DEVELOPMENT OF TRANSGENIC ACALA 1517 COTTON

Jinfa Zhang
Department of Plant and Environmental Sciences, New Mexico State University
Las Cruces, NM
Roy Cantrell
Cotton Incorporated
Cary, NC
S. Ed Hughs
USDA-ARS-Southwestern Cotton Ginning Research Laboratory
Mesilla Park, NM

Abstract

Through backcross breeding, insect resistant Bt genes (W, BG, and BGII) and herbicide resistant Roundup Ready genes (RR and RF) have been introduced into Acala 1517 cotton, resulting in the development of one Acala cultivar 1517-99W and a number of elite breeding lines. Acala 1517 germplasm with two Bt genes - WideStrike (W), RR and W/RR have been tested in multiple environments since 2003, while Acala 1517 with BGII/RF were tested in 2007.

Introduction

Since transgenic cotton was first approved for commercial use in the U.S. in 1995, biotech cotton acreage has been steadily increased in major cotton-growing countries including U.S., China, India and Brazil. The release of commercial cotton cultivars containing Bt and/or Roundup-Ready genes has been solely through a partnership between Monsanto and seed companies. Several issues and concerns arise from this partnership. First, seed companies have been utilizing their in-house conventional germplasm and cultivars for conversion through backcrossing breeding. This has resulted in little genetic gain in improving cotton yield, quality, and stress tolerance since no other desirable genes are introduced into the recurrent parents except for the transgenes. Second, the public cotton breeding programs were inaccessible to the biotechnology, leaving numerous elite public germplasm lines unused for the benefits of cotton growers. Third, some small niche markets with small cotton acreages may not have necessary adapted transgenic cotton cultivars, because large seed companies tend to focus on large growing regions. Fourth, this partnership between Monsanto and seed companies may not work in the future if other biotech companies provide similar but competitive biotech traits and seed companies have more options. This has provided incentives for biotech companies such as Monsanto to seek other outlets for their biotechnology.

In early 2000, an agreement between New Mexico State University (NMSU) and Dow/Phytogen was reached to transfer Dow's Bt genes into Acala 1517-99. In 2003, NMSU participated in the Cotton States Program offered by Monsanto. Through the collaborations, Dow's Widestrike and Monsanto's BGII, RR and RF traits have been transferred into the Acala 1517 cotton background.

The objective of the paper was to report the progress on developing transgenic Acala 1517 germplasm in the New Mexico Cotton Breeding Program.

Materials and Methods

Breeding Strategy

Backcross introgression has been used for introducing Bt, Roundup Ready (RR), Bollgard II (BGII) and Roundup Ready Flex (RF) genes into Acala 1517 cotton (Fig. 1). The recurrent parents were Acala 1517-99 and NM 970123. Individual progenies selected or plants selected after seed increase were advanced to the Preliminary Yield Trial (PYT) in replicated field tests in one location (Las Cruces, NM) in one year. Elite breeding lines selected from PYT were further advanced to the Advanced Yield Trial (AYT) in replicated field tests in two locations (Las Cruces and Artesia, NM) in 2-3 years. Several promising lines were further tested in multiple locations in and outside of New Mexico.

2003

Acala 1517 Bt PYT: In 2002, 10 individual plants from each of the 100 $BC_3F_{2:3}$ progenies with Dow's two Bt genes were randomly selected for selfing at the Leyendecker Plant Science Research Center (PSRC). In the fall, these individual plants were evaluated for agronomic performance in the field. As a result, open-pollinated mature bolls were harvested from 294 plants that had selfed mature bolls. Based on seed-cotton yield/plant, number of bolls/plant, boll size, lint percentage, and fiber length, selfed seeds from 265 individual plants were advanced for seed increase in Costa Rica in the winter of 2002-2003.

In 2003, 216 $BC_3F_{2:4}$ lines of 265 were divided into three separate replicated PYT trials with 72 progenies each. 1517-99 and PHY 72 were included as standards for comparison. All the entries were arranged in random complete block designs with 3-4 replications. The plot size was 1 row x 24.5 ft. All the plots were planted on May 9, 2003 and harvested on Nov. 26, 2003. Seed cotton yield was measured by the seed-cotton weight mechanically harvested. Prior to mechanical harvest, 25 sound open bolls from each plot were hand picked. However, only these progenies with potentially higher seed-cotton yield were selected for determining boll size, lint percentage and fiber quality.

Acala 1517 RR PYT: 90 Acala 1517 RR $BC_3F_{2:3}$ progenies were grown in the field. Depending on the seed amounts, the progenies were grown in 1 to 6 rows with an average of 2.9 rows/progeny (1 row- 17 progenies; 2 rows- 22 progenies; 3 rows- 19 progenies; 4 rows- 19 progenies; 5 rows- 12 progenies; and 6 rows- 1 progeny). 1517-99 and ST 5599BG were grown as standards between every 5-6 progeny rows. The plot size was 1 row x 24.5 ft. Planting, harvesting, and production practices were the same as these for Acala 1517 Bt PYT. The individual rows were harvested separately for seed-cotton yield analysis based on one-way analysis of variance (ANOVA).

Acala Bt/RR PYT: 47 Acala 1517 Bt/RR progenies were planted in 1-2 rows (31 progenies had 2 rows). The plot size was 1 row x 24.5 ft. Planting, harvesting, and production practices were the same as these for Acala 1517 Bt PYT.

Acala 1517 AYT: 34 advanced Acala Bt strains were tested in three locations: Leyendecker Plant Science Research Center (PSRC), Tharp Farm, and Artesia Science Research Center (ASRC). Included in PSRC and ASRC were also three standards, Acala 1517-99, Acala PHY 72 and ST 5599 BG. All entries were arranged in random complete block designs that were replicated 3 (Tharp Farm and ASRC) or 4 (PSRC) times. In PSRC, 148 2-row x 24.5 ft plots were planted with a 4-row planter on May 9, 2003 and harvested on Nov. 26, 2003. In ASRC, 111 2-row x 30 ft plots were planted with a 2-row planter on May 6, 2003 and harvested on Nov. 12, 2003. Prior to mechanical harvest, 25 sound open bolls from each plot were hand picked. The grab seed-cotton boll samples were weighted to determine boll size and then ginned to determine lint percentage. A sub-sample of fiber from each plot was tested for fiber length, strength, and fineness at the Fiber Testing Lab of the NM Cotton Breeding Program.

On-farm Trial: The 34 advanced Acala 1517 Bt lines were grown in Tharp Farm, Las Cruces, NM, in a randomized complete block design with 4 replicates. Irrigation, weeds and insect controls were implemented as needed during the cotton growing season. Before mechanical harvest, 50 open bolls from the individual plots were hand harvested for measuring agronomic and fiber traits. In PSRC and Tharp Farm, on Nov. 19-20, 2003, plots were rated 1-2 times for productivity based on a scale of 1 to 5 with 1 being poor and 5 being most productive.

2004

Four AYT trials in Las Cruces and 2 AYT trials in Artesia were conducted, with each containing 31 lines and a check (1517-99). Each test was arranged in a randomized complete block design with 3-4 replicates. The plot size was 2 rows x 40 ft. The planting dates and crop management practices were similar to these in 2003.

