Fusarium Wilt in Cotton Trial Results for 2020

Cecilia Monclova and Terry Wheeler
Texas A&M AgriLife Extension Service and Texas A&M AgriLife Research

Background: Fusarium wilt is a fungal disease that causes wilting and stand loss in cotton. Fusarium wilt is present in fields with nematode pressure (either root knot and/or reniform). In 2020, two fields were used to evaluate cotton variety trials for reaction to Fusarium wilt.

Hall County: Planted on May 15 and harvested on November 16. Soil texture is loamy sand (sand 88%; silt 5%; clay 7%). Soil properties are included on Table 1. Yield ranged from 819 to 2,023 lbs of lint/acre (Table 3). The top five yielding varieties carry root knot nematode resistant (RKN) genes. PHY 480 W3FE is highly resistant to RKN, while PHY 400 W3FE is partially resistant. ST 4946GLB2 and ST 5600B2XF are both partially resistant to RKN. In addition, ST 4946GLB2 is resistant to Fusarium wilt. In contrast, ST 4990B3XF had the highest stand change (stand loss) among all varieties and had one of the lowest yields.

Table 1: Soil properties for Hall County field.

OM %	pH	Conductivity[a]	N[b]	P	K	Ca	Mg	S	Na
0.57	7.8	240	20	150	273	1349	339	21	30

[a] Presented in umho/cm. [b] Presented in parts per million (ppm)

Cochran County: Planted on May 19 and harvested on November 10. Soil texture is fine sandy loam and soil properties are included in Table 2. Cropland Genetics varieties were rebranded under the name Armor. Lint yield ranged from 717 to 1,096 lbs/acre. The top five yielding varieties have an unknown response to Fusarium wilt. FM 2141GLTP, PHY 400 W3FE, and ST 4946GLB2, were the top three yielding cultivars (Table 5). All three have partial root-knot nematode resistance. Fiber quality associated to each line is included on table 6 presented in alphabetical order.

Table 2: Soil properties for Cochran county field.

OM %	pH	Conductivity[a]	N[b]	P	K	Ca	Mg	S	Na
0.44	6.3	100	5	76	202	734	323	13	10

[a] Presented in umho/cm. [b] Presented in parts per million (ppm)

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Table 3: Fusarium wilt variety trial in Hall County in 2020. Data presented from the top yielding variety.

Variety[1]	Lint Yield	Yield x Loan ($/A)	Loan Value ($/lb)	Avg. Turnout	Plant/ ft row		% Change in stand	RK[3] / 500 cm soil	RK R[4]
					Jun-04	Nov-16			
PX4B08W3FE	2023	989.38	0.562	0.27	3.08	2.86	10.32	2445	HR
PHY 480 W3FE	2019	1217.17	0.551	0.26	2.89	2.31	0.46	1605	HR
ST 5600B2XF	1875	918.53	0.562	0.24	2.39	2.15	12.8	2310	R
PHY 400 W3FE	1860	1101.44	0.572	0.27	2.81	2.61	29.42	1665	PR
PHY 545 W3FE	1836	861.16	0.567	0.27	2.71	2.44	-2.2	2295	R
ST 4946GLB2	1835	1029.08	0.554	0.26	2.81	2.83	-0.43	2565	PR
PX2C14W3FE	1786	811.37	0.547	0.22	2.83	2.89	-1.87	2880	HR
FM 1621GL	1770	789.39	0.556	0.27	2.76	2.45	6.06	3480	PR
PHY 332 W3FE	1682	915.48	0.573	0.25	3.01	3.21	-5.52	2280	R
PHY 500 W3FE	1667	763.50	0.539	0.23	2.52	2.54	18.2	2760	R
PX2D18W3FE	1654	828.41	0.555	0.25	2.47	2.94	-15.41	2580	HR
PHY 580 W3FE	1634	797.19	0.565	0.27	2.34	2.25	7.56	1965	HR
PHY 443 W3FE	1619	881.77	0.563	0.25	2.93	3.01	7.79	2250	PR
ST 5610 B3XF	1458	908.95	0.561	0.24	2.25	2.16	3.64	2700	S
FM 1911GLT	1435	698.38	0.569	0.27	2.39	2.51	-2.75	3090	PR
PX5E28W3FE	1419	744.72	0.541	0.24	2.95	2.71	9.85	2820	HR
DP 1840 B3XF	1405	729.91	0.573	0.27	1.81	1.81	0.29	3240	S
FM 1730GLTP	1340	619.49	0.576	0.25	2.57	2.52	13.42	2580	PR
DP1747NRB2XF	1337	666.31	0.526	0.27	2.01	1.51	47.23	2820	R
DP 1646 B2XF	1332	733.50	0.572	0.26	2.16	1.94	13.45	2940	S
PX2E05W3FE	1288	580.41	0.563	0.26	2.89	2.33	25.71	4080	HR
PX5E34W3FE	1276	615.11	0.538	0.23	2.57	2.54	0.79	2700	HR
PX3E33W3FE	1108	767.15	0.564	0.26	2.49	2.12	21.54	2115	HR
ST 4480B3XF	1034	386.83	0.570	0.26	1.9	1.92	6.04	2880	S
ST 4990B3XF	819	433.09	0.572	0.23	2.26	1.69	79.09	3510	S
Prob>F	0.002	0.32	0.678	<0.0001	<0.0001	<0.0001	0.29	0.20	
MSD (0.05)[2]	554	900.77	4.18	0.01	0.59	0.59	49.65	1399	

