

CULTIVAR RELEASE

BRS 335: A midseason high-yielding upland cotton cultivar for Northeast Brazilian savanna

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Received 28 October 2011

Accepted 27 January 2012

Abstract – Cotton cultivar BRS 335 is a midseason high-yield cultivar and has adaptation to the Northeast Brazilian savanna, yield stability, desirable resistance to main cotton diseases and good fiber quality. The cultivar BRS 335 meets growers' demands for competitive lint yield as well as fulfilling industrial textile requirements.

Key words: *Gossypium hirsutum*, disease resistance, and linter yield.

INTRODUCTION

Upland cotton (*Gossypium hirsutum* L. r *latifolium* Hutch) is an economically important species for fiber and seed production in the Brazilian savanna. However, there is a lack of cotton cultivar development specifically for savanna region located in Bahia, Piauí, Maranhão, and Tocantins States, in Brazilian Northeast and North regions. The 'BRS 335' upland cotton cultivar (*Gossypium hirsutum* L.) (Reg. no. 27690) was developed by Empresa Brasileira de Pesquisa Agropecuária (Embrapa) and partners (Fundação Bahia and Fundo para o Desenvolvimento do Agronegócio do Algodão - FUNDEAGRO) in 2011 as part of an ongoing effort to develop new cotton strains and cultivars with improved yield potential and excellent fiber quality adapted to major growing regions in Brazil (Freire et al. 2008).

GENETIC ORIGIN AND DEVELOPMENT

The cultivar BRS 335 was developed by hybridization following pedigree selection. It was originated from a tri-parental cross of cotton cultivars Deltapine 4049, CNPA ITA 96, and

Delta Opal [(Deltapine 4049 x CNPA ITA 96) x Delta Opal], carried out in 2000 and 2001, respectively. Deltapine 4049 (pedigree Chaco 520 x Georgia King) has good fiber quality and earliness. CNPA ITA 96 (selection in EPAMIG 3) is a high-yielding cotton cultivar with average fiber quality. Delta Opal (Deltapine 5816 x Sicala 33) is a high-yielding cotton cultivar with resistance to the main diseases occurring in Brazil. Hybrid combinations with cultivar Delta Opal are recommended for the improvement of seed cotton yield, lint yield, seed index and index of production and earliness (Morello et al. 2010).

'BRS 335' was derived from a single F_{3:4} progeny row following single plant selections based on apparent yield potential, fiber properties, disease resistance, and overall plant conformation. The strain obtained was treated subsequently as a pure line (CNPA BA 2005-3008), and was evaluated in Bahia State in the 2006/2007 season at one location and at two locations in the 2007/2008 season. In the 2008/2009, 2009/2010, and 2010/2011 seasons, it was evaluated in 21 field trials in states of Bahia, Goiás, Mato Grosso do Sul, Mato Grosso, Minas Gerais, Maranhão, Piauí, Paraíba, and Rondônia.

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PERFORMANCE TRAITS

‘BRS 335’ is a midseason maturity, picker-type upland cotton cultivar with growth habits similar to those of ‘BRS 293’ when grown at São Desidério, BA. Plants have trichomes on leaves and on the main stem. ‘BRS 335’ possesses normal-shaped leaves and bracts (7 to 12 lobes), glands and nectaries. The first reproductive branch is inserted generally on the fifth node, growing with oblique angle insertion. Flowers have cream-colored petals, anthers, and pollen. Full-size green bolls are longer than their width and are broader in the middle. The bolls possess five locks with four occurring occasionally. Open bolls resist shattering but are not storm proof and are thus suitable for picker harvesting. Lint and fuzz are white in color.

Plants are of medium height; reaching 110 to 120cm, when 50 to 75g of the active ingredient of growth regulator (mepiquat chloride and chlormequat chloride) are applied.

At an altitude of 794 meters, first flower appears at about 55 to 60 days after emergence (DAE) and the first boll opens at about 110 to 120 DAE. In these environmental conditions and using harvest aid chemicals, total harvest was attained at 150 to 160 DAE.