2005

One PYT and 2 AYT field tests were conducted in Las Cruces and Artesia with the same experimental design as that in 2004.

2006

Two AYT field tests were conducted in Las Cruces and Artesia with the same experimental design as that in 2004 and 2005.

2007

One AYT field test was conducted in Las Cruces and Artesia with the same experimental design as that in 2004 -2006. In this test at Artesia, *Verticillium* wilt (Vw) resistance was also evaluated. After harvesting, 30 plants per plot were cut to assess stem infection by Vw. The number of infected plants is divided by the total number of plants screened to calculate percentage of infected plants.

Fiber Quality Test

Either used in-house single instruments at NMSU or HVI by Cotton Inc.

Data Analysis

Data collected were subjected to the analysis of variance with LSD obtained to compare the tested lines with check cultivar(s).

Results and Analysis

2003

Acala Bt AYT

Lint yield: On average, the Bt strains produced 5.9-8.4% higher lint yield than 1517-99 in the two locations, which was the recurrent parent for the development of these Bt lines. However, significant yield variation was also detected among the Bt lines. The lint yield for individual lines ranged from 88.3% to 122.7% of the check in Las Cruces and 94.7% to 129.1% of 1517-99 in Artesia. NM 020062, 020068, 020073, 020077, 020096, 020119, 020130, and 020146 had consistently higher lint yield than 1517-99 in both locations. NM 020062, 020073, 020077, and 020097 were top peformers (>20% more yield) in Las Cruces (Table 1), while NM 020068 and 020119 also produced 20% more lint than 1517-99 in Artesia.

On average, Bt lines had similar lint percentage and fiber quality as compared with their recurrent parent, 1517-99. However, significant genetic variation did exist among these selected Bt lines in these traits. For example, in Las Cruces location, five lines had significantly higher lint percentage than 1517-99, while the lint percentage in 10 lines was significantly lower (below 38.25%); For fiber length, only 5 lines had significantly shorter fiber, whereas 8 lines had fiber longer than 1.25 inch; For fiber strength, only three lines (NM 020060, 020100, and 020104) were significantly stronger, while 5 lines had significantly weaker fiber. NM 020100 and 020104 also had significantly higher fiber strength in Artesia.

The following lines exhibited improved fiber quality:

Fiber length: NM 020056, 020088, 020092, 020096, 020104, 020131, 020155, 020156, and 020157 in Las Cruces; NM 020129, 020136, 020152, and 020155 in Artesia. NM 020155 had significantly longer fiber in both locations.

Fiber strength: NM 020060, 020100, and 020104 in Las Cruces; NM 020062, 020082, 020100, 020104, 020131, and 020142 in Artesia. NM 020100 and 020104 were identified in both locations. NM 020104 had consistently extremely strong fiber (28.1-30.8 g/tex) in both locations. It had comparable yield (87.7-112.4% of 1517-99) and fiber length (1.20-1.25 inch).

Boll size: The most significant effect due to the introduction of Bt genes is the reduction of boll size. 28 lines in Las Cruces and 23 lines in Artesia produced significantly smaller bolls than 1517-99, while only one line in Las Cruces had significantly heavier boll. On average, Acala 1517 Bt reduced boll size by 8.9-16.3%. However, the reduction of boll size should not be a concern since it was compensated by cotton plants in producing more bolls and higher yield than 1517-99.

When data from the two locations were jointly analyzed, the following strains had a combination of high yield potential and good fiber quality: NM 020062, 020068, 020073, 020077, 020097, 020119, 020131, and 020137.

Productivity ratings and its correlation with lint yield: The ratings between Las Cruces Farm (PSRC) and Tharp Farm were highly significantly correlated (r = 0.604, $P<0.01$). Also, in the PSRC field test, the productivity ratings were highly significantly correlated with lint yield (r = 0.476, $P<0.01$). Interestingly, the average ratings for the 34 Bt lines in Tharp Farm were significantly correlated with the average lint yield of the same lines tested in PSRC (r = 0.375, $P<0.05$). However, the ratings in both locations were not significantly correlated with the lint yield of the same lines tested in ASPC (r = 0.149-0.199, $P>0.05$). But the lint yield for the 37 entries in PSRC and ASPC was significantly correlated (r = 0.363, $P<0.05$), indicating that the trend of lint yield for these lines tested in the two locations was similar.

Acala 1517 Bt PYT

In Acala 1517 Bt PYT 1, four progenies, 020059-6, 020062-10, 020076-8, and 020077-8 produced significantly higher lint yield (21-29%) than 1517-99. Except for 020077-8, the other lines showed significantly higher lint percentage. 020059-6 had significantly smaller bolls than the check. However, the boll size in 30 lines was significantly larger. For fiber quality, among 20 selected lines, 11 lines had shorter fiber (below 1.17 inch); 10 lines had lower fiber strength (below 27 g/tex). Of the 4 high-yielding lines, only 020077-8 had relatively comparable fiber quality as 1517-99.

In Acala 1517 Bt PYT 2, due to high environmental variation, the F test was not significant for lint yield. However, four lines, 020090-2, 020097-8, 020102-1, and 020108-2, out-yielded 1517-99 by 18-22%, and they also had similar lint percentage, similar or smaller bolls than 1517-99. Only 30 lines had similar boll size to the recurrent parent, while most of the lines had smaller boll size. Of 34 lines tested for fiber quality, 26 had fiber longer than 1.17 inch, while only 5 lines possessed stronger fiber (>27 g/tex). Of the four high-yielding lines, only 020090-2 had comparable fiber length and stronger fiber than 1517-99.

In Acala 1517 Bt PYT 3, 020124-10 increased lint yield by 48% and the other 12 lines had 15-25% higher yield than 1517-99. Interestingly, the majority of lines (65) had similar or larger boll size than 1517-99. Most of the high-yielding lines had similar or higher lint percentage than 1517-99. All the high-yielding lines also had comparable or longer fiber than 1517-99. However, their fiber strength was all below 27 g/tex. Among the high-yielding lines, 020124-4 had fiber length of 1.35 inch; 02117-5, 020122-5, and 020126-1 had longer fiber and comparable fiber strength as 1517-99.

Acala 1517 RR PYT

The tested RR lines produced lint yield ranging from 54.6-115.6% of that in 1517-99 with an average of 1459 lb/acre vs. 1698 lb/acre for Acala 1517-99, the recurrent parent. 20 lines produced significantly lower lint yield. 11 lines produced ca. 95% yield of 1517-99, while 15 lines produced 1722 lb/acre to 1964 lb/acres, 1.4-15.6% higher than 1517-99. Of the 15 lines with equal or higher yield, 8 had smaller boll size, while the other 7 had similar boll weight. However, the other 16 lines had significantly larger bolls. There were no lines with significant higher lint percentage than 1517-99, while 5 lines had significantly reduced lint fraction, as compared with 1517-99.

The average boll size and lint percentage of the RR lines were 5.57 g/boll and 40%, respectively, as compared with 5.75 g/boll and 40% for 1517-99. Therefore, overall, the Acala 1517 RR lines had similar boll size and lint fraction as their recurrent parent, indicating that RR gene does not affect these two traits.

