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PLANT PATHOLOGY & NEMATOLOGY

Effect of Varieties with Reniform Nematode Resistance on Yield and Nematode Density in Field Trials in the Southern High Plains of Texas

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ABSTRACT

Small-plot replicated variety trials were conducted in a field naturally infested with the reniform nematode from 2021 to 2025. The objectives were to determine if resistant varieties yielded better than susceptible varieties; compare fiber properties of various resistant varieties; and determine reniform nematode density differences between resistant and susceptible varieties. From 2021 to 2025, resistant varieties averaged 76% higher lint yield than susceptible varieties (983 vs. 559 kg of lint/ha); 77% higher value (lint yield x loan value was $1,184/ha vs. $670/ha); and 59% lower nematode density (241 vs. 595 vermiform reniform nematodes/500 cm^3 soil). The highest yielding varieties were PHY 332 W3FE and PHY 205 W3FE in 2021; PHY 411 W3FE in 2022 and 2023; PHY 357 W3FE, PHY 433 W3FE, PHY 443 W3FE, PHY 332 W3FE, and ST 5931AXTP in 2024; and PHY 475 W3FE, PHY 332 W3FE, DP 2522NR B3TXF, PHY 411 W3FE, and PHY 357 W3FE in 2025. The best fiber length among the resistant varieties were associated with PHY 332 W3FE in 2021 and 2023, DP 2143NR B3XF in 2022 and 2023, and PHY 433 W3FE in 2024 and 2025. The strongest fiber within resistant varieties were associated with PHY 443 W3FE in 2021, DP 2143NR B3XF in 2022 and 2024, PHY 332 W3FE in 2023, and PHY 433 W3FE in 2025.

The reniform nematode, *Rotylenchulus reniformis* (Linford and Oliveira), causes substantial yield losses in cotton (*Gossypium hirsutum* L.) (Robinson, 2007; Singh et al., 2023; Soto-Ramos et al., 2023). This nematode species is found on cotton in most major cotton producing countries including the U.S. (Faske et al., 2024a), India (Swetha et al., 2017), Brazil (Farias et al., 2002; Lordello, 1992), and Australia (Smith et al., 2024).

Reniform nematode has several attributes that cause it to be a damaging pathogen of cotton. It is a semi-endoparasite, with high egg production (50-75 eggs/female) and a short life cycle (17-23 d at optimal temperature of 27 to 30 °C) (Faske et al., 2024b; Singh et al., 2023). Unlike *Meloidogyne* spp., which favors soil high in sand content, the reniform nematode can reproduce and cause yield loss in a broad range of soil textures (Herring et al., 2010; Starr et al., 1993; Xavier et al., 2014). The reniform nematode also can survive soil drying better than most nematode species (Guar and Perry, 1991; Womersley and Ching, 1989).

Management of reniform nematode in cotton involves crop rotation with nonhosts, use of nematicides, and in recent years, resistant cultivars (Faske et al., 2024b; Singh et al., 2023). Crop rotation with nonhosts (corn, grain sorghum, peanut, weed-free fallow) is an important method of reniform nematode management. However, one year with a nonhost crop followed by cotton does not always reduce the nematode population effectively, and so two consecutive years with a nonhost crop followed by susceptible cotton might be necessary for effective control (Davis et al., 2003; Lee et al., 2015; Smith et al., 2024; Stetina et al., 2007; Westphal and Smart, 2003). Use of nonfumigant nematicides did not reduce reniform nematode density sufficiently to minimize cotton losses (Grabau et al., 2021; Schumacher et al., 2020; Wilson et al., 2020). Fumigant nematicides might not reduce reniform nematode density sufficiently, especially in finer textured soils or they might not increase cotton yield enough to pay for the product (Crow et al., 2021; Wheeler et al., 2008). However, in some cases fumigation can give effective yield response to reniform nematode infection (Koenning et al., 2007).