[1] PX are experimental lines from Phytogen, PHY is Phytogen, ST is Stoneville, FM is Fibermax, DP is Deltapine, and BX is experimental lines from BASF

[2] MSD is the minimum significance difference

[3] RK is root-knot nematode

[4]RKR is root-knot nematode resistance response, HR-highly resistant, PR- partially resistance, R- resistance, U- unknown response, S- susceptible.

Table 4: Fiber traits for the Hall County Fusarium wilt trial in 2020. Results are presented in alphabetical order.

Variety[1]	Micro naire	Length	Strength	Unifor-mity	Elon-gation	Rd	+b	Leaf	CGRD
DP 1646 B2XF	3.83	1.19	29.85	81.85	6.75	85.30	7.95	1.5	11-1
DP 1747 NRB2XF	3.39	1.10	29.25	80.25	6.35	82.00	9.05	1.5	11-1
DP 1840 B3XF	3.86	1.16	31.00	81.65	6.15	84.45	8.40	1.5	11-1
FM 1730GLTP	3.92	1.20	32.80	82.70	5.40	84.90	7.65	1.0	11-1
FM 1621GL	4.69	1.15	30.55	81.35	5.55	81.55	7.95	3.0	21-1
FM 1911GLT	4.25	1.15	30.35	81.40	5.80	84.90	7.65	1.5	11-1
PHY 332 W3FE	4.05	1.18	30.65	81.40	6.60	82.95	8.70	1.5	11-1
PHY 443 W3FE	3.70	1.18	33.20	82.50	6.35	83.85	8.35	1.0	11-1
PHY 545 W3FE	3.98	1.11	30.70	82.30	6.65	83.30	8.60	1.0	11-1
PHY 400 W3FE	4.01	1.19	32.40	82.60	6.20	83.90	8.10	2.5	11-1
PHY 480 W3FE	3.36	1.19	30.90	83.00	7.15	83.90	8.30	2.5	11-1
PHY 500 W3FE	3.31	1.16	33.15	83.10	5.85	84.40	7.95	2.0	11-1
PHY 580 W3FE	3.98	1.14	30.55	81.90	6.50	82.95	8.50	2.5	11-1
PX2C14W3FE	3.37	1.15	31.80	82.50	6.45	83.70	8.25	1.5	11-1
PX2D18W3FE	3.62	1.21	33.45	81.65	5.60	83.00	8.15	1.5	11-1, -2
PX2E05W3FE	4.12	1.11	33.35	82.55	5.85	83.70	8.00	2.0	11-1, -2
PX3E33W3FE	4.09	1.17	32.05	81.55	6.65	81.70	8.60	2.5	21-2, 11-1
PX4B08W3FE	4.06	1.10	31.25	81.35	6.45	82.30	8.35	2.0	11-2
PX5E28W3FE	3.28	1.18	32.75	82.25	6.45	84.80	7.75	1.5	11-1
PX5E34W3FE	3.26	1.21	32.25	81.20	6.50	83.65	7.85	2.0	11-2
ST 4480B3XF	4.08	1.16	31.20	80.60	5.65	85.65	6.75	2.0	21-1, 11-1
ST 4946GLB2	3.67	1.16	32.00	82.50	6.75	82.35	8.75	2.0	11-1
ST 4990B3XF	4.38	1.19	29.65	83.45	6.35	84.45	8.05	1.0	11-1
ST 5600B2XF	3.86	1.18	31.55	82.45	6.70	82.40	8.95	2.0	11-1
ST 5610B3XF	3.84	1.16	30.85	82.40	6.50	85.35	8.20	1.5	11-1
Prob>F	0.18	0.001	0.01	0.01	<0.0001	0.06	0.0002	0.35	
MSD (0.05)[2]		0.05	2.09	1.38	0.35	2.52	0.67		

