

Root-knot nematode variety trial results, 2009

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Root-knot nematode is an economically important pest of cotton throughout the Southern High Plains of Texas. Historically, resistance to the root-knot nematode was limited; however, several newly released varieties have confirmed partial resistance. The objective of this work was to evaluate cotton varieties with varying levels of resistance in fields infested with the root-knot nematode. Field tests were conducted at Lamesa, Ropesville, and Whiteface. The test at Lamesa consisted of 20 entries and was planted using a low rate of Temik 15G (2.5 lbs) at planting. The test at Ropesville consisted of 32 entries and was planted with 3.5 lbs of Temik 15G at planting, and the test at Whiteface consisted of 16 entries in a split-plot design with variety as the main factor and Temik 15G (5 lbs/acre) as the subplot. All sites had a moderate to high density of root-knot nematode. The root-knot nematode density at Ropesville was sampled in late October and numbers had already started to crash for the year.

At the Lamesa site (study was conducted by Dr. Jane Dever, Texas AgriLife Research), the best yielding varieties were: Deltapine (DP) 174RF, DP 0935B2RF, Stoneville (ST) 5458B2F, Phytogen 367WRF, and ST 5288B2F (Table 1). Fiber data is not currently available at this site, so a value/acre has not yet been calculated. This was the site with the longest growing season and was under center pivot irrigation. A more complete report from this site can be found at <http://lubbock.tamu.edu/cotton/pdf/2009AGCARES.pdf>

At the site located in Ropesville, the highest valued (lint yield x loan value – seed and technology costs) varieties were DP 0912B2RF and ST 4288B2F (Table 2). The highest yielding varieties were DP 0912B2RF, ST 4288B2F, ST 4498B2F, and Phytogen (PG) 367WRF (Table 2). Both ST 5288B2F and DP 0935B2RF were also planted at this site, but they performed poorer at this site than in the Lamesa site. ST 4288B2F which was the second highest ranked variety (2 of 32) at this site, was ranked 7th of 20 varieties in Lamesa, based on yield. This site was under center pivot irrigation.

The Whiteface site was planted into drip irrigation, with the tape under every bed. In the absence of Temik 15G, the fewest number of root galls was seen on DP 174RF (Table 3). When Temik 15G was present, the average number of galls was less than when Temik 15G was absent across all varieties. The highest valued varieties were NexGen (NG) 2549B2RF and ST 4288B2F (Table 3). The varieties with the highest yields were NG 2549B2RF, DP 0935B2RF, ST 4288B2F, ST 5458B2F, and PG 367WRF (Table 3). All of these varieties except for NG 2549B2RF were top yielders at one or more of the other sites. DP 174RF, which was the best yielding variety at Lamesa was ranked 12th of 16 varieties at this site. Growing season length certainly affects the performance of some of these varieties.

A relative root-knot nematode rating was calculated for varieties that were planted in at least two of the three sites (14 varieties). With this statistic, every variety can have a 0 to 1 value, with 1 being the most reproduction at a site and 0 being no reproduction by root-knot nematode at a site. These ratings were constructed to get an idea of which varieties most consistently had lower levels of root-knot nematode by the season end. DP 174RF and PG 367WRF had the lowest ratings, followed by NG 2549B2RF, ST 4288B2F, and ST 5458B2F (Table 4). All of these varieties except for NG 2549B2F are known to have been developed from root-knot nematode resistant germplasm. Varieties with the highest reproduction were Fibermax (FM) 9160B2F, NG 1556RF, and ST 5288B2F (Table 4). A good strategy for selecting varieties may be to consider yield performance, maturity grouping, and degree of root-knot nematode reproduction.