Commercial cotton varieties with reniform nematode resistance have been available since 2021 (Singh et al., 2023; Soto-Ramos et al., 2023). Where information is available, the source of resistance for at least some resistant cotton varieties came from *Gossypium barbadense* L. GB713 (PVP 202000220 and 202000221). The development of reniform

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nematode-resistant varieties has been facilitated by the identification of simple sequence repeat markers associated with this source of reniform nematode resistance (Gutiérrez et al., 2011). This source of resistance substantially delays reniform nematode development to its gravid stages compared with a susceptible variety (Stetina, 2015) and reduces overall reniform nematode density based on greenhouse trials (Robinson et al., 2004). Resistant commercial cotton (*G. hirsutum*) varieties in field trials have lower reniform nematode densities than susceptible varieties (Soto-Ramos et al., 2023; Watson, 2024). However, it is important that reniform nematode-resistant varieties' yield is competitive. The objective of this study is to compare the yield, fiber quality, and reniform nematode density of commercially available resistant varieties (2021-2025) in a reniform nematode field, relative to commercially available reniform nematode-susceptible varieties.

MATERIALS AND METHODS

Small-plot variety trials were conducted from 2021 to 2025 at the Texas A&M AgriLife Research and Extension Center in Lubbock, TX. Plots were two rows wide (1.02 m centers), 10.67 m long, and varieties were arranged in a randomized complete block design with four replications. Plots were planted with a cone planter (dates of planting in Table 1). Commercial varieties and experimental lines from companies were planted, ranging from 16 to 36 entries per year. The experimental lines that did not become commercially available varieties were removed from this analysis. The plots were irrigated as needed at least once or several times each year with furrow irrigation on every other furrow. Irrigation water was limited at this location, so irrigation was applied strategically to allow for adequate yield (1000-1200 kg lint/ha).

The soil is an Olton series (fine, mixed, superactive, thermic Aridic Paleustolls) with 0 to 1% slope. There were two fields involved in this research project. Field 204 (2021, 2023-2025) is a sandy clay loam (55% sand, 20% silt, 25% clay), with 1.2% organic matter, pH = 7.4, and CEC = 19.9. Field 305 (2022) is a sandy clay loam (45% sand, 26% silt, 29% clay), with 0.6% organic matter, pH = 7.7, CEC = 13.2.

Soil samples were taken in August or September (Table 1) in each plot and assayed for vermiform stage plant-parasitic nematodes. A narrow-bladed shovel was used to sample four to five locations per plot, taking soil 10 to 14 cm from the plant stalk to a depth of approximately 15 to 20 cm. Soil was then collected from the 8 to 20 cm depth, mixed in a bucket, and approximately 1 L of soil was placed in a plastic bag. Samples were stored in a refrigerator until nematode extraction, which was within 2 wk of sampling. The assay was a modified Baermann funnel (termed pie-pan, Thistlethwayte, 1970), designed to recover mobile nematodes. A pie-pan assay with 200 cm^3 soil plus root fragments was used to extract vermiform reniform nematode stages over 48 h. The circular pie-pans were made of glass, and a wire mesh (0.64 cm diameter) was placed in the pie-pan. Two pieces of facial tissue (2-ply) were laid on top of the mesh and the soil sample placed on the facial tissue. Tap water (250 ml) was gently added to the pie-pan without disturbing the soil, and then the wet facial tissues were arranged around the soil to keep it from floating into the water. A cover was placed over the pie-pan to eliminate evaporation. The extracted nematodes were counted by concentrating the extracted liquid to 100 ml and then counting a 5- or 10-ml aliquot. Although eggs also were extracted from root fragments in the soil samples for some years, they were not extracted for all years and are not reported.

Plots were mechanically harvested with a cotton stripper (John Deere model 484, Moline, IL) modified to weigh plot yields using load cells (Rusty Weigh, Lubbock, TX). Harvested plot weights included lint, seed, and plant debris. A 1,000-g subsample was

Table 1. Planting, soil sampling, and harvest dates for 2021-2025

Year	Planting Date	Soil Sampling Date	Harvest Date
2021	**June 8**	**August 24**	**November 19**
2022	**May 16**	**September 7**	**November 18**
2023	**June 7**	**August 17**	**November 29**
2024	**May 21**	**August 21**	**December 9**
2025	**May 14**	**August 11**	**November 17**

collected from plots, and two replicate samples were ginned from each entry to determine lint turnout. The research gin was equipped with a 10-saw gin stand, stick machine, feeder extractor, and saw lint cleaner. Gin components have been modified for research scale and are not commercially manufactured. Lint samples were sent to the Texas Tech University Biopolymer Research Institute (Lubbock, TX) for HVI analysis. The Commodity Credit Corporation loan premium and discount schedule each year for upland cotton (https://www.cotton.org/econ/govprograms/cccloan/ccc-upland-discounts.cfm [verified 19 April 2026]) was used to calculate a loan value for each plot fiber sample, and the average loan value for a variety was applied to all plot yields of that variety to calculate value ($/hectare).

