RELEASE OF THE FIRST BT ACALA COTTON CULTIVAR, ACALA 1517-99W

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Summary

Acala 1517-99W was derived from a cross of Acala 1517-99/Phytogen 72W (Phy72W) and then backcrossed three times using Acala 1517-99 (Cantrell et al., 2000) as the recurrent parent. Phy 72W was Acala germplasm line containing two Bt genes (Cry 1Ac and Cry 1F). Acala 1517-99W is a bulk selection from 100 progeny rows in BC_3F_4 based on plant type, yield potential, and fiber quality. The bulked progeny had 9.7% higher lint yield than its recurrent parent, Acala 1517-99, while maintained the fiber quality traits. Acala 1517-99W has been extensively tested in Mesilla Valley, and also tested in Pecos Valley, NM in 2003, 2004 and 2005. The results are summarized in Table 1, Figure 1 and 2.

On average, Acala 1517-99W has exhibited 13.6% higher lint yield (1741.8 kg ha^{-1} vs. 1,533.3 kg ha^{-1}) than Acala 1517-99 in nine field trials conducted in NM from 2002 to 2005. In the seven field tests in Mesilla Valley, the lint yield of Acala 1517-99W ranged from 5.7% to 31.0% higher than that of Acala 1517-99. Acala 1517-99W has performed especially well in on-farm strip plot trials. Of the seven tests, Acala 1517-99W has significantly higher yield (19.9%-30.1%) than Acala 1517-99 in three tests. This new cultivar was also tested in Pecos Valley (Artesia), NM in 2003 and 2005, it showed consistently higher yield (8.4%- 12.2%) than Acala 1517-99.

The higher productivity of Acala 1517-99W was confirmed in an on-farm large field test conducted in Tharp Farm, Las Cruces, NM, 2005 (Figure 3).

Acala 1517-99W has consistently smaller boll size (5.23 g and 7.3% smaller) than Acala 1517-99 (5.64 g) and the difference was significant in most of the tests. Its lint percentage (40.46%) is the same as that for Acala 1517-99 (40.54%). Acala 1517-99W has similar fiber length (30.86 mm vs. 30.83 mm), fiber strength (253.98 kN m kg^{-1} vs. 255.54 kN m kg^{-1}), and fineness as measured by micronaire readings (4.36 vs. 4.38) to Acala 1517-99.

The Verticillium wilt resistance of Acala 1517-99W was evaluated in both greenhouses and the field and it exhibited similar response to its recurrent parent, Acala 1517-99.

Widestrike is a trademark of Dow AgroSciences LLC for its proprietary Bt cotton trait expressing Cry1F and Cry1Ac insecticidal proteins from *Bacillus thuringiensis*, which was developed through crossing two independent transgenic cotton events, 281-24-236 and 3006-210-23 (OECD Unique Identifier DAS-24236-5/DAS-21023-5), generated by *Agrobacterium* mediated transformation (http://www.agbios.com/main.php; http://www.dowagro.com/widestrike/index.htm). This Widestrike trait offers season long protection against a broad spectrum of insect pests including bollworms and pink bollworms (Haygood et al., 2006).

Since its release in the United States in 2005, Acala 1517-99W was grown in ca. 3% (1,500 acres) cotton acreage in New Mexico in 2005 and 13.4% (8,417 acres) and 6.8% (3,400 acres) of cotton acreage in New Mexico in 2006 and 2007, respectively, according to the "2006-2007 Variety Planted" and "2007-2008 Variety Planted" reported by USDA-AMS (Table 2). The new cultivar 1517-99W increased cotton production by 70-140 pounds per acre, totaling >600,000-1,200,000 pounds ($300,000-600,000) and 238,000-476,000 pounds ($150,000-300,000) of cotton in net income for New Mexico cotton growers in 2006 and 2007, respectively.

The development of Acala 1517-99W was supported in part by funding from USDA-ARS and Cotton Incorporated. An intellectual property right with ownership of Acala 1517-99W was granted to Dow AgroSciences by the New Mexico Agricultural Experiment Station for commercialization in 2005.

Acknowledgements

We are grateful to the collaborations and support from Mr. Charles Tharp, Dr. Charles Glover, Dr. D. McWilliams, Dr. Soum Sanogo, and Mr. C. French. The collaboration from Dow AgroScience is also highly appreciated.

