF and FM2498 GLT under low and high irrigation regimes, Lamesa, Texas, 2024.

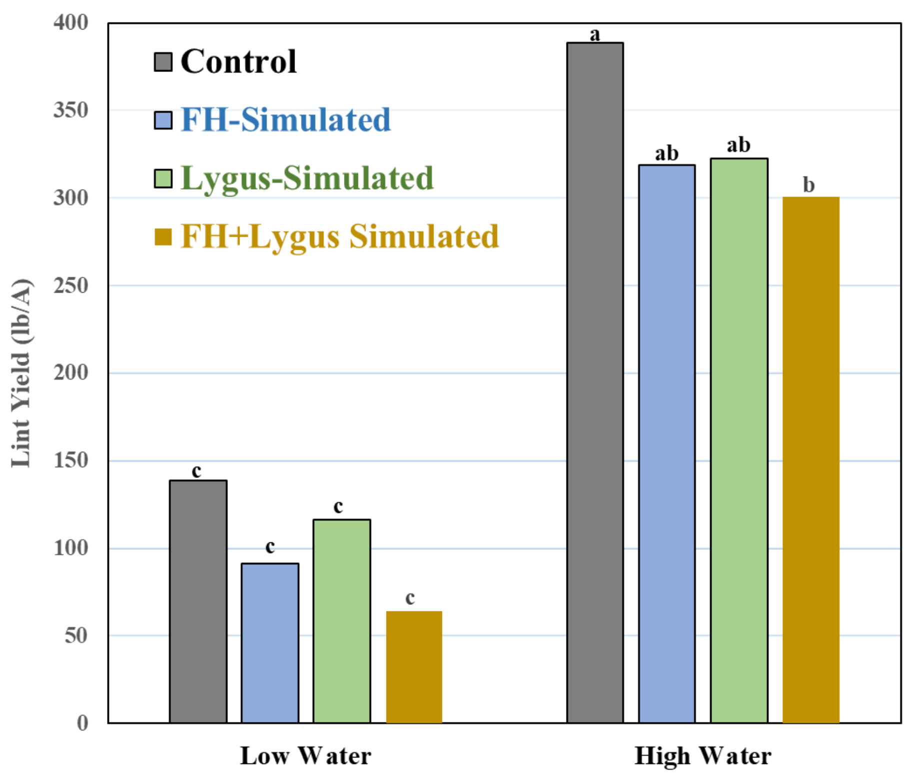

Figure 2. Average lint yield influenced by simulated cotton fleahopper versus *Lygus*-induced fruit removal in two cotton cultivars under low and high irrigation regimes, Lamesa, Texas, 2024.