The reniform nematode densities (Ren) for each plot and year were $\mathrm{LOG}_{10}(\mathrm{Ren}+1)$ transformed. PROC GLIMMIX (SAS version 9.4, SAS Institute, Cary, NC) was used for analysis of each year separately. This procedure fits statistical models to data with nonconstant variability and where the response is not normally distributed (SAS/STAT® 13.1 User Guide, 2013; SAS Institute, Cary, NC). All the susceptible commercial varieties in each test were grouped under the variety name “S”, and reniform nematode-resistant varieties were compared against each other and group S. The x variable was variety (and S) and the y variable was transformed Ren, lint yield, or value (loan value x lint yield) in $/hectare. The random term was replication. The response distribution was Gaussian; estimation technique was Restricted Maximum Likelihood; and degrees of freedom calculation based on Kenward-Rogers. Least squares mean separations were based on a T grouping (alpha = 0.05). Additional analyses across all years combined were conducted where the S group of varieties were compared against R (resistant) group of varieties for reniform nematode density, transformed nematode density, lint yield, and value/hectare. The random term for these group analyses was year and year x replication.

Soil moisture and soil temperature were monitored at the 10-cm depth with a SM100 soil moisture sensor (#6460) and external temperature sensor (#3667) attached to a 1200 Data Logger (WatchDog Microstation, #3680WD1, Spectrum Technologies, Inc., Aurora, IL). The air temperature and rain were monitored with a weather station during 2021 to 2024 at the test site (Spectrum Technologies Inc. weather station [model no longer sold]), and in 2025 based on the West Texas mesonet (New Deal location, temperature only, rain was monitored at the research site through a rain gauge).

RESULTS AND DISCUSSION

Environmental Conditions. Weather during the 2021 growing season was relatively cool and wet, with only 15 d from emergence through September, with a maximum daily temperature > 35 °C. There was heavy rainfall prior to planting (which delayed planting until 8 June) and then showers at least monthly through August (Fig. 1A). This resulted in fewer heat units (1,981 degree days [DD]) than normal by the end of September. There were no days when the average volumetric soil moisture at 10 cm was < 25% (Fig. 2A), which suggests that the plants were not drawing down soil moisture in the root profile.

Weather conditions in 2022 and 2023 were hot and dry, with some rain early in the season, but then long stretches with little to no rain during the flowering and boll filling stages (Fig. 1B, C). There were 65 and 66 d where the maximum daily air temperature was > 35 °C, in 2022 and 2023, respectively, and 2,683 and 2,442 DD by the end of September in 2022 and 2023, respectively. The test was irrigated four and three times, respectively in 2022 and 2023 (Fig. 2B, C). In 2022, the volumetric soil moisture fell below 25% for 25 d in July, 18 d in August, and 20 d in September (Fig. 2B). In 2023, the volumetric soil moisture fell below 25% for 15 d in July, 27 d in August, and 27 d in September (Fig. 2C).

In 2024, there was excellent rain from planting through mid-June, then rain was sparse the rest of the growing season (Fig. 1D). There was a total of 2,505 DD from emergence until the end of September, and 49 d where the maximum daily air temperature was > 35 °C. The test was irrigated once during the growing season in mid-August (Fig. 2D), and the volumetric soil moisture did not fall below 25% during the growing season. On 2, 7, and 17 November there were 4.8, 3.3, and 5.1 cm of rain, respectively, which delayed harvest until 9 December. Some varieties with poor stormproof boll traits experienced substantial lint fallout to the ground with the delay in harvest and force of the rain.

In 2025, the soil moisture was light at planting, so the test was irrigated 5 d after planting to assist in emergence and plant establishment. There were substantial rains during June and early July, and then light rains during August (Fig. 1E). The field was irrigated in mid-August (Fig. 2E). Although soil moisture was not high, except after the irrigation event, there was little soil moisture draw down by plants until late August (Fig. 2E). There were 26 d after emergence when the air temperature was > 35 °C, and plants had accumulated 2,235 DD by the end of September.