Among these selected lines that were tested for fiber quality, 0314703, 0314721, 0314746, 0314747, and 0314750 had similar fiber length and strength to 1517-99. No line exhibited significant enhancement in fiber quality.

Acala 1517 Bt/RR PYT

About 14 progenies produced 17% more yield than 1517-99, but most of them had inferior fiber quality (shorter and weaker). These lines usually had higher lint percentage. Five lines, including 03S1010, 03S1031, 03S1032, 03S1037, and 03S1065, appeared to have a good combination of high yield and Acala fiber quality (>1.17 inch long and >24.5 g/tex strong).

Except for one line with extremely smaller boll (3.8 g/boll), the majority of lines had boll size ranging from 5.02 g/boll to 7.07 g/boll. The lint percentage ranged from 37% to 48%. About 34 lines had shorter fiber than 1517-99, while 6 lines had fiber exceeding 1.26 inch. Whereas many lines had weaker fiber than 1517-99, four lines had fiber strength higher than 28.7 g/tex. However, their lint yield was lower.

2004

Even though the F values were not significant among genotypes tested in most of the tests, 11 Acala Bt lines had higher lint yield by 10-20% than the recurrent parent, 1517-99 (Table 1 and 2), while 3 RR lines (10-13%) and 4 Bt/RR lines (10-20%) displayed higher yield than 1517-99 (Table 3 and 4).

Among the 62 Bt lines tested, all lines had similar lint percentage and most lines had significantly smaller boll size, compared with 1517-99 (Table 1 and 2). Except for 020052 and 020059-5, all other lines had similar fiber length to 1517-99, some of which had significantly longer fiber. Except 020110-5 that had weaker fiber, all the Bt lines had similar fiber strength and the fiber from 4 lines (020062, 020104, 02062-10 and 0206702) was significantly stronger. 6 and 7 Bt lines had significantly higher and lower micronaire, respectively.

Among the Acala RR lines tested (Table 3), 4 lines had significantly lower lint percentage. 11 lines had significantly smaller boll size, while the boll size from 4 lines was significantly heavier. 6 lines had significantly longer fiber; 3 lines had significantly stronger fiber, and 4 lines had higher micronaire.

Among the Bt/RR lines tested (Table 4), 8 lines and 3 lines had significantly lower and higher lint percentage than 1517-99, respectively, while most lines had significantly smaller boll size. The fiber in 3 lines was significantly weaker and 3 other lines had stronger fiber. 7 lines had significantly lower micronaire.

2005

The results from Las Cruces, NM, are listed in Table 5, 6 and 7.

Of the 12 RR lines tested (Table 5), 6 lines had significantly higher yield (11-21%) than 1517-99; 1 and 3 lines had larger and smaller boll size, respectively; 2 lines and 1 line had significantly higher and lower lint percentage, respectively. Only 1 line had significantly shorter fiber length and the fiber from another line was significantly weaker. Three lines had significantly lower micronaire than 1517-99.

Of the 26 Bt and 5 Bt/RR lines tested (Table 6), 5 Bt lines and 1 Bt/RR line displayed significantly higher (14-19%) lint yield than 1517-99. Similar to the results obtained from 2003-2004, many lines had significantly smaller boll size and some of them had significantly lower lint percentage. Except 2 lines with significantly shorter fiber length and 2 lines with significantly weaker fiber, all other lines had similar fiber length and strength. 6 Bt lines and 2 Bt/RR lines had significantly finer fiber.

The data in Table 7 indicated that 15 lines further selected from Acala Bt, RR or Bt/RR lines had significantly higher yield than 1517-99 (14-26%). This was accompanied by the improvement in lint percentage and reduction in boll size. However, many lines had shorter, weaker and higher micronaire. This demonstrates the difficulties in simultaneously enhancing yield and fiber quality.

2006

The two AYT trials in 2005 were further tested in both Las Cruces and Artesia in 2006 (Table 8, 9, 10, and 11).

In Las Cruces, most of the selected RR lines showed significantly higher yield (12-26%) than 1517-99 (Table 8). These lines also had improved lint percentage; but a few lines had inferior fiber quality than 1517-99. In Artesia, 3 RR lines had higher yield (10-14%) than 1517-99, but the difference was insignificant. 3 lines had lower lint percentage and 6 lines displayed small boll size (Table 9).

Surprisingly, most Bt and Bt/RR lines had significantly higher yield than 1517-99 in both Las Cruces and Artesia (Table 10 and 11). Only 6 Bt lines and 1 Bt/RR line had significantly small boll size in Las Cruces, while 14 Bt lines and 4 Bt/RR lines had significantly lower boll weight in Artesia. However, all the Bt lines had similar lint percentage and 2 Bt/RR line had lower lint fraction than 1517-99 in Las Cruces location, while 15 Bt lines and 3 Bt/RR lines had significantly higher lint percentage than 1517-99 when tested in Artesia. Many Bt lines were found to have longer fiber than 1517-99 when tested in Las Cruces.

2007

31 Acala lines with BGII and RF traits were tested in two locations in 2007 and 1517-99W with two Bt genes from Dow was used as the check (Table 12). 19 Acala BGII/RF lines were 10-50% lower in *Verticilium* wilt (Vw) infection than 1517-99W, indicating that Vw resistance has been improved in the new BGII/RF lines. In Las Cruces, in comparison with 1517-99W, seedcotton yield in 17 lines were significantly lower and 14 lines were similar, even though most of them had lower yield. Only one line 06NMM019 overyielded 1517-99W by 3.8%.

In Artesia, even though most lines had lower yield, only 5 lines showed significantly lower yield than 1517-99W. Of four lines having slight yield advantages over the check, one line 06NMM010 had significantly higher yield. This line and two other lines also had similar yield in Las Cruces.

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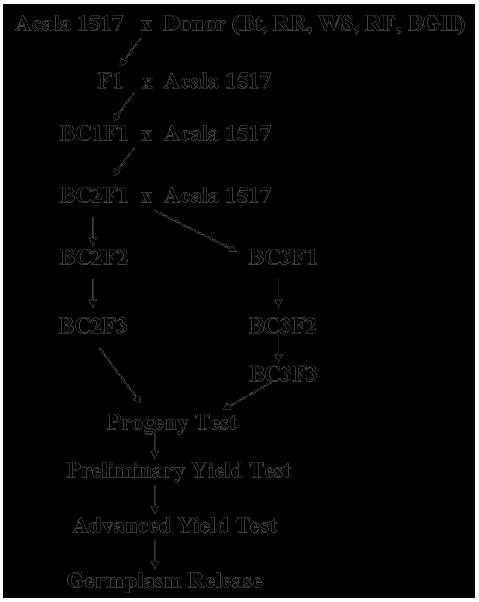

Figure 1. A flow chart to illustrate the strategy for developing Acala 1517 transgenic cotton