Table 1. Root-knot nematode trial in Lamesa in 2009

Variety	Lint yield (lb/A)	RK ^a
Deltapine 174RF	1,573 a ^b	305 g
Deltapine 0935B2RF	1,547 ab	6,090 a-e
Stoneville 5458B2RF	1,407 a-c	3,945 a-f
Phytogen 367WRF	1,396 a-d	600 fg
Stoneville 5288B2F	1,384 a-d	10,830 ab
Phytogen 565WRF	1,373 a-d	9,150 ab
Stoneville 4288B2F	1,348 b-e	1,110 b-g
Fibermax 955LLB2	1,346 b-f	21,990 a
Cropland Genetics 3220B2RF	1,324 c-g	5,820 a-e
All-Tex 8VCRN-123	1,322 c-g	9,930 a-d
Cropland Genetics 3035RF	1,277 c-h	4,050 e-g
Deltapine 164B2RF	1,251 c-h	4,800 d-g
BCXS 1010B2F	1,221 c-h	3,900 a-e
Fibermax 9170B2F	1,211 c-h	11,490 ab
Cropland Genetics 4020 B2RF	1,207 c-h	6,780 c-g
Cropland Genetics 3520B2RF	1,199 d-h	1,920 b-g
Fibermax 1845LLB2	1,146 d-h	11,910 a-d
Fibermax 9160B2F	1,141 f-h	16,020 ab
Fibermax 9063B2F	1,134 gh	11,790 a-b
Cropland Genetics 3020B2RF	1,112 h	4,200 a-e

^aRK is root-knot nematodes / 500 cm³ soil. More detail from this site is available at <http://lubbock.tamu.edu/cotton/pdf/2009AGCARES.pdf> (under Dever as first author, root-knot nematode trial).

^b Means followed by different letters are significantly different at $P = 0.05$, based on the Waller-Duncan k-ratio t-test.

Table 2. Root-knot nematode trial near Ropesville in 2009.

Variety	Return (\$/A) ^a	Lint yield (lb/A)	Plants/Ft. row	RK ^b
Deltapine 0912B2RF	620 a ^c	1,234 a ^c	2.3 c-i ^c	1,695 a
Stoneville 4288B2F	594 ab	1,174 ab	2.6 a-g	930 a
Phytogen 367WRF	551 bc	1,114 a-d	2.9 ab	120 a
Stoneville 4498B2F	549 bc	1,155 abc	2.3 b-i	630 a
Fibermax 9160B2F	539 bcd	1,105 bcd	3.0 a	1,950 a
NexGen 3348B2RF	523 cde	1,082 b-e	2.7 a-f	995 a
NexGen 3410RF	513 c-f	1,076 b-e	2.8 abc	1,350 a
Fibermax 9170B2F	502 c-g	1,056 b-e	2.8 a-e	875 a
Phytogen 425RF	495 c-h	1,032 c-g	2.8 a-d	1,020 a
Deltapine 104B2RF	478 d-i	1,025 d-g	2.6 a-g	390 a
Deltapine 1032B2RF	463 e-j	1,020 d-g	1.6 j	4,315 a
NexGen 2549B2RF	455 f-k	1,048 c-f	2.6 a-g	565 a
All-Tex Epic RF	449 f-l	991 d-h	2.1 g-j	560 a
Phytogen 375WRF	447 g-l	969 e-i	2.8 a-f	1,020 a
Fibermax 9180B2F	433 h-m	880 h-k	2.9 ab	1,170 a
NexGen F015B2RF	423 i-n	916 hij	2.2 f-i	1,530 a
Americot 1550B2RF	423 i-n	992 d-h	2.7 a-g	1,150 a
All-Tex Patriot RF	417 i-n	889 h-k	2.2 e-i	620 a
NexGen 1556RF	414 i-p	844 jkl	2.5 a-h	3,630 a
Stoneville 4554B2RF	399 j-q	893 h-k	2.2 d-i	690 a
Americot 1532B2RF	396 k-q	886 h-k	2.1 g-j	745 a
NexGen 3273B2RF	396 k-q	925 f-j	2.3 c-i	655 a
Deltapine 0920B2RF	386 l-r	865 ijk	2.3 b-i	1,395 a
Stoneville 5288B2F	369 m-s	874 h-k	2.3 b-i	1,980 a
AFD 5065B2F	368 m-s	800 jkl	2.6 a-g	220 a
Deltapine 0935B2RF	362 n-s	855 ijk	2.2 f-i	1,380 a
NexGen 712B2RF	353 o-s	814 jkl	2.4 b-i	940 a
Deltapine 1044B2RF	351 p-s	851 ijk	2.1 g-j	1,840 a
BCSX 1010B2F	345 q-s	831 jkl	1.9 ij	1,015 a
NexGen 3538RF	340 q-s	725 l	2.0 hij	495 a
Deltapine 1034B2RF	323 r-s	774 kl	1.6 j	515 a
Deltapine EXP	305 s	778 kl	1.6 j	695 a

^a \$/acre = (lint yield/acre x loan value) – cost of seed and technology fees/acre. Seed and technology fee values were obtained from the Plains Cotton Grower's web site

<http://www.plainscotton.org>

^b RK is root-knot nematodes/500 cm³ soil.