Nematode Reproduction. The Deltapine reniform nematode-resistant varieties DP 2141NR B3XF (2021-2024), DP 2143NR B3XF (2021-2025), and DP 2522NR B3TXF (2025) had lower ($p < 0.05$) transformed reniform nematode densities than the susceptible group of varieties in 3 of 4 trials, 3 of 5 trials, and 0 of 1 trial, respectively (Table 2). The older Phytogen varieties, PHY 205W3FE (2021-2025), PHY 332 W3FE (2021-2025), PHY 411 W3FE (2021-2025), and PHY 443 W3FE (2021-2024) had lower ($p < 0.05$) transformed reniform nematode densities than the susceptible group in 2 of 5 trials, 2 of 5 trials, 3 of 5 trials, and 2 of 4 trials, respectively (Table 2). The newer Phytogen varieties, PHY 357 W3FE (2024-2025), PHY 433 W3FE (2024-2025), and PHY 475 W3FE (2023, 2025) had lower ($p < 0.05$) transformed reniform nematode densities than the susceptible group in 1, 0, and 1 out of 2 trials (Table 2). ST 5931AXTP (2024-2025) had a lower ($p < 0.05$) transformed reniform nematode density than the susceptible group in 1 of 2 trials.

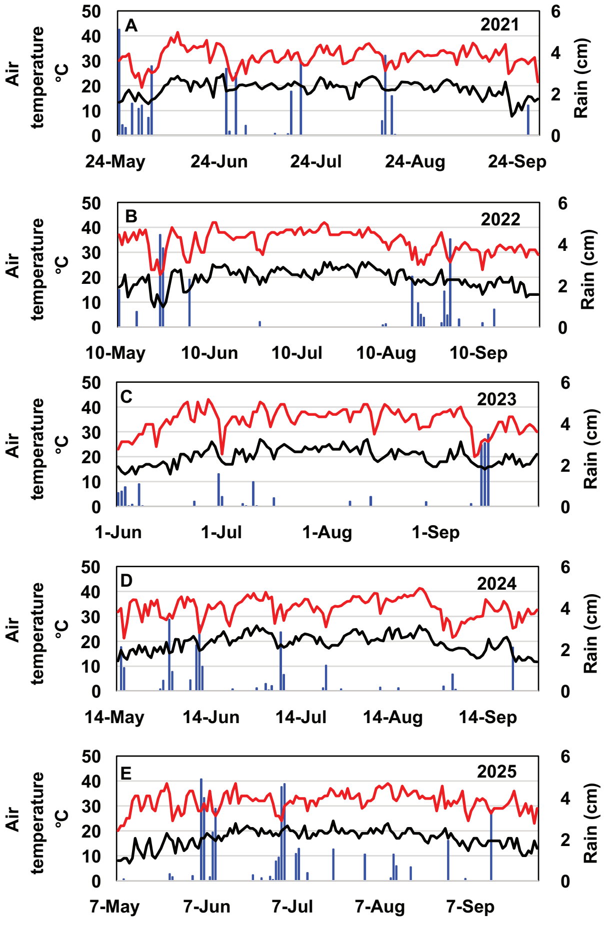

Figure 1. Maximum (red) and minimum (black) air temperature and rain (blue) at the test site: A) 2021, B) 2022, C) 2023, D) 2024, E) 2025