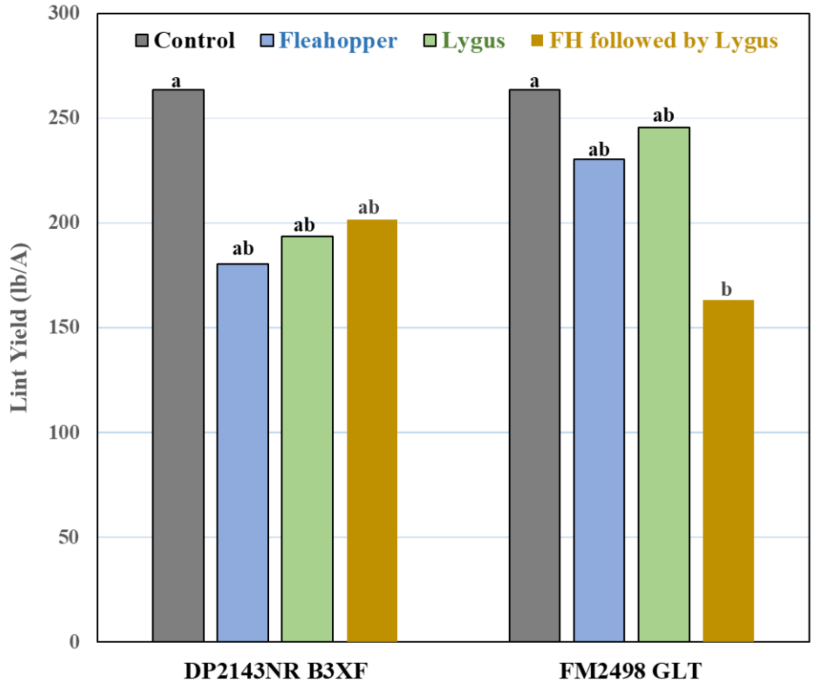

Figure 3. Average lint yield influenced by simulated cotton fleahopper versus *Lygus*-induced fruit removal in two cotton cultivars combined over two irrigation treatments, Lamesa, Texas, 2024.

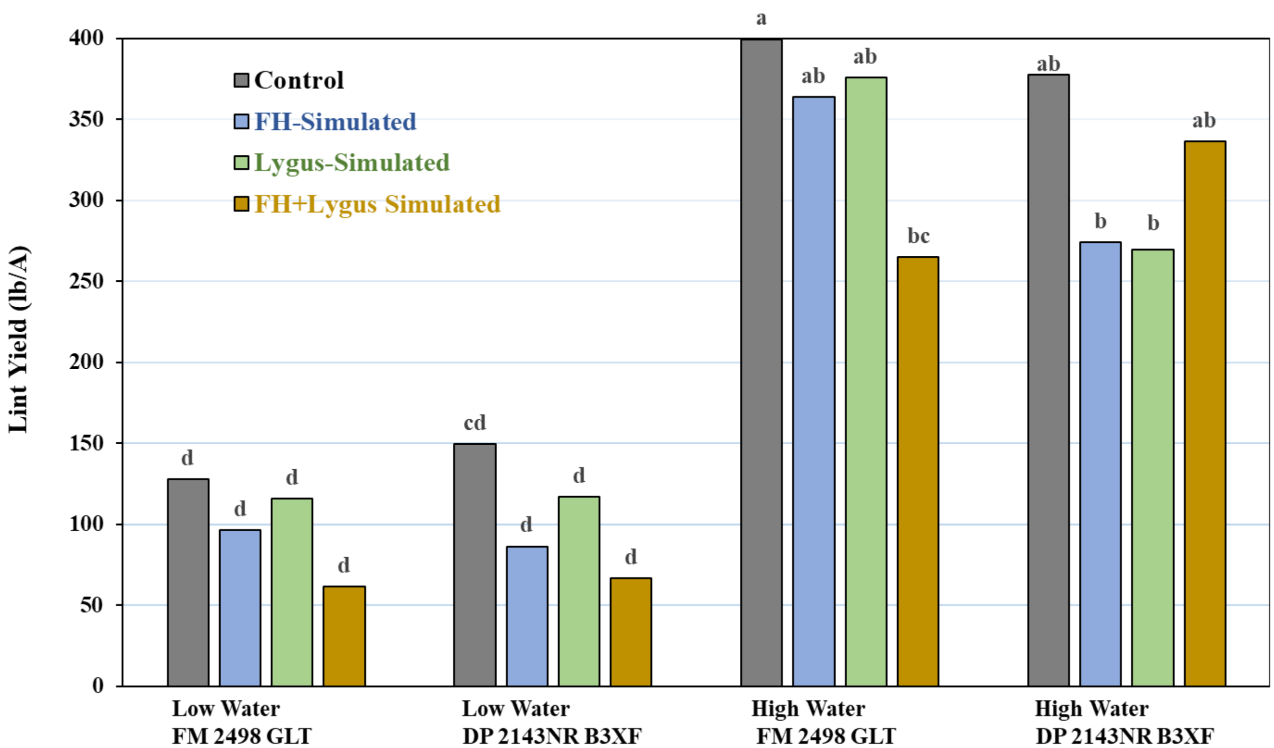

Figure 4. Average lint yield influenced by simulated cotton fleahopper versus *Lygus*-induced fruit removal in two cotton cultivars x two irrigation treatments, Lamesa, Texas, 2024.