^c Means followed by different letters are significantly different at $P = 0.05$, based on the Waller-Duncan k-ratio t-test.

Table 3. Root-knot nematode trial near Whiteface in 2009.

Variety	Return (\$/A) ^a	Lint yield (lb/A)	Galls/root		Plants/ Ft. row	RK ^c
			T ^b =0	T ^b =5		
NexGen 2549B2RF	929 a ^d	1,965 a ^d	26 ab ^d	21 a ^d	3.2 a ^d	693 a-c ^d
Stoneville 4288B2F	895 ab	1,883 abc	17 bc	7 b	3.3 a	781 bc
Fibermax 9180B2F	863 bc	1,828 bcd	34 a	16 ab	3.2 a	3,096 ab
Stoneville 5458B2F	830 cd	1,863 abc	27 ab	11 ab	3.1 a	1,770 ab
Fibermax 9160B2F	824 cd	1,808 b-e	18 bc	12 ab	2.9 a	5,854 ab
Deltapine 0935B2RF	808 cde	1,915 ab	26 ab	11 ab	3.1 a	2,244 ab
Phytogen 367WRF	804 de	1,853 abc	17 bc	11 ab	3.3 a	809 c
Stoneville 5288B2F	790 de	1,797 cde	22 b	8 b	3.0 a	3,891 ab
Deltapine 0920B2RF	783 def	1,718 def	21 b	16 ab	3.1 a	4,910 ab
Phytogen 375WRF	781 def	1,852 bc	24 ab	12 ab	2.9 a	5,550 a
NexGen 1556RF	761 efg	1,459 h	19 b	15 ab	3.2 a	3,124 ab
Deltapine 174RF	733 fgh	1,708 ef	7 c	10 b	3.2 a	450 c
All-Tex Epic RF	718 gh	1,635 fg	16 bc	14 ab	3.2 a	3,428 a-c
All-Tex Apex B2RF	683 h	1,585 g	27 ab	17 ab	3.1 a	1,885 ab
All-Tex Orbit RF	613 i	1,391 hi	16 bc	13 ab	3.1 a	1,444 ab
Deltapine 141B2RF	538 j	1,329 i	18 bc	13 ab	2.8 a	4,360 ab

^a\$/acre = (lint yield/acre x loan value) – cost of seed and technology fees/acre – cost of Temik 15G. Seed and technology fee values were obtained from the Plains Cotton Grower's web site <http://www.plainscotton.org> Temik 15G applied at 5 lbs/acre was estimated at \$17.50/acre.

^bT = Temik 15G applied in lbs/acre.

^dRK is root-knot nematode/500 cm³ soil, sampled on 18 September. Mean separation was applied to log₁₀ transformed values.

^eMeans followed by different letters are significantly different at $P = 0.05$, based on the Waller-Duncan k-ratio t-test.

Table 4. Relative rating^a of root-knot nematode reproduction (Rk) across the three sites, for varieties in at least two of the three sites.

Variety	Rel. Rk
Deltapine 174RF	0.6282
Phytogen 367WRF	0.6685
NexGen 2549B2RF	0.7610
Stoneville 4288B2F	0.7700
Stoneville 5458B2F	0.8395
All-Tex Epic RF	0.8526
Deltapine 935B2RF	0.8850
Fibermax 9170B2F	0.9028
Fibermax 9180B2F	0.9135
Phytogen 375WRF	0.9162
Deltapine 920B2RF	0.9279
Stoneville 5288B2RF	0.9404
NexGen 1556RF	0.9590
Fibermax 9160B2F	0.9689

^aRelative rating for each test was calculated by taking a Log10 transformation of the average root-knot nematode density at that site and dividing it by the Log10 transformed highest average density at that site. For Lamesa, Ropesville and Whiteface, transformed averages were divided by 4.2, 3.63, and 3.77 respectively.