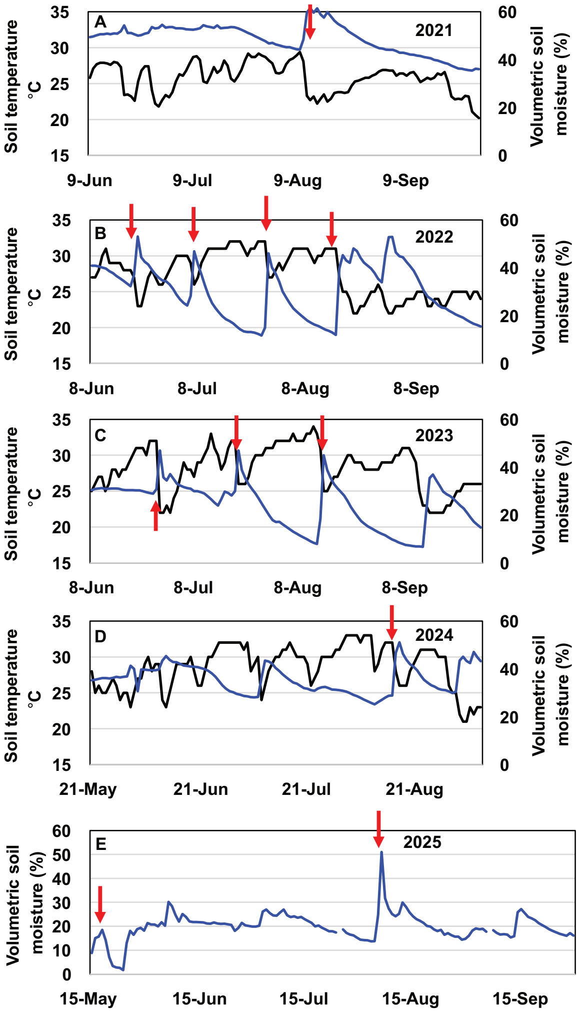

Figure 2. Average daily soil temperature (black) and volumetric soil moisture (blue) at a 10 cm depth at the test site. Furrow irrigation occurred on the dates with the red arrows: A) 2021, B) 2022, C) 2023, D) 2024, E) 2025. In 2025, the temperature sensor misfunctioned.

Lint yield was higher ($p < 0.05$) for the resistant DP 2141NR B3XF, DP 2143NR B3XF, and DP 2522NR B3TXF than the susceptible group in 3 of 4 trials, 4 of 5 trials, and 1 of 1 trial, respectively (Table 3). Lint yield was higher ($p < 0.05$) for the older Phytogen varieties (PHY 205 W3FE, PHY 332 W3FE, PHY 411 W3FE, and PHY 443 W3FE) than

Table 2. Effect of reniform nematode-resistant and susceptible varieties on reniform nematode density (Ren[z]) in trials from 2021-2025

	2021		2022		2023		2024		2025	
	Ren	**LRen**	**Ren**	**LRen**	**Ren**	**LRen**	**Ren**	**Lren**	**Ren**	**LRen**
Variety	--100 cm^3 soil^{-1}--									
Susceptible[y]	667	2.70 a	419	2.49 a	814	2.84 a	634	2.53 a	429	2.51 a
DP 2141NR B3XF	240	2.29 ab	100	2.00 b	147	2.05 bc	220	1.83 b		
DP 2143NR B3XF	100	1.59 c	240	2.27 ab	200	1.75 c	110	1.92 b	360	2.49 a
DP 2522NR B3TXF									240	2.38 a
PHY 205 W3FE	540	2.68 ab	390	2.54 a	250	2.27 bc	135	1.56 b	500	2.66 a
PHY 332 W3FE	340	2.44 ab	270	2.27 ab	254	2.88 bc	173	1.94 b	370	2.56 a
PHY 357 W3FE							90	1.56 b	290	2.42 a
PHY 411 W3FE	320	2.35 ab	190	2.24 ab	220	2.20 bc	75	1.65 b	190	1.79 b
PHY 433 W3FE							345	2.15 ab	350	2.53 a
PHY 443 W3FE	190	2.22 b	80	1.79 b	420	2.60 ab	185	2.11 ab		
PHY 475 W3FE					360	2.36 abc			55	1.71 b
ST 5931AXTP							48	1.68 b	310	2.42 a
Prob>F	0.085	0.001	0.032	0.015	0.001	0.005	0.059	0.001	0.086	0.009

[z] Least square means of the vermiform stages of reniform nematode/100 cm^3 soil = Ren approximately the week after the last irrigation event. LRen is LOG$_{10}$(Ren+1) least square means. A conservative T grouping for least squares means, with alpha = 0.05. Least squares mean with the same letters are not significantly different.