‘BRS 335’ has not suitable resistance levels to the main diseases that occur in Brazil (Suassuna and Coutinho 2007). At high inoculum pressure, BRS 335 was resistant to bacterial blight [caused by *Xanthomonas axonopodis* pv. *malvacearum*], moderately susceptible to cotton blue disease [caused by *Cotton leafroll dwarf virus- CLRDV*], false mildew [caused by *Ramularia areola*], *Fusarium oxysporum* f. sp. *vasinfectum - Meloidogyne incognita* complex and *Rotylenchulus reniformis*, and susceptible to ramulosis [caused by *Colletotrichum gossypii* var. *cephalosporioides*]. Fungicide foliar sprays are necessary to avoid losses caused by false mildew.

Table 1. Means for seed cotton yield (SCY), lint percentage (LP), and lint yield (LY) of the cotton cultivars BRS 335 and Delta Opal (control), in 24 field performance trials

Municipalities/State	Season	BRS 335			Delta Opal (control)			CV*
		SCY (kg ha ⁻¹)	LP (%)	LY (kg ha ⁻¹)	SCY (kg ha ⁻¹)	LP (%)	LY (kg ha ⁻¹)	
São Desidério/BA	2006/07	7002.0	43.8	3066.9	7246.5	43.3	3137.7	14.5
Barreiras/BA	2007/08	5415.0	42.7	2312.2	3828.0	42.2	1615.4	16.0
São Desidério/BA	2007/08	6498.0	44.1	2865.6	5550.0	42.9	2381.0	11.3
Correntina/BA	2008/09	5118.3	43.9	2246.9	4918.5	43.8	2154.3	11.4
Formosa do Rio Preto/BA	2008/09	6867.0	41.8	2870.4	6499.5	41.2	2677.8	13.0
Correntina/BA	2009/10	5560.5	43.7	2429.9	5580.0	43.0	2399.4	12.7
São Desidério/BA	2009/10	5250.0	43.9	2304.8	5029.0	43.9	2207.7	15.5
Formosa do Rio Preto/BA	2009/10	5181.0	44.0	2279.6	5049.0	43.2	2181.2	14.6
Mineiros/GO	2009/10	5098.0	42.4	2160.8	4561.4	42.1	1920.3	16.5
Montividiu/GO	2009/10	4401.1	41.8	1838.9	4383.3	40.8	1787.9	11.7
Uberaba/MG	2009/10	2788.0	43.8	1222.0	2401.0	43.4	1042.8	19.7
Vilhena/RO	2009/10	2601.3	42.9	1116.0	2464.4	40.5	998.1	16.3
São Raimundo/MA	2009/10	3830.0	43.7	1673.7	3763.8	41.5	1562.0	9.3
Bom Jesus/PI	2009/10	3703.8	43.3	1603.7	3577.5	42.1	1506.1	8.7
Chapadão do Sul/MS	2009/10	3185.5	43.5	1384.7	3040.6	44.6	1356.3	13.4
Itaquiraí/MS	2009/10	3270.2	37.9	1239.8	2326.0	36.6	851.7	17.7
Sapezal/MT	2009/10	5048.7	44.1	2226.7	4360.3	43.4	1891.7	11.1
Pedra Preta/MT	2009/10	5214.2	45.4	2367.8	4953.2	45.6	2256.4	7.9
Formosa do Rio Preto/BA	2010/11	3773.0	42.7	1611.1	3412.8	40.7	1389.0	18.1
Correntina/BA	2010/11	5522.0	43.8	2418.7	5458.9	40.4	2205.4	10.0
Campo Novo dos Parecís/MT	2010/11	1809.7	43.0	778.2	1406.0	40.5	569.4	28.2
Cristalina/GO	2010/11	5516.5	44.9	2487.5	5083.3	41.6	2115.9	10.4
Santa Helena de Goiás/GO	2010/11	3873.7	44.2	1713.1	3848.9	40.2	1548.5	18.1
Chapadão do Sul/MS	2010/11	4522.2	43.7	1975.4	4306.5	40.4	1739.5	9.2
Mean		4627.1	43.3	2008.1	4293.8	41.9	1812.3	13.9