[1] PX are experimental lines from Phytogen, PHY is Phytogen, ST is Stoneville, FM is Fibermax, DP is Deltapine, and BX is experimental lines from BASF.

[2] MSD is the minimum significance difference.

Table 5: Fusarium wilt variety trial in Cochran County in 2020. Data presented from the higher yielding variety to the less yielding one.

Variety[1]	Lint yield lbs/a	Yield x loan ($/a)	Loan value ($/lb)	Turn-out	Plants/ft row		% Change in stand	RK[3]/ 500 cm soil	RK R[4]
					Jun-6	Nov - 11			
FM 1730GLTP	1,096	634.58	0.579	0.279	2.79	2.46	11.85	1,765	PR
PHY 400W3FE	1,087	615.79	0.567	0.291	2.96	2.54	14.57	2,455	PR
ST 4946GLB2	1,038	594.92	0.573	0.280	2.56	2.44	4.67	2,640	PR
FM 2398GLTP	1,028	580.24	0.564	0.316	3.07	2.74	10.48	9,585	S
FM 1621GL	974	538.08	0.552	0.263	2.46	1.94	21.86	3,715	PR
NG 4050XF	968	546.45	0.565	0.308	1.84	1.78	3.09	10,015	S
FM 2202GL	962	535.98	0.557	0.296	2.44	2.35	3.50	9,520	S
ST 5600B2XF	952	528.98	0.556	0.288	2.49	2.12	13.98	1,050	R
DP 2012B3XF	940	535.19	0.570	0.290	2.11	1.96	7.23	10,075	S
DP 2020B3XF	937	535.21	0.572	0.279	2.44	2.19	10.91	10,860	S
WFUT9	925	530.91	0.5738	0.323	1.56	1.23	28.13	2,320	U
NG 4689B2XF	917	500.82	0.546	0.290	2.34	1.74	25.98	7,190	S
FM 2334GLT	896	514.75	0.575	0.288	2.63	2.20	15.33	14,305	S
FM 1320GL	892	500.55	0.561	0.274	2.03	1.84	14.80	4,740	S
NG 3956B3XF	890	497.07	0.559	0.301	2.76	2.59	5.52	3,830	S
NG 4098B3XF	887	499.21	0.563	0.284	2.36	2.23	5.99	4,760	S
PHY 350W3FE	886	484.82	0.547	0.257	2.91	2.67	8.68	4,130	PR
FM 2498GLT	865	482.85	0.558	0.309	2.89	2.29	20.02	6,690	S
DP 1646B2XF	861	493.79	0.574	0.299	2.91	2.27	25.19	4,810	S
DP 2038B3XF	860	456.36	0.531	0.315	2.60	2.34	9.56	6,830	S
DP 1916B3XF	858	481.17	0.561	0.306	2.21	2.01	9.11	5,595	S
DP 1845B3XF	838	483.66	0.578	0.295	1.81	1.58	18.36	15,740	S
Armor 9210B3XF	828	473.87	0.572	0.296	2.25	2.02	9.65	9,545	S
DP 1823NRB2XF	824	456.22	0.554	0.291	2.04	1.74	16.43	690	R
FM 1911GLT	821	455.63	0.555	0.290	2.04	1.82	11.07	5,170	PR
DP 2022B3XF	816	456.41	0.560	0.266	2.53	2.01	21.47	12,650	S
NG 2982B3XF	812	462.27	0.569	0.241	2.51	2.34	7.40	4,500	S
NG 4792XF	807	444.25	0.551	0.288	2.34	1.67	29.86	14,445	S
DP 1820B3XF	805	460.42	0.572	0.293	1.69	1.37	18.47	6,715	S
ST 4550GLT	804	455.57	0.567	0.303	2.50	1.99	25.50	4,675	S
FM 2322GL	795	456.33	0.574	0.297	2.78	2.14	23.85	8,625	S
DP 1840B3XF	780	447.33	0.574	0.309	2.01	1.66	21.28	2,455	S