[y] Reniform nematode susceptible varieties are listed in Table 5.

the susceptible group in 4 of 5 trials, 5 of 5 trials, 5 of 5 trials, and 4 of 4 trials, respectively (Table 3). Lint yield was higher for the newer Phytogen varieties (PHY 357 W3FE, PHY 433 W3FE, and PHY 475 W3FE) than the susceptible group in 2 of 2 trials for these three varieties. Lint yield was higher for ST 5931AXTP than the susceptible group in 1 of 2 years (Table 3).

Yield and Fiber Properties. Lint value/hectare was higher ($p < 0.05$) for the resistant DP 2141NR B3XF, DP 2143NR B3XF, and DP 2522NR B3TXF than the susceptible group in 3 of 4 trials, 4 of 5 trials, and 1 of 1 trial, respectively (Table 4). Lint value/hectare was higher for the older Phytogen varieties (PHY 205 W3FE, PHY 332 W3FE, PHY 411 W3FE, and PHY 443 W3FE) than the susceptible group in 3 of 5 trials, 5 of 5 trials, 5 of 5 trials, and 4 of 4 trials, respectively (Table 4). Lint value/hectare was higher for the newer Phytogen varieties (PHY 357 W3FE, PHY 433 W3FE, and PHY 475 W3FE) than the susceptible group in 2 of 2 trials for these three varieties. Lint value/hectare was higher for ST 5931AXTP than the susceptible group in 1 of 2 years (Table 4).

Fiber properties for micronaire, length, and strength for each individual variety included in a trial are presented in Table 5. Micronaire was in the discount range (> 5.0) in 2022 for DP 2141NR B3XF, DP 2143NR B3XF, and PHY 205 W3FE; in 2023 for DP 2141NR B3XF, DP 2143NR B3XF, and PHY 332 W3FE; and in 2024 for DP 2143NR B3XF (Table 5). DP 2141NR B3XF had greater fiber length and strength than the test averages for all four trials. DP 2143NR B3XF had greater than test average fiber length in 3 of 5 trials and greater than average strength in 4 of 5 trials (Table 5).

PHY 205 W3FE had shorter than average fiber length for all 5 trials, and weaker than test average fiber strength for 1 of 5 trials; fiber strength was generally only slightly higher than the test averages for all other trials. PHY 332 W3FE had longer fiber length and strength than the test averages for all five trials. PHY 411 W3FE had shorter fiber length than the test averages for all five trials but had better fiber strength than the test averages in all five trials. PHY 443 W3FE fiber length was longer than the test average in 2 of 4 trials, and better fiber strength in 3 of 4 trials than the test average. The newer PHY 357 W3FE and PHY 433 W3FE had excellent fiber length and strength in 2 of 2 trials. PHY 475 W3FE had shorter fiber length but better fiber strength than the test averages in 2 of 2 trials. ST 5931AXTP had

Table 3. Effect of reniform nematode-resistant and susceptible varieties on cotton lint yield from 2021-2025

	2021	2022	2023	2024	2025
Variety			---kg ha^{-1}---		
Susceptible[z]	523 d[y]	356 e	501 d	701 d	746 e
DP 2141NR B3XF	1013 b	683 cd	676 c	716 cd	
DP 2143NR B3XF	792 c	844 abc	774 bc	766 cd	1148 bcd
DP 2522NR B3TXF					1339 ab
PHY 205 W3FE	1177 ab	627 d	694 bc	852 bcd	942 d
PHY 332 W3FE	1255 a	913 ab	797 bc	1123 ab	1350 ab
PHY 357 W3FE				1328 a	1186 abc
PHY 411 W3FE	1093 ab	1008 a	1178 a	1139 ab	1238 abc
PHY 433 W3FE				1316 a	1083 cd
PHY 443 W3FE	1026 b	837 bc	832 b	1259 a	
PHY 475 W3FE			794 bc		1407 a
ST 5931AXTP				998 abc	923 de
Prob>F	0.001	0.001	0.001	0.001	0.001

[z] **Reniform nematode susceptible varieties are listed in Table 5 for each year.**

[y] **A conservative T grouping for least squares means, with alpha = 0.05. Least squares mean with the same letters are not significantly different.**

Table 4. Effect reniform nematode-resistant and susceptible varieties on cotton lint value[z] in trials from 2021-2025