* Coefficient of variation (%) for seed cotton yield (kg ha⁻¹)

Averaged across the 24 performance trials in central, northeastern, and northern Brazil in 2006/2007 to 2010/2011, 'BRS 335' produced 10.8% more lint yield than 'Delta Opal'. Higher performance in lint productivity is due to its average lint percentage 43.3% (ranging from 37.9 to 45.4%, measured in a roller gin) (Table 1). High volume instrument (HVI) measurements reveal desirable physical attributes for a medium fiber length cultivar, such as: micronaire reading ranging from 3.9 to 4.3; fiber length (UHML) from 29.0 to 31.0 mm; fiber strength from 27.2 to 33.1 gf tex⁻¹; reflectance from 73.5 and 80.9%; yellowness (+b) from 5.6 to 8.4; short fiber index from 5.7 to 9.5 and spinning consistency index from 139 to 152. Such fiber spin character could be defined as very good (Table 2).

Table 2. Other traits obtained for cultivars BRS 335 and Delta Opal (control)

Traits	'BRS 335'	'Delta Opal'
First flower (DAE)*	50 – 55	55 – 60
First open boll (DAE)*	105 – 115	110 – 120
Boll weight (g) ^a	6.0	6.4
Span Length 2.5% (mm) ^a	29.0 – 31.0	27.8 – 31.8
Uniformity index (ML/UHML - %) ^a	82.0 - 85.6	82.3 – 86.6
Strength HVI (gf/tex) ^a	27.2 – 33.1	28.9 – 34.1
Micronaire reading ^a	3.9 – 4.3	3.8 – 4.7
Elongation (%) ^a	6.5 – 8.6	5.9 – 8.1
Reflectance – Rd (%) ^a	73.5 – 80.9	70.4 – 82.2
Yellowness (+ b) ^a	5.6 – 8.4	6.2 – 8.7
Spinning consistency index ^a	139.0 – 152.0	144.0 – 154.0
Short fiber index (%) ^a	5.7 – 9.5	5.2 – 10.0
Total seed oil (%) ^b	24.08	21.2
<i>Cotton leafroll dwarf virus</i> ^c	1.2	0.0
False mildew ^d	3.5	4.0
Bacterial blight ^d	1.1	1.0
Ramulosis ^e	86.3	33.5 ^h
Root-knot nematode ^f	2.1	1.3 ^h
Fusarium wilt ^g	18.3	9.6 ^h

* Data recorded at São Desidério – BA (alt. 794m, 12°57'71" S 45°58'92" W).

^a Means from 18 field trials in 2006/2007, 2007/2008, and 2009/2010 seasons, in several environments (States of Goiás, Bahia, Mato Grosso, Mato Grosso do Sul, Minas Gerais, Maranhão, Piauí, and Rondônia); ^b Total seed oil (%) measured by nuclear magnetic resonance (NMR); ^c Incidence (%) of plants with cotton blue disease symptoms - data from two experiments with no control of virus vector (*Aphis gossypii*); ^d Disease severity (grades from 1 = resistant to 5 = highly susceptible) - data from two experiments with no fungicide application; ^e Amaral disease index calculated (Amaral 1969) – data from two experiments artificially inoculated with *Colletotrichum gossypii* var. *cephalosporioides* using methods proposed by Oliveira et al. (2010); ^f Gallings index (Zhang et al. 2006); ^g Disease index (Machado et al. 2009); ^h Cotton cultivar IAC 25 was used as a resistant control.

SEED MAINTENANCE AND DISTRIBUTION

'BRS 335' is registered in Ministério da Agricultura, Pecuária e Abastecimento (MAPA) under the number 27690. Foundation seed is produced by Embrapa Transferência de Tecnologia (SNT). The Fundação Bahia, working in partnership with Embrapa, is responsible for certified seed production.

ACKNOWLEDGEMENTS

Research leading to the development of 'BRS 335' was supported in part by grants from FUNDEAGRO.

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