References

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Table 1. Lint yield of Acala 1517-99W and check cultivar 1517-99 in Progeny Test, Preliminary Yield Trials (PYT), Advanced Yield Trials (AYT), Regional Variety Trials (RVT), and Large Plot Test (LPT) at Las Cruces and Artesia, NM, from 2002 to 2005.

Year tested	Type of test	Genotype	Lint yield (LB/A)	Boll size (g)	Lint (%)	Fiber length (mm)	Strength (kN m kg^{-1})	Micro-naire (units)
2002	Progeny	**1517-99W**	**1982.85**	**5.12**	**40.45**	**31.24**	**215.99**	**4.25**
		1517-99	1807.67	5.27	42.41	30.48	206.88	4.37
		LSD (5%)	nt[b]	nt	nt	nt	Nt	nt
2003	PYT[a] (LC)	**1517-99W**	**1501.01**	**5.30***	38.87	30.99	260.19	**4.62**
		1517-99	1420.31	5.82	39.25	30.73	264.80	4.62
		LSD (5%)	145.26	0.27	2.00	2.03	17.74	0.31
2003	PYT[a] (Artesia)	**1517-99W**	**1754.52**	**4.89***	**39.75**	**30.23**	**237.75**	**4.43**
		1517-99	1618.57	5.84	40.13	30.99	228.63	4.15
		LSD (5%)	175.47	0.46	2.00	0.76	9.11	0.36
2004	AYT[a] (LC)	**1517-99W**	**1452.59**	**5.55***	**41.69**	**30.23**	**255.19**	**4.62**
		1517-99	1334.23	6.26	41.14	30.23	248.14	4.47
		LSD (5%)		0.27	ns	1.02	21.76	0.23
2004	LPT[a] (LC)	**1517-99W**	**1775.39***	**nt**	**39.55**	**31.50**	**257.05**	**4.39**
		1517-99	1355.75	nt	41.14	30.23	250.29	4.47
		LSD (5%)	252.86		2.24	1.78	26.07	0.32
2005	AYT[a] (LC)	**1517-99W**	**1803.40***	**4.99***	**40.94**	**nt**	**Nt**	**nt**
		1517-99	1461.91	5.41	40.44	nt	Nt	nt
		LSD (5%)	283.41	0.32	1.12			
2005	AYT[a] (LC)	**1517-99W**	**2157.23**	**5.10***	**41.57**	**30.99**	**286.16**[d]	**4.04**
		1517-99	2003.68	5.49	41.36	31.24	304.09[d]	4.33
		LSD (5%)	283.41	0.39	1.22	1.52	35.28	0.41
2005	AYT[a] (Artesia)	**1517-99W**	**1533.29**	**6.11**	**39.88**	**31.24**	**290.47**[d]	**4.09**
		1517-99	1366.51	6.14	38.88	30.99	292.73[d]	4.13
		LSD (5%)	ns	ns	ns	ns	Ns	ns
2005	LPT[a] (LC)	**1517-99W**	**1716.21***	**4.76***	**41.45**	**30.48**	**229.03**	**4.45**
		1517-99	1431.07	5.40	40.42	31.75	248.72	4.48
		LSD (5%)	118.36	0.50	1.30	ns	20.38	0.47
	Average	**1517-99W**	**1741.83**	**5.23**	**40.46**	**30.86**	**253.98**	**4.36**
		1517-99	1533.30	5.64	40.54	30.83	255.54	4.38

***** Indicates significant difference at the 0.05 probability level.

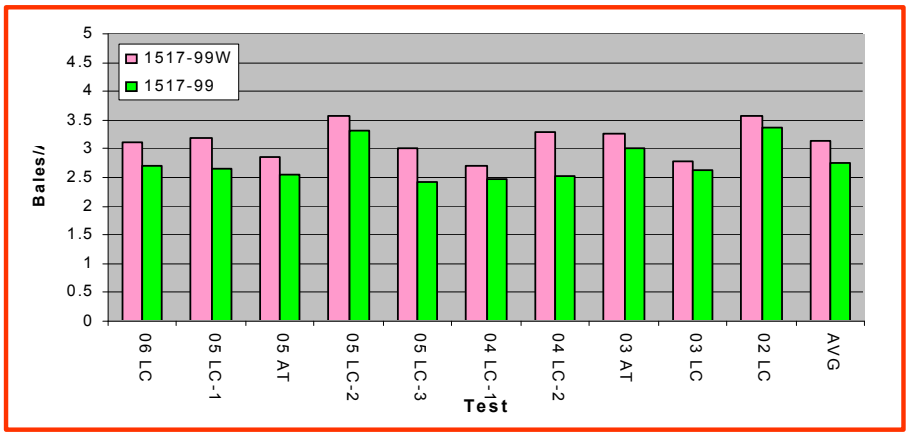
[a] Analysis of variance was performed for each trial to calculate LSD (5%) for a comparison between a breeding line and the check. To simplify the table, only means for the two genotypes were presented here.