	2021	2022	2023	2024	2025
Variety			---\$ ha^{-1}---		
Susceptible[z]	652 d[x]	416 e	557 e	841 c	936 f
DP 2141NR B3XF	1291 b	792 cd	746 d	879 bc	
DP 2143NR B3XF	996 c	1016 ab	885 bc	928 bc	1392 cde
DP 2522NR B3TXF					1665 abc
PHY 205 W3FE	1439 ab	674 d	763 cd	1011 bc	1123 ef
PHY 332 W3FE	1601 a	1144 ab	955 b	1377 a	1713 ab
PHY 357 W3FE				1624 a	1507 a-d
PHY 411 W3FE	1346 b	1195 a	1277 a	1314 ab	1469 bcd
PHY 433 W3FE				1618 a	1362 de
PHY 443 W3FE	1304 b	981 bc	896 b	1503 a	
PHY 475 W3FE			874 bcd		1760 a
ST 5931AXTP				1200 ab	1149 ef
Prob>F	0.001	0.001	0.001	0.001	

[z] **The value/ha was calculated by multiplying the loan value x lint yield (kg/ha) = \$Value/ha.**

[y] **Reniform nematode susceptible varieties are listed in Table 5.**

[x] **A conservative T grouping for least squares means, with alpha = 0.05. Least squares mean with the same letters are not significantly different.**

higher fiber strength and length than the test averages in 2 of 2 trials.

In the analyses for the group of susceptible versus group of resistant varieties, there was a 59% reduction in nematode density for the resistant group (Table 6). Lint yield averaged 983 kg/ha for the group of resistant varieties compared to 559 kg/ha for the susceptible varieties. Lint value/hectare averaged \$1,184/ha higher for the group of resistant varieties compared to \$670/ha for the susceptible varieties. The actual improvement in yield varied depending on the variety of choice. For the varieties that were

Table 5. Effect of varieties tested in a reniform nematode field on fiber[z] properties

	2021			2022			2023			2024			2025			Nem[y] Rating
	Mic	Len	Str	Mic	Len	Str	Mic	Len	Str	Mic	Len	Str	Mic	Len	Str	
Variety		in	g		in	g		in	g		in	g		in	g	
Armor 9371 B3XF										4.8	1.15	28.7				S
Armor 9413 XF										4.7	1.07	26.3				S
Armor 9831 B3XF										4.8	1.15	31.2				S
DP 1820 B3XF	4.5	1.18	33.7													S
DP 1845 B3XF	3.7	1.21	32.5													S
DP 2012 B3XF				4.6	1.08	28.7										S
DP 2038 B3XF							4.6	1.05	27.5							S
DP 2044 B3XF	3.8	1.17	33.1													S
DP 2115 B3XF				4.9	1.07	29.3										S
DP 2127 B3XF							5.5	1.06	27.7	4.9	1.11	28.9				S
DP 2141NR B3XF	4.5	1.15	32.3	5.5	1.13	32.2	5.4	1.09	28.9	4.9	1.14	32.1				R
DP 2143NR B3XF	4.4	1.12	32.3	5.1	1.18	32.8	5.5	1.11	29.7	5.1	1.16	31.2	4.7	1.14	31.1	R
DP 2317 B3TXF							4.3	1.08	25.8	4.3	1.16	29.8				S
DP 2335 B3XF													3.9	1.19	31.0	S
DP 2414 B3TXF										4.0	1.13	28.7				S
DP 2522NR B3TXF													4.6	1.13	27.7	R
DP 393				4.7	1.11	31.7							4.0	1.12	29.5	S
FM 1621GL	4.2	1.09	30.1	4.9	1.03	30.3										S
FM 2202GL	4.0	1.11	32.3													S
FM 2398GLTP	4.6	1.14	30.2													S
FM 2498GLT	4.8	1.12	30.0													S
FM 765AX										4.7	1.08	28.4	4.3	1.17	31.3	S
FM 868AXTP										4.6	1.13	30.6				S
NG 3195 B3XF	3.9	1.12	30.4	4.6	1.09	29.5	4.7	1.06	28.2	4.5	1.11	28.9				S
NG 3956 B3XF	4.3	1.11	30.5													S
NG 2535 B3XF													4.0	1.17	32.8	S
PHY 205 W3FE	4.5	1.09	31.0	5.1	1.03	31.7	3.7	1.02	28.6	4.6	1.07	30.1	4.4	1.08	31.1	R
PHY 332 W3FE	4.1	1.16	32.3	4.9	1.16	31.5	5.1	1.12	30.0	4.5	1.13	30.6	4.4	1.16	31.3	R
PHY 357 W3FE										4.8	1.16	31.9	4.4	1.16	31.3	R
PHY 411 W3FE	4.4	1.08	32.1	4.9	1.09	32.0	4.9	1.03	29.2	4.9	1.07	30.2	4.7	1.08	30.3	R
PHY 433 W3FE										4.6	1.17	32.3	4.3	1.19	33.4	R
PHY 443 W3FE	4.2	1.14	32.6	5.3	1.12	32.0	5.3	1.06	29.1	4.8	1.11	29.2				R
PHY 475 W3FE							4.9	1.03	29.3				4.5	1.12	31.9	R
ST 5931AXTP										4.6	1.16	31.1	3.4	1.18	31.6	R
UA 103													4.0	1.14	29.8	S
Prob>F	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.01	0.06	0.29	0.00	0.00	0.00	0.01	0.01	