Table 1. Acala 1517 Bt AYT-1, Las Cruces, 2004

Genotype	Lint	yield	Lint percent	Boll size	2.5% SL	50% SL	Strength	Elo	Mic
	lb/A	CK%	%	g	inch	inch	g/tex	%	units
1517-99 (CK)	1723.62	100.00	41.47	5.87	1.23	0.61	25.45	7.25	4.42
020076-8	1832.89	106.34	41.63	5.49	1.23	0.59	25.82	6.63	4.38
020077-8	1822.96	105.76	41.36	5.65	1.27	0.64	26.11	7.75	4.30
020096-10	1803.09	104.61	41.32	5.05	1.23	0.59	24.15	7.25	4.30
020102--1	1768.32	102.59	41.17	5.42	1.23	0.60	24.04	7.75	4.32
020107-7	1768.32	102.59	39.18	5.32	1.22	0.63	24.25	8.00	3.97
020109-4	1897.47	110.09	41.27	5.06	1.23	0.62	25.79	7.25	4.40
020110-5	1788.19	103.75	41.43	5.30	1.17	0.59	20.04	7.50	4.24
020110-9	1882.57	109.22	41.16	5.85	1.27	1.24	24.39	7.75	4.20
020112-1	1768.32	102.59	41.19	5.98	1.30	0.61	24.43	7.50	4.36
020112-5	1907.40	110.66	41.75	5.22	1.19	0.58	25.30	7.25	4.38
020112-10	1698.78	98.56	40.26	5.49	1.23	0.62	24.58	7.63	4.44
020113-6	1822.96	105.76	40.84	5.88	1.30	0.63	25.96	7.75	4.24
020114-3	1971.98	114.41	45.59	5.70	1.26	0.61	25.53	7.50	4.55
020114-4	1837.86	106.63	40.72	5.34	1.28	0.59	24.52	7.75	4.12
020114-5	1693.81	98.27	40.03	5.55	1.20	0.62	27.41	7.75	4.18
020114-10	1629.24	94.52	42.16	5.31	1.23	0.61	24.74	7.25	4.77
020115-2	1678.91	97.41	40.10	5.54	1.25	0.61	25.90	7.50	4.55
020118-8	1872.63	108.65	41.56	4.92	1.22	0.59	25.88	7.25	4.42
020119-7	1932.24	112.10	41.08	5.49	1.28	0.62	25.89	7.25	4.44
020120-2	1803.09	104.61	40.44	5.55	1.18	0.58	24.62	7.50	4.67
020122-3	1574.60	91.35	40.76	5.61	1.26	0.60	25.95	7.50	4.30
020122-5	1723.62	100.00	41.94	5.65	1.18	0.57	23.85	7.50	4.71
020124-6	1718.65	99.71	40.14	5.59	1.30	0.61	23.88	7.75	4.20
F	1.3		1.63	7.75	3.3	1.02	2.34	0.98	9.93
CV (%)	9.26		4.52	3.15	3.33	40.71	7.22	7.79	2.29
LSD (0.05)	233.45		2.63	0.26	0.06	0.36	2.54	0.82	0.14

Table 2. Acala 1517 Bt AYT-2, Las Cruces, 2004

Genotype	Lint	yield	Lint percent	Boll size	2.5% SL	50% SL	Strength	Elo	Mic
	lb/A	CK%	%	g	inch	inch	g/tex	%	units
1517-99 (CK)	1188.70	100.00	41.14	6.26	1.19	0.59	25.32	7.25	4.47
020052	1432.53	120.61	43.63	5.39	1.11	0.56	24.23	8.00	4.88
020062	1273.90	107.26	41.67	6.21	1.22	0.61	27.68	7.75	4.65
020064	1306.36	109.99	42.03	5.98	1.17	0.59	25.55	7.00	4.88
020068	1436.83	120.98	42.33	5.99	1.18	0.61	24.80	7.25	4.79
020073	1423.53	119.86	42.94	5.68	1.17	0.58	26.41	7.50	4.81
020077	1342.74	113.05	41.63	5.44	1.19	0.60	26.00	7.25	4.61
020096	1271.12	107.02	40.11	5.62	1.24	0.61	23.84	7.00	4.28
020097	1341.60	112.96	41.36	5.32	1.18	0.59	24.96	7.50	4.49
020104	1181.37	99.47	39.70	5.77	1.22	0.63	28.81	7.25	4.63
020119	1243.10	104.67	41.51	4.91	1.21	0.60	27.22	7.00	4.73
020122	1265.27	106.53	40.96	5.12	1.22	0.59	25.33	7.00	4.51
020124	1379.89	116.18	41.79	5.12	1.21	0.59	25.85	7.25	4.71
020129	1166.76	98.24	42.60	5.21	1.20	0.58	26.30	7.25	4.57
020130	1282.64	107.99	41.81	5.13	1.22	0.60	24.81	7.50	4.67
020131	1239.98	104.40	41.16	5.01	1.17	0.58	26.73	7.00	4.69
020137	1254.73	105.64	40.49	5.40	1.21	0.58	25.94	7.00	4.32
020146	1241.95	104.57	41.70	5.33	1.19	0.59	26.25	7.25	4.81
020152	1289.38	108.56	40.82	5.78	1.27	0.59	26.14	6.63	4.40
020059-1	1337.89	112.65	43.71	5.57	1.12	0.54	24.58	7.75	4.51
020059-5	1293.63	108.92	41.81	5.90	1.17	0.59	24.93	8.50	4.42
020059-6	1292.28	108.81	43.78	5.27	1.09	0.54	24.36	8.00	4.73
020062-10	1266.12	106.60	41.56	5.75	1.18	0.59	28.61	7.25	4.81
020067-2	1270.34	106.96	39.88	6.67	1.24	0.62	29.62	7.25	4.40
F value	0.54		0.40	20.63	7.26	3.4	3.65	2.18	4.9
CV (%)	15.40		8.38	3.45	2.54	3.94	6.03	7.58	3.49
LSD (0.05)	281.49		4.94	0.27	0.04	0.03	2.22	0.79	0.23