[b] nt- not tested

[c] Not significant.

[d] Tested by High Volume Instrument (HVI) from Cotton Inc.

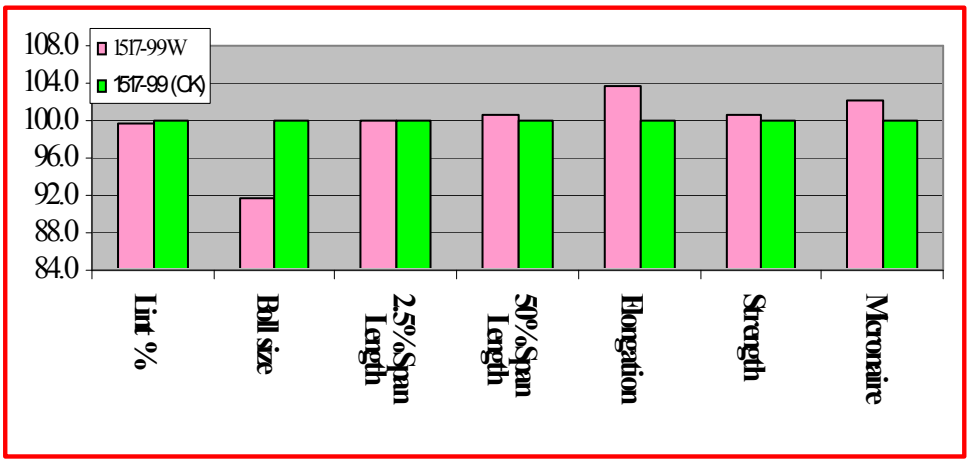
1517-99W: Yield



	06 LC	05 LC-1	05 AT	05 LC-2	05 LC-3	04 LC-1	04 LC-2	03 AT	03 LC	02 LC	AVG
1517-99W	3.11	3.19	2.85	3.56	3.00	2.70	3.30	3.26	2.79	3.56	3.13
1517-99	2.71	2.66	2.54	3.31	2.42	2.48	2.52	3.01	2.64	3.36	2.76
CK +%	14.88	19.92	12.20	7.55	23.97	8.87	30.95	8.40	5.94	5.95	13.86

Figure 1. Productivity of Acala 1517-99W in comparison with Acala 1517-99.

1517-99W: Agronomic Traits



	Lint %	Boll size g/boll	2.5% inch	50% inch	Elong. %	Strength g/tex	Mike
1517-99W	**40.48**	**4.65**	**1.21**	**0.59**	**7.86**	**24.75**	**4.46**
1517-99 (CK)	**40.54**	**5.06**	**1.21**	**0.58**	**7.57**	**24.62**	**4.36**

Figure 2. Agronomic traits of Acala 1517-99W in comparison with Acala 1517-99.

Figure 3. On-farm performance of Acala 1517-99W in comparison with Acala 1517-99, Tharp Farm, Las Cruces, NM, 2005.

Table 2. Cotton cultivars planted in New Mexico in 2006 and 2007.

Year	Cultivar	Percentage (%)*
2006		
	FM 989 B2R	55.88
	Acala NM 1517-99W	13.36
	DP 445 BG/RR	9.48
	DP 455 BG/RR	3.78
	ST 4646B2R	1.89
	DP 143 B2RF	1.36
	DP 449 BG/RR	1.36
	DG OA265BR	1.36
	PHY 745 WRF	1.36
	ST 4892 BR	1.36
2007		
	FM 989 B2R	12.83
	DG 2520 B2RF	12.13
	DG 2242 B2RF	10.67
	FM 960 B2R	10
	FM 9063 B2R	7.15
	FM 1880 B2R	7.11
	1517-99W	6.76
	DP 143 B2RF	5.74
	DG OA 265 BR	4.42

* Based on USDA-AMS.