[z] **Mic is micronaire, Len is fiber length in inches, Str is fiber strength in grams tex^{-1}.**

[y] **Nem rating is reniform nematode rating, where R is resistant and S is susceptible.**

used for all five trials (DP 2143NR B3XF, PHY 205 W3FE, PHY 332 W3FE, PHY 411 W3FE, versus susceptible group), a least square means analysis for value/hectare indicated that PHY 332 W3FE ($1357.97/ha or $519.15/ac) and PHY 411 W3FE ($1,332.23/ha or $539.13/ac) were more profitable than DP 2143NR B3XF ($1,043.48/ha or $422.28/ac), PHY 205 W3FE ($1,007.42/ha or $407.68/ac),

Table 6. Least square mean yield and reniform nematode densities (Ren) when varieties were grouped as resistant or susceptible combined across five years

	Lint Yield	Yield X Loan	Ren. Nematode	LOG_{10} (Ren+1)
Type of Variety	kg ha^{-1}	\$ ha^{-1}	------------------100 cm^3 $soil^{-1}$	------------------
Resistant	**983**	**1,184**	**241**	**2.16**
Susceptible	**559**	**670**	**595**	**2.62**
Prob>F	**0.001**	**0.001**	**0.001**	**0.001**

and the susceptible group of varieties (\$673.31/ha or \$272.48/ac). All four reniform nematode resistant varieties that were in the tests from 2021 to 2025 had higher value/hectare than the susceptible group of varieties.

CONCLUSIONS

Variety testing in other regions could have different results when comparing reniform nematode-resistant varieties to susceptible varieties, particularly with regards to yield. Watson (2024) reported a consistent reduction in reniform nematode density with resistant (Phytogen varieties) compared to susceptible varieties, but there was no consistent yield increase with resistant varieties compared to susceptible varieties. In Mississippi, Connor et al. (2023) found no significant yield difference in a reniform nematode field trial between resistant and susceptible varieties. In 2021 for a protocol conducted in multiple states with the Beltwide Nematode Research and Education Committee (Faske et al., 2022), the reniform nematode susceptible variety, DP 1646 B2XF averaged 1,582 lbs of lint/acre and the reniform nematode resistant variety DP 2141NR B3XF averaged 1,014 lbs of lint/acre, which was a significant ($p = 0.05$) reduction in yield for the resistant variety. This study was across seven locations. So, yield comparison between resistant and susceptible varieties is a cultivar specific or location specific response. It is noteworthy that the yield advantage of reniform nematode-resistant varieties over susceptible varieties was every year in this West Texas location. The water limited environment in West Texas can play a significant role in the yield advantage encountered by resistant varieties. Although the reniform nematode populations in West Texas would be considered low compared to reniform nematode infested areas elsewhere in the U.S., they cause high yield loss in cotton in this environment. The temperature/water stress in which cotton is produced in this region resulted in consistently high yield loss caused by reniform nematode (higher loss/unit vermiform reniform nematode). Reniform nematode damage thresholds vary greatly across the U.S., but in this region, Wheeler et al., (2008) found that 203 reniform nematodes/100 cm^3 soil (preplant) were sufficient to cause a 70% yield loss.

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