Table 3. Acala RR AYT, Las Cruces, 2004

Genotype	Lint	yield	Lint percent	Boll size	2.5% SL	50% SL	Strength	Elo	Mic
	lb/A	CK%	%	g	inch	inch	g/tex	%	units
1517-99 (CK)	1425.58	100.00	41.57	6.05	1.17	0.58	23.65	6.75	5.20
010509	1440.49	101.05	40.31	5.91	1.25	0.56	23.94	6.25	5.05
010525	1370.94	96.17	37.96	6.47	1.27	0.61	26.61	7.00	4.88
010537	1420.62	99.65	38.79	6.72	1.24	0.59	26.87	6.25	5.25
0314703	1296.44	90.94	38.72	5.86	1.20	0.58	23.88	7.13	5.63
0314704	1435.52	100.70	39.38	5.57	1.15	0.56	23.55	7.44	5.33
0314705	1410.68	98.95	38.96	5.75	1.22	0.60	25.00	7.50	5.05
0314710	1380.88	96.86	38.99	7.03	1.19	0.54	22.69	6.50	5.43
0314721	1365.98	95.82	41.22	5.44	1.20	0.57	23.74	6.75	5.45
0314726	1569.63	110.10	41.47	6.01	1.16	0.57	22.78	6.69	5.38
0314731	1609.37	112.89	45.61	6.49	1.13	0.54	24.69	6.00	5.60
0314740	1534.86	107.67	42.17	5.73	1.20	0.59	24.83	7.06	5.43
0314741	1594.47	111.85	42.65	5.70	1.18	0.60	23.77	7.00	5.28
0314746	1430.55	100.35	41.25	5.63	1.26	0.58	24.07	6.25	5.00
0314747	1505.06	105.57	40.73	5.64	1.23	0.58	24.56	6.56	5.03
0314748	1405.72	98.61	41.20	5.61	1.15	0.55	23.63	7.13	5.45
0314749	1500.09	105.23	40.71	5.25	1.17	0.58	24.47	7.06	5.58
0314750	1539.83	108.01	42.07	5.42	1.20	0.57	24.72	7.00	5.10
0314752	1465.32	102.79	42.33	6.07	1.11	0.54	22.41	7.00	5.48
0314755	1500.09	105.23	42.59	5.45	1.16	0.57	25.60	7.31	5.38
0314761	1470.29	103.14	41.22	5.50	1.24	0.58	23.76	7.63	5.10
0314763	1539.83	108.01	40.96	5.50	1.21	0.57	23.94	7.25	5.18
0314765	1435.52	100.70	40.47	5.43	1.21	0.58	24.37	6.63	5.10
0314775	1460.35	102.44	40.45	5.62	1.14	0.55	26.63	7.00	5.25
F value	1.30		3.4	8.85	5.4	3.66	2.3	3.35	3.06
CV (%)	9.85		4.2	4.9	3.13	4.46	6.13	6.43	4.4
LSD (0.05)	203.65		2.42	0.4	0.05	0.04	2.1	0.624	0.33

Table 4. Acala 1517 Bt/RR AYT, Las Cruces, 2004

Genotype	Lint	yield	Lint percent	Boll size	2.5% SL	50% SL	Strength	Elo	Mic
	lb/A	CK%	%	g	inch	inch	g/tex	%	units
1517-99 (CK)	1574.60	100.00	40.38	6.27	1.20	0.58	25.22	7.25	4.28
0383403	1514.99	96.21	38.74	5.8	1.19	0.58	22.49	6.75	3.91
0383573	1614.34	102.52	41.32	5.81	1.08	0.55	23.76	7.25	4.55
0383594	1569.63	99.68	38.44	6.08	1.28	0.60	25.14	6.75	3.97
0383618	1544.80	98.11	40.70	5.72	1.13	0.57	23.11	8.00	4.57
0383621	1842.83	117.03	42.01	5.53	1.10	0.55	22.48	7.50	4.67
0383916	1569.63	99.68	38.44	5.65	1.22	0.65	24.81	7.25	3.91
0383916	1485.19	94.32	38.34	5.62	1.26	0.63	25.37	7.25	4.01
0383952	1529.90	97.16	38.21	5.36	1.26	0.61	25.42	7.25	3.85
0383952	1529.90	97.16	38.71	5.63	1.21	0.55	24.78	7.75	4.03
0384015	1664.01	105.68	41.00	5.85	1.21	0.59	22.87	8.50	4.24
0384029	1549.76	98.42	39.90	5.34	1.20	0.58	23.10	7.50	4.20
0384039	1644.14	104.42	38.40	5.68	1.23	0.63	26.65	7.75	3.79
0384089	1589.50	100.95	40.34	5.22	1.20	0.57	25.33	7.50	4.30
0384221	1624.27	103.15	38.43	7.04	1.25	0.60	24.89	7.25	4.44
0384322	1594.47	101.26	40.09	6.51	1.19	0.60	25.21	7.13	4.47
0384388	1594.47	101.26	41.00	5.52	1.21	0.60	25.78	8.25	4.34
0384444	1773.29	112.62	43.01	5.47	1.16	0.58	25.37	7.75	4.63
0384507	1733.55	110.09	42.78	4.77	1.18	0.57	24.04	8.75	4.44
0384507	1887.53	119.87	43.40	4.91	1.20	0.61	23.73	8.25	4.38
020216--1	1668.98	105.99	40.16	5.42	1.26	0.60	25.87	7.75	4.51
020218-7	1559.70	99.05	40.21	5.79	1.27	0.60	25.25	7.50	4.22
020219-10	1579.57	100.32	37.88	5.83	1.27	0.62	24.66	7.75	4.38
020134-1	1475.26	93.69	38.90	6.08	1.23	0.61	25.61	7.25	4.30
F value	1.82		6.51	6.51	11.36	6.87	2.17	2.86	3.13
CV (%)	9.74		3.02	4.64	3.31	6.08	5.52	7.46	3.99
LSD (0.05)	191.04		1.47	0.32	0.05	0.04	1.65	0.69	0.21

Table 5. Acala 1517 RR AYT, Las Cruces, 2005

Genotype	Type	Lint	yield	Boll size	Lint percent	2.5% SL	Strength	Mic
		lb/A	CK%	g	%	inch	g/tex	units
010113		1513.13	90.63	6.33	36.16	1.35	32.93	3.63
010462		1773.29	106.21	6.06	36.81	1.26	33.40	3.97
010504		1755.53	105.15	5.53	42.05	1.27	31.70	4.33
010368		1697.89	101.69	5.64	36.85	1.22	34.27	4.37
010311		1741.81	104.32	6.39	41.32	1.25	30.37	4.07
010124		1806.49	108.20	5.37	39.88	1.24	32.43	4.23
010122		1696.53	101.61	5.97	39.37	1.27	34.40	4.40
010180		1673.18	100.21	6.06	40.87	1.20	30.03	4.63
010341		1554.09	93.08	6.38	36.29	1.30	33.07	4.23
010456		1670.63	100.06	6.25	38.23	1.30	30.43	4.00
010454		1775.27	106.33	6.25	37.05	1.29	31.03	3.97
010125		1658.83	99.35	5.89	39.53	1.24	32.87	4.27
010094		1618.01	96.91	5.29	38.07	1.30	33.03	3.70
010170		1815.39	108.73	5.54	41.29	1.26	31.80	4.50
010460		1606.22	96.20	6.16	37.28	1.27	32.07	3.93
010464		1712.67	102.58	6.61	37.30	1.28	29.80	4.07
0314731	RR	1898.66	113.72	6.42	40.34	1.22	31.87	4.37
0314761	RR	1713.65	102.64	4.92	40.62	1.26	27.53	4.00
0314746	RR	1942.48	116.34	5.11	41.44	1.29	28.93	3.57
0314747	RR	1622.38	97.17	5.17	39.67	1.29	29.50	3.77
0314755	RR	1745.15	104.52	5.15	41.58	1.21	30.10	4.23
010509		1791.29	107.29	5.50	39.85	1.29	30.23	4.07
010537		1718.12	102.91	5.69	39.05	1.27	32.37	4.13
0314749	RR	1796.64	107.61	4.63	40.43	1.14	30.00	4.50
0314705	RR	1671.52	100.11	5.14	39.04	1.24	29.77	4.13
0314741	RR	2017.08	120.81	5.50	42.55	1.21	29.73	4.33
0314750	RR	1858.35	111.30	5.04	40.84	1.26	29.07	3.97
0314763	RR	1684.87	100.91	4.53	38.76	1.23	29.67	4.03
0314726	RR	1874.35	112.26	5.62	41.61	1.19	28.73	4.07
0314740	RR	1855.01	111.10	5.30	42.15	1.23	30.37	4.37
010525		1637.33	98.07	5.77	37.83	1.29	34.07	4.00
1517-99 (CK)		1669.62	100.00	5.55	40.66	1.22	29.93	4.20
F		3.97		9.79	29.85	9.45	7.57	11.15
CV (%)		5.57		5.33	1.50	1.85	3.61	3.18
LSD (0.05)		158.01		0.49	0.97	0.04	1.84	0.21