(continued)

Table 5: *(continued)* Fusarium wilt variety trial in Cochran County in 2020. Data presented from the top yielding variety to the less.

Variety[1]	Lint yield lbs/a	Yield X loan ($/a)	Loan $/lb	Turn-out	Plants/ft row		% Change in stand	RK[3]/ 500 cm soil	RKR[4]
					Jun-6	Nov - 11			
DP 1822XF	778	445.74	**0.573**	0.287	1.96	1.70	12.41	25,645	S
ST 4480B3XF	754	432.74	**0.574**	0.261	2.06	2.06	-0.15	10,535	S
Armor 9608B3XF	749	402.92	0.538	0.283	2.53	2.32	7.81	3,625	S
ST 4990B3XF	725	414.56	**0.572**	0.268	2.24	2.05	8.51	9,545	S
DP 2044B3XF	723	412.47	**0.570**	0.281	2.81	2.38	14.46	5,530	S
NG 3500XF	721	396.63	0.550	0.282	2.15	1.98	6.96	14,125	S
DP 1747NRB2XF	717	380.46	0.531	0.273	2.05	1.94	5.99	835	R
NG 4936B3XF	702	401.76	**0.572**	0.298	2.36	1.70	27.07	15,415	S
Prob>F	0.004	0.001	0.0001	0.001	<0.0001	0.05	0.53	0.001	
MSD[2] (0.05)	265	142.20	0.02	0.03	0.60	0.79	22.46	11395	

[1] ST is Stoneville, FM is Fibermax, DP is Deltapine, BX is experimental lines from BASF, NG is Next Gen, and Armor is formerly Cropland Genetics.

[2] MSD is the minimum significance difference

[3] RK is root-knot nematode

[4] RKR is root-knot nematode resistance response, HR-highly resistant, PR- partially resistance, R- resistance, U- unknown response, S- susceptible.

Table 6: Fiber traits for the Cochran County Fusarium wilt trial in 2020. Results are presented in alphabetical order.