Table 6. Acala 1517 Bt and Bt/RR AYT, Las Cruces, 2005

Genotype	Type	Lint	yield	Boll size	Lint percent	2.5% SL	Strength	Mic
		lbA	CK%	g	%	inch	g/tex	units
020052	Bt	1783.52	99.77	4.78	41.82	1.25	31.77	4.03
020062	Bt	2002.94	112.04	5.19	41.49	1.21	27.53	3.93
020064	Bt	2044.57	114.37	5.39	42.61	1.20	30.00	4.33
020068	Bt	2074.33	116.03	5.16	42.36	1.23	29.47	4.03
020073	Bt	2064.22	115.47	5.06	43.14	1.24	29.97	4.10
020077	Bt	1688.37	94.44	5.24	41.53	1.22	29.63	4.13
020097	Bt	2043.05	114.29	4.93	41.23	1.19	28.10	4.10
020119	Bt	1941.83	108.62	4.77	41.04	1.25	28.33	4.00
020124	Bt	1837.24	102.77	5.20	41.51	1.22	28.87	3.83
020137	Bt	1795.84	100.46	4.91	40.87	1.24	28.53	3.80
020146	Bt	1829.42	102.33	5.20	41.79	1.22	29.40	4.13
020152	Bt	1990.78	111.36	5.38	39.39	1.20	28.80	4.00
020062-10	Bt	2051.36	114.75	5.35	41.70	1.23	26.00	3.97
020067-2	Bt	1767.26	98.86	5.91	39.68	1.22	29.23	3.67
020076-8	Bt	1921.95	107.51	5.20	41.92	1.26	29.90	3.97
020077-8	Bt	1959.74	109.62	4.99	40.86	1.16	27.73	4.17
020109-4	Bt	1843.80	103.14	4.80	40.43	1.20	28.50	4.37
020110-9	Bt	1842.59	103.07	5.70	39.93	1.14	29.23	4.37
020112-5	Bt	1927.82	107.84	4.81	40.58	1.23	27.97	3.77
020113-6	Bt	1814.09	101.48	5.54	39.77	1.28	27.63	3.73
020114-3	Bt	1819.13	101.76	5.51	40.05	1.24	32.27	4.20
020114-5	Bt	1622.11	90.74	4.85	38.67	1.27	28.40	3.80
020115-2	Bt	1693.44	94.73	5.08	41.17	1.27	29.97	3.93
020118-8	Bt	1880.40	105.19	4.79	40.99	1.24	29.50	4.13
020119-7	Bt	1750.12	97.90	5.07	40.14	1.22	30.10	4.07
020122-3	Bt	1910.37	106.86	5.13	40.04	1.19	27.37	4.00
0383594	Bt/RR	1721.13	96.28	5.55	38.73	1.23	30.07	3.90
0383621	Bt/RR	1760.82	98.50	4.88	41.34	1.24	30.17	4.13
0384039	Bt/RR	1932.19	108.08	5.39	39.51	1.24	30.00	3.73
0384444	Bt/RR	1738.90	97.27	4.97	42.32	1.23	31.63	4.23
0384507	Bt/RR	2125.98	118.92	4.66	42.93	1.22	29.87	4.20
1517-99 (CK)		1787.68	100.00	5.49	41.36	1.23	31.03	4.33
F value		2.12		4.80	7.07	1.78	1.15	1.75
LSD (0.05)		252.86		0.39	1.22	0.06	3.60	0.41

Table 7, Acala 1517 Bt and Bt/RR PYT, Las Cruces, 2005

Genotype	Lint	yield	Boll size	Lint percent	2.5% SL	Strength	Mic
	lb/A	CK%	g	%	inch	g/tex	units
03063-1	1784.99	126.25	4.95	43.32	1.18	30.10	4.37
1517-99 S3	1758.97	124.40	4.64	45.55	1.18	29.10	4.67
970123-1	1584.36	112.05	5.44	44.72	1.23	31.87	4.63
03K1037-1	1620.42	114.61	4.73	38.28	1.19	29.53	4.23
03K1037-2	1598.83	113.08	4.89	38.67	1.22	29.40	4.20
03K2007-1	1738.59	122.96	4.95	40.28	1.19	29.50	4.40
MONCS-31	1803.04	127.52	5.03	43.73	1.16	28.03	4.43
03N1126-1	1626.98	115.07	5.46	41.01	1.19	29.60	4.37
03N1133-1	1573.45	111.28	4.94	41.40	1.22	28.70	4.07
03N1150-1	1483.13	104.90	5.25	40.26	1.25	29.93	3.87
03N1159-1	1502.69	106.28	4.98	39.68	1.20	30.33	4.27
03R2008-1	1733.79	122.62	5.59	42.48	1.20	28.43	4.40
03R2026-1	1737.58	122.89	5.31	43.86	1.19	30.50	4.43
03R3021-1	1529.89	108.20	5.49	41.93	1.21	31.03	4.50
03R3022-2	1667.06	117.90	5.30	41.85	1.13	30.60	4.93
03R3022	1486.52	105.14	4.86	39.55	1.27	29.30	3.87
03R3022-3	1673.63	118.37	5.49	41.46	1.16	32.10	4.73
03R3022-4	1541.73	109.04	5.29	39.86	1.26	32.87	4.67
03R3023-1	1498.50	105.98	4.91	39.90	1.23	27.43	4.27
03R3025-1	1574.68	111.37	4.74	39.87	1.20	29.23	4.33
03R3030-1	1482.51	104.85	5.15	40.14	1.23	31.07	4.47
03R4030-1	1440.08	101.85	5.17	40.07	1.24	34.60	4.43
03S1007-1	1331.94	94.20	5.71	37.50	1.23	31.63	4.03
03S1087-1	1633.10	115.50	4.79	40.60	1.16	30.97	4.63
03S1072-1	1685.11	119.18	4.68	42.35	1.16	31.23	4.40
03W1056-2	1363.78	96.45	5.00	39.21	1.20	28.53	4.27
03W1005-2	1624.45	114.89	5.56	39.07	1.31	29.60	4.23
03W1023-1	1645.32	116.37	4.69	38.36	1.19	28.93	4.20
03Y3055-1	1598.64	113.06	4.65	40.29	1.25	29.63	4.27
03Y3038-1	1638.43	115.88	4.80	40.86	1.18	28.60	4.50
FS 15 SPS	1485.91	105.09	5.32	40.24	1.23	32.57	4.70
1517-99 (CK)	1413.91	100.00	5.34	38.87	1.25	31.10	4.17
F value	2.96		7.47	25.52	7.75	6.01	11.44
LSD (0.05)	197.60		0.33	1.08	0.04	1.79	0.20

Table 8. Acala 1517 RR AYT, Las Cruces, 2006

Genotype	Type	Lint	yield	Lint percent	Boll size	2.5% SL	Strength	Mic
		lb/A	CK%	%	g	inch	g/tex	units
010113		4.04	92.51	36.04	5.60	1.36	34.97	4.10
010462		5.25	120.17	36.91	5.83	1.28	34.93	4.27
010504		4.89	111.96	40.46	5.13	1.29	34.00	4.43
010368		4.73	108.32	38.91	4.91	1.30	33.17	4.36
010311		4.31	98.68	40.06	6.13	1.28	34.13	4.55
010124		5.27	120.62	39.26	4.99	1.24	34.53	4.68
010122		4.13	94.45	38.54	5.48	1.28	34.13	4.46
010180		5.22	119.42	40.16	5.97	1.25	31.17	4.98
010341		4.28	97.92	37.01	6.14	1.29	35.73	4.61
010456		4.83	110.48	37.98	5.90	1.30	32.97	4.47
010454		4.84	110.82	36.84	5.80	1.33	33.70	4.24
010125		5.01	114.70	37.69	5.50	1.26	37.47	4.37
010094		4.44	101.68	37.19	7.37	1.32	37.77	3.88
010170		5.99	137.01	39.92	5.37	1.30	34.93	4.80
010460		4.54	103.86	36.97	5.63	1.28	34.57	4.36
010464		5.04	115.27	40.30	4.82	1.26	32.50	4.34
0314731	RR	4.91	112.42	40.48	5.82	1.24	34.93	4.86
0314761	RR	4.83	110.43	40.47	4.29	1.32	31.10	4.43
0314746	RR	5.20	119.09	41.25	5.09	1.32	33.30	4.19
0314747	RR	5.20	118.99	40.34	6.24	1.26	33.47	5.08
0314755	RR	5.12	117.16	40.87	4.77	1.24	32.80	4.56
010509		4.71	107.86	39.01	4.87	1.35	32.50	4.24
010537		4.67	106.97	38.82	5.73	1.26	35.70	4.52
0314749	RR	4.99	114.15	36.03	5.35	1.27	37.33	4.60
0314705	RR	4.06	92.83	37.78	4.96	1.28	32.80	4.48
0314741	RR	4.86	111.27	41.11	6.44	1.25	31.53	5.30
0314750	RR	4.90	112.14	40.90	4.55	1.27	32.57	4.34
0314763	RR	5.27	120.53	40.51	5.45	1.26	33.53	4.59
0314726	RR	5.27	120.59	39.95	5.29	1.26	32.73	4.39
0314740	RR	5.52	126.34	40.90	4.81	1.30	32.83	4.72
010525		4.52	103.53	36.58	5.46	1.30	35.30	4.23
1517-99 (CK)		4.37	100.11	39.47	5.23	1.29	34.23	4.57
F value		4.42		25.39	3.09	4.11	4.78	21.69
LSD (0.05)		0.53		0.84	0.90	0.04	1.95	0.16

Table 9. Acala 1517 RR AYT, Artesia, 2006

Genotype	Type	Lint	yield	Lint percent	Boll size	Plant height
		lb/A	CK%	%	g	Inch
010113		1947.72	98.93	36.04	7.06	38.00
010462		2028.22	103.01	36.07	7.21	39.00
010504		2066.82	104.97	42.55	6.14	37.33
010368		2002.70	101.72	39.55	5.67	38.33
010311		1999.69	101.56	39.43	6.97	37.33
010124		1965.74	99.84	40.12	5.69	36.33
010122		2213.53	112.43	37.98	6.70	39.00
010180		2177.40	110.59	40.86	6.98	37.67
010341		1689.03	85.79	36.65	7.48	38.33
010456		2059.72	104.61	38.55	7.09	37.67
010454		1947.39	98.91	36.94	7.21	37.33
010125		1972.72	100.20	38.66	5.94	37.00
010094		1525.43	77.48	36.49	6.51	37.33
010170		2331.67	118.43	40.55	6.00	37.00
010460		2126.07	107.98	38.08	7.18	36.67
010464		2167.21	110.07	39.56	5.16	39.67
0314731	RR	2172.16	110.32	39.73	6.45	38.33
0314761	RR	1955.17	99.30	37.78	5.33	37.00
0314746	RR	2112.82	107.31	38.98	5.23	37.33
0314747	RR	2104.87	106.91	41.04	7.00	40.00
0314755	RR	1861.74	94.56	40.12	5.79	37.33
010509		2034.54	103.33	40.32	5.79	38.33
010537		2031.52	103.18	37.10	6.70	38.67
0314749	RR	1767.98	89.80	35.06	6.06	37.33
0314705	RR	1996.57	101.41	39.20	5.72	38.00
0314741	RR	1980.09	100.57	40.92	6.95	38.00
0314750	RR	2253.38	114.45	39.60	5.48	39.00
0314763	RR	2008.20	102.00	40.10	6.13	34.67
0314726	RR	2034.13	103.31	39.41	6.12	37.33
0314740	RR	2203.21	111.90	40.01	5.47	36.33
010525		1841.46	93.53	36.83	6.40	39.00
1517-99 (CK)		1968.88	100.00	40.90	6.20	38.33
F value		2.45		10.73	14.23	0.56
CV (%)		8.93		2.42	4.89	6.57
LSD (0.05)		294.08		1.54	0.50	4.05

Table 10. Acala 1517 Bt and Bt/RR AYT, Las Cruces, 2006

Genotype	Type	Lint	yield	Boll size	Lint percent	2.5% SL	Strength	Mic
		lb/plot	CK%	g	%	inch	g/tex	units
020052	Bt	4.82	117.88	4.43	41.87	1.15	33.23	4.28
020062	Bt	5.26	128.61	5.31	39.79	1.26	36.73	4.66
020064	Bt	4.54	110.93	5.28	41.40	1.21	33.57	5.00
020068	Bt	4.92	120.31	4.27	42.21	1.23	30.70	4.35
020073	Bt	5.61	137.07	5.05	40.77	1.25	33.43	4.84
020077	Bt	5.20	127.03	4.77	40.19	1.25	31.33	4.58
020097	Bt	5.75	140.63	4.75	39.48	1.24	32.27	4.49
020119	Bt	5.63	137.69	4.41	40.00	1.27	34.37	4.55
020124	Bt	4.12	100.73	5.27	39.69	1.25	31.13	4.49
020137	Bt	5.15	125.86	4.89	39.70	1.29	33.87	4.24
020146	Bt	4.61	112.78	4.85	39.42	1.27	32.67	4.68
020152	Bt	5.23	127.84	5.18	39.21	1.33	33.03	4.32
020062-10	Bt	5.03	122.91	5.35	40.43	1.27	35.47	4.87
020067-2	Bt	5.65	138.26	5.38	41.18	1.32	36.73	4.28
020076-8	Bt	4.86	118.84	5.26	40.19	1.24	31.80	4.54
020077-8	Bt	6.02	147.24	5.52	39.03	1.36	33.43	4.47
020109-4	Bt	5.25	128.37	4.51	39.29	1.30	32.97	4.55
020110-9	Bt	4.72	115.31	5.52	38.89	1.37	32.67	4.29
020112-5	Bt	5.68	138.95	4.54	39.78	1.27	33.40	4.32
020113-6	Bt	5.25	128.26	4.97	38.94	1.37	31.90	4.32
NM03S1023	Bt/RR	4.63	113.16	5.25	37.80	1.28	35.23	4.26
020114-5	Bt	4.46	109.03	5.11	38.60	1.26	32.80	4.40
020115-2	Bt	4.84	118.24	4.73	38.27	1.32	34.23	4.56
020118-8	Bt	5.09	124.51	4.33	40.11	1.30	32.50	4.47
020119-7	Bt	5.37	131.38	4.72	39.14	1.21	31.67	4.48
020122-3	Bt	5.29	129.42	4.90	39.43	1.41	33.50	4.34
04N1165	Bt/RR	6.04	147.65	4.48	43.16	1.16	33.03	4.45
0383621	Bt/RR	5.38	131.52	5.15	39.63	1.29	34.20	4.58
0384039	Bt/RR	5.77	141.10	5.48	37.93	1.25	35.07	4.15
0384444	Bt/RR	5.43	132.65	5.05	40.65	1.24	33.47	4.82
0384507	Bt/RR	5.62	137.42	4.95	39.31	1.22	33.93	4.46
1517-99(CK)		4.09	100.10	5.12	40.03	1.22	33.27	4.46
F value		3.42		4.11	2.37	17.01	7.08	5.49
LSD (0.05)		0.11		0.46	1.95	0.04	1.37	0.22