Variety[1]	Micro naire	Length	Strength	Unifor- mity	Elon- gation	Rd	+b	Leaf	CGRD
Armor 9210B3XF	4.49	1.13	31.05	81.4	6.40	81.6	9.0	2.5	11-1, -2
Armor 9608B3XF	4.18	1.07	26.25	80.8	5.65	79.9	9.5	1.5	21-3, 11-3
FM 2141GLTP	4.02	1.17	33.20	83.7	5.30	85.5	7.5	2	11-1
DP 1646B2XF	4.32	1.16	28.80	81.6	6.85	84.2	8.5	1.5	11-1
DP 1747NRB2XF	4.41	1.06	29.45	81.7	6.20	79.4	9.8	1	11-3, -4
DP 1820B3XF	4.64	1.13	30.80	81.3	5.45	84.1	8.3	1.5	11-1
DP 1822XF	4.57	1.14	32.15	81.4	5.70	83.3	8.5	1	11-1
DP 1823NRB2XF	4.05	1.10	30.25	81.6	6.70	81.1	9.2	2.5	11-1
DP 1840B3XF	4.48	1.14	30.35	82.6	6.15	84.1	8.6	1	11-1
DP 1845B3XF	4.36	1.18	31.80	82.5	6.70	84.1	7.9	1.5	11-1
DP 1916B3XF	4.35	1.09	30.15	82.7	5.95	83.3	8.4	1	11-1
DP 2012B3XF	4.54	1.13	28.70	82.0	5.30	84.4	8.5	1	11-1
DP 2020B3XF	4.55	1.15	28.40	82.5	5.35	84.6	8.4	1	11-1
DP 2022B3XF	4.19	1.10	29.25	81.8	5.95	83.6	8.2	2	11-1
DP 2038B3XF	4.51	1.05	28.10	80.1	6.00	82.7	8.4	1	21-1, 11-1
DP 2044B3XF	4.36	1.12	28.40	81.8	6.50	84.3	8.3	1	11-1
FM 1320GL	4.53	1.09	30.70	82.3	6.15	83.9	8.3	1	11-1
FM 1621GL	4.79	1.11	29.05	82.0	5.50	82.6	8.1	2.5	21-1, 11-2
FM 1911GLT	4.33	1.09	29.55	81.2	5.80	84.7	7.8	1.5	11-1
FM 2202GL	4.47	1.09	32.40	83.3	6.15	81.5	8.7	1.5	11-2
FM 2322GL	4.41	1.12	31.15	81.9	5.15	82.4	8.4	1.5	11-1, -2
FM 2334GLT	4.71	1.16	29.85	82.2	5.50	84.1	8.2	1.5	11-1
FM 2398GLTP	4.78	1.11	29.40	82.7	5.80	84.0	8.1	1.5	11-1
FM 2498GLT	4.80	1.10	29.30	81.6	5.55	84.1	7.9	1	11-1, -2
NG 2982 B3XF	3.85	1.10	31.50	82.7	5.70	81.6	7.9	4.5	21-1, -2
NG 3500 XF	4.68	1.08	31.65	83.0	6.25	81.8	9.1	1	11-1
NG 3956 B3XF	4.53	1.10	29.25	82.2	6.25	83.2	8.7	1.5	11-1
NG 4050 XF	4.37	1.11	30.20	81.8	6.20	83.8	7.8	2	11-1, -2
NG 4098 B3XF	4.71	1.14	31.80	81.8	6.40	82.3	8.8	2	11-1
NG 4689 B2XF	4.57	1.07	28.55	81.7	5.20	81.5	9.1	1	11-1
NG 4792 XF	4.81	1.07	31.50	82.7	6.55	81.6	9.3	1.5	11-1
NG 4936 B3XF	4.38	1.15	28.95	82.6	6.60	84.5	8.1	1	11-1
PHY 350 W3FE	4.22	1.09	28.05	81.4	5.65	82.9	8.3	1	11-1, -2
PHY 400 W3FE	4.40	1.11	31.25	81.2	6.05	83.6	8.5	2	11-1

(continued)

Table 6: (*continued)* Fiber traits for the Cochran County Fusarium wilt trial in 2020. Results are presented in alphabetical order.

Variety[1]	Micro naire	Length	Strength	Unifor-mity	Elon-gation	Rd	+b	Leaf	CGRD
ST 4480B3XF	4.44	1.16	30.00	82.1	5.45	86.5	7.3	1	11-1
ST 4550GLT	4.34	1.10	30.45	81.8	6.75	82.4	9.0	1.5	11-1
ST 4946GLB2	4.56	1.12	31.05	82.5	6.60	81.9	8.9	1	11-1, -2
ST 4990B3XF	4.29	1.14	28.95	82.1	6.45	84.8	8.2	1	11-1
ST 5600B2XF	4.91	1.12	30.85	82.5	6.50	81.8	9.1	1	11-1
WFUT9	4.44	1.14	30.10	82.5	6.85	82.0	9.2	1	11-1
Prob>F	0.1263	<0.0001	0.0107	0.0002	<0.0001	<0.0001	<0.0001		
MSD	0.54	0.04	1.34	2.25	0.54	1.37	0.67		

[1] ST is Stoneville, FM is Fibermax, DP is Deltapine, BX is experimental lines from BASF, NG is Next Gen, and Armor is formerly Cropland Genetics.

[2] MSD is the minimum significance difference

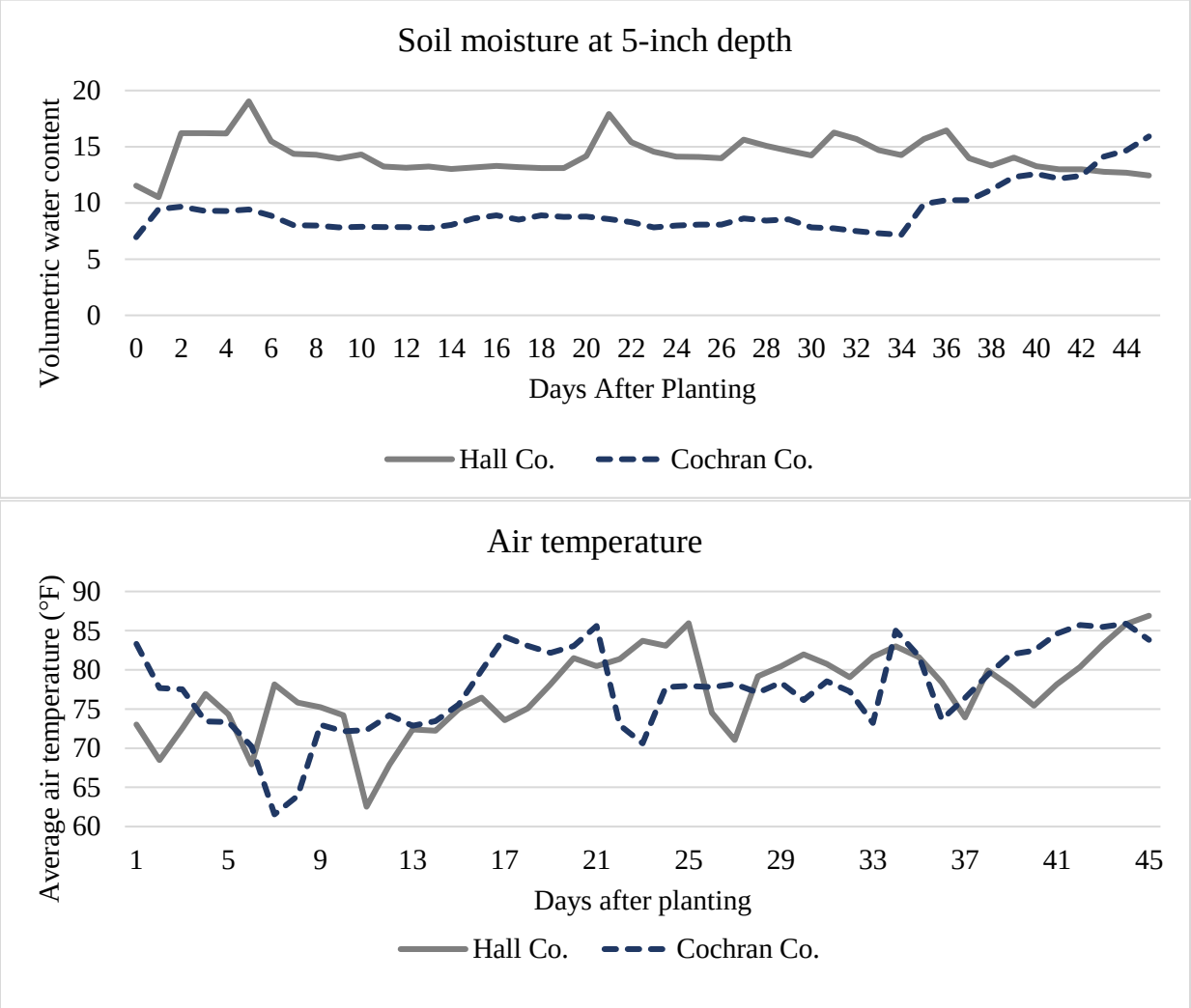

Figure 4: Soil moisture at the Hall county and Cochran county sites for 45 days after planting. Air temperature measured at the West Texas Mesonet for Turkey (Hall county) and Whiteface (Cochran county).

Figure 1: Cotton roots with galls caused by Root knot nematode adult females (A), stem necrosis caused by Fusarium wilt (B)