Table 11. Acala 1517 Bt and Bt/RR AYT, Artesia, 2006

Genotype	Type	Lint yield		Boll size	Lint percent	Plant height
		lb/A	CK%	g	%	Inch
020052	Bt	1823.14	100.80	4.69	41.21	39.3
020062	Bt	2356.98	130.31	5.71	40.93	37.7
020064	Bt	2061.25	113.96	5.55	41.39	39.3
020068	Bt	2317.65	128.14	4.99	42.10	36.0
020073	Bt	2372.25	131.16	5.53	42.22	38.0
020077	Bt	2230.78	123.33	5.27	40.96	33.7
020097	Bt	2291.14	126.67	5.02	40.26	39.7
020119	Bt	2381.81	131.68	4.88	40.48	37.7
020124	Bt	2008.06	111.02	5.66	39.23	39.7
020137	Bt	1989.47	109.99	5.27	39.49	37.7
020146	Bt	2052.95	113.50	5.77	39.49	38.0
020152	Bt	2149.22	118.83	5.31	39.09	37.3
020062-10	Bt	2291.00	126.66	5.65	41.19	38.3
020067-2	Bt	1987.15	109.87	6.44	38.60	39.7
020076-8	Bt	2326.65	128.64	5.33	41.72	39.0
020077-8	Bt	2370.59	131.06	5.56	40.57	38.0
020109-4	Bt	2084.41	115.24	4.77	40.96	35.0
020110-9	Bt	2095.06	115.83	5.86	39.04	37.7
020112-5	Bt	2306.27	127.51	5.00	40.10	37.3
020113-6	Bt	2075.89	114.77	5.60	39.27	38.0
NM03S1023	Bt	2111.87	116.76	5.73	39.89	39.0
020114-5	Bt	1814.94	100.34	5.05	38.47	36.3
020115-2	Bt	2164.62	119.68	5.34	38.87	37.7
020118-8	Bt	2105.25	116.39	4.99	40.76	37.7
020119-7	Bt	2138.73	118.25	5.32	40.20	38.3
020122-3	Bt	2225.44	123.04	5.45	39.12	39.3
04N1165	Bt/RR	1985.71	109.79	5.09	40.31	35.0
0383621	Bt/RR	2427.28	134.20	5.33	39.90	38.0
0384039	Bt/RR	2452.81	135.61	5.62	39.08	37.0
0384444	Bt/RR	2221.95	122.85	5.16	40.68	38.3
0384507	Bt/RR	2262.27	125.08	5.25	40.62	37.7
1517-99(CK)		1808.72	100.00	5.93	39.67	38.7
F value		5.52		3.49	7.67	1.21
CV (%)		6.04		6.48	1.57	5.86
LSD (0.05)		213.64		0.57	1.03	3.62

Table 12. Acala 1517 BGII/RF AYT, New Mexico, 2007

Genotype	Vw	Vw	Seedcotton yield-Las Cruces		Seedcotton yield-Artesia	
	%	CK%	lb/plot	CK%	lb/A	CK%
1517-99W (CK)	63.33	100.00	15.46	100.00	4410.45	100.00
06NMM002	57.78	91.24	13.43	86.89	4105.53	93.09
06NMM003	43.33	68.42	13.68	88.49	4345.11	98.52
06NMM004	64.44	101.75	14.19	91.76	3778.83	85.68
06NMM005	65.56	103.52	14.02	90.69	4149.09	94.07
06NMM007	33.33	52.63	13.09	84.65	4356.00	98.77
06NMM008	41.11	64.91	12.49	80.81	4138.20	93.83
06NMM009	44.44	70.17	11.14	72.06	4072.86	92.35
06NMM010	30.00	47.37	14.01	90.60	4933.17	111.85
06NMM012	53.33	84.21	13.85	89.56	4105.53	93.09
06NMM013	55.56	87.73	13.25	85.73	4051.08	91.85
06NMM014	24.44	38.59	12.53	81.07	4769.82	108.15
06NMM015	60.00	94.74	13.23	85.60	4279.77	97.04
06NMM017	50.00	78.95	12.79	82.71	4094.64	92.84
06NMM018	68.89	108.78	13.31	86.07	3604.59	81.73
06NMM019	55.56	87.73	16.05	103.79	4279.77	97.04
06NMM020	57.78	91.24	13.19	85.30	3953.07	89.63
06NMM022	70.00	110.53	13.65	88.27	4029.30	91.36
06NMM023	40.00	63.16	13.19	85.34	4312.44	97.78
06NMM024	42.22	66.67	14.55	94.09	4508.46	102.22
06NMM025	55.56	87.73	12.73	82.36	3408.57	77.28
06NMM027	63.33	100.00	13.85	89.56	3942.18	89.38
06NMM028	48.89	77.20	13.80	89.26	3049.20	69.14
06NMM029	38.89	61.41	12.95	83.74	4421.34	100.25
06NMM030	41.11	64.91	14.17	91.68	4552.02	103.21
06NMM032	47.78	75.45	13.99	90.51	4061.97	92.10
06NMM033	50.00	78.95	11.43	73.95	3430.35	77.78
06NMM034	73.33	115.79	12.64	81.76	3887.73	88.15
06NMM035	53.33	84.21	13.62	88.10	3691.71	83.70
06NMM037	67.78	107.03	12.01	77.66	3484.80	79.01
06NMM038	42.22	66.67	12.45	80.51	4061.97	92.10
06NMM039	64.44	101.75	13.28	85.90	3974.85	90.12
F value	0.93		1.88		1.63	
LSD (0.05)			1.85		795.22	