



BRS 293: A midseason high-yielding upland cotton cultivar for Brazilian savanna

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Received 22 October 2009

Accepted 13 January 2010

ABSTRACT - Cotton cultivar BRS 293 is a midseason high-yield cultivar and has wide adaptation to the Brazilian savanna, yield stability, desirable resistance to main cotton diseases and good fiber quality. The cultivar BRS 293 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. Lately, exportation opportunities for fiber of this species have arisen (Ferreira Filho and Alves 2007). The genetic cotton improvement program of the Empresa Brasileira de Pesquisa Agropecuária (Embrapa) in Goiás State is run in partnership with private financial support from FIALGO and technical support from the Fundação Goiás. 'BRS 293' upland cotton (*Gossypium hirsutum* L.) (Reg. no. 25139) was developed by Embrapa and partners in 2008 as part of an ongoing effort to create germplasm and cultivars with improved yield potential and excellent fiber quality adapted to major cotton growing regions in Brazil (Freire et al. 2008).

GENETIC ORIGIN AND DEVELOPMENT

The cultivar BRS 293 was developed by hybridization and pedigree selection methods. 'BRS 293' was originated from crosses between Stoneville 132 (a widely cultivated cotton cultivar with pedigree DES 56 x TAMCOT SP37) and Delta Opal (a high-yielding cotton cultivar with pedigree DP 5816 x Sicala 33), carried out in 2000 at Rondonópolis, MT. Hybrid combinations with cultivar Delta Opal are recommended for the improvement of seed cotton yield, lint yield, seed index, index of production, and earliness (Aguiar et al., 2007). 'BRS 293' was derived from a single F_{3:4} progeny row following selection of single plants in the F₂ and F₃ generations. Plant selections and F₄ progeny rows were selected on the basis of apparent yield potential, high volume instrument fiber properties, disease resistance, and overall plant conformation. 'BRS

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was treated subsequently as a pure line (CNPA GO 2003-1947), evaluated in Goiás State at five sites in the 2005/2006 season, and at eight sites in 2006/2007 season. Then, it was evaluated in 16 trials in Goiás, Bahia, Mato Grosso do Sul, Mato Grosso, and Rondônia States in the 2007/2008 season.

PERFORMANCE TRAITS

'BRS 293' is a midseason maturity, picker-type upland cotton with growth habits similar to those of 'Stoneville 132' when grown at Santa Helena de Goiás, GO. Plants have trichome on leaves and the main stem. 'BRS 293' possesses normal-shaped leaves and bracts (7 to 12 lobes) and is glanded and nectaried. First reproductive branch inserted generally on fifth node, and branches with oblique angle insertion. Flowers from plants of 'BRS 293' have cream-colored petals, anthers, and pollen. Full-size green bolls are longer than their width and are broader in the middle. Bolls have 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 produced are white in color.

Plants are of medium size, reaching 110 to 120 cm, when 35 to 50 g of the active ingredient of growth regulator

(mepiquat chloride and chlormequat chloride) are applied. At an altitude of 750 meters, first flower appear at about 50 to 55 days after emergence (DAE) and the first boll opens at about 110 to 120 DAE. In these environmental conditions and using defoliant and boll maturer, total harvest was performed at 150 to 160 DAE.

'BRS 293' has suitable resistance levels to the main diseases that occur in Brazil (Suassuna and Coutinho 2007). At high inoculum pressure BRS 293 was moderately resistant to bacterial blight [caused by *Xanthomonas axonopodis* pv. *malvacearum*], to cotton blue disease [caused by *Cotton leafroll dwarf virus*- CLRDV], false mildew [caused by *Ramularia areola*] and ramulosis [caused by *Colletotrichum gossypii* var. *cephalosporioides*] and moderately susceptible to *Fusarium oxysporum* f. sp. *vasinfectum* - *Meloidogyne incognita* complex and *Rotylenchulus reniformis*.

Averaged across the 29 performance trials in central, northeastern, and northern Brazil in 2004/2005 to 2007/2008, 'BRS 293' produced 8.99% more lint yield than 'Delta Opal'. Higher performance in lint productivity is related to lint percentage, with a mean of 41.4% across trials (Table 1). HVI measurements reveal desirable physical attributes of a medium fiber length cultivar: lint percentage ranged from

Table 1. Means of total cottonseed yield (CY), lint percentage (LP), and lint yield (LY) of the cotton cultivars BRS 293 and Delta Opal (control), in 29 field performance trials

Municipalities/State	Season	BRS 293			Delta Opal (control)			CV*
		CY (kg ha ⁻¹)	LP (%)	LY (kg ha ⁻¹)	CY (kg ha ⁻¹)	LP (%)	LY (kg ha ⁻¹)	
Montividiu/GO	2005/06	5612.1	41.8	2340.9	4849.0	42.8	2079.8	9.6
Palmeiras de Goiás/GO	2005/06	2453.8	41.9	1028.7	2259.9	41.5	941.5	16.4
Paraúna/GO	2005/06	4493.9	42.2	1896.4	3999.8	40.9	1635.9	11.3
Mineiros/GO	2005/06	5023.8	41.1	2064.8	4624.6	40.4	1868.3	9.1
Sta Helena de Goiás/GO	2005/06	2329.0	41.6	969.6	1855.9	41.1	762.7	13.1
Itumbiara/GO	2006/07	5153.5	38.9	2007.6	5121.6	38.3	1967.6	7.2
Cristalina/GO	2006/07	4531.7	41.8	1895.6	4044.6	41.2	1665.2	8.6
Montividiu/GO	2006/07	5023.5	41.7	2096.0	4499.1	41.2	1855.9	13.2
Mineiros/GO	2006/07	6114.9	42.7	2611.0	5922.5	40.8	2416.3	10.1
Sta Helena de Goiás/GO	2006/07	5039.8	40.5	2041.8	4611.3	39.2	1809.6	9.9
Chapadão do Sul/MS (VCU)**	2006/07	4653.0	41.3	1923.9	4409.1	41.1	1804.9	14.4
Montividiu/GO (VCU)	2006/07	3728.6	41.5	1550.6	3922.7	39.0	1534.6	16.5
Sta Helena de Goiás/GO (VCU)	2006/07	4155.9	40.9	1700.5	4137.4	39.1	1616.8	10.9
Cristalina/GO	2007/08	5844.8	41.6	2341.1	5524.7	39.5	2182.2	8.8
Montividiu/GO	2007/08	7449.8	41.7	3106.5	6308.6	40.2	2536.0	13.2
Palmeiras de Goiás/GO	2007/08	3775.1	41.4	1568.2	3710.1	40.3	1500.5	10.3
Mineiros/GO	2007/08	5583.4	42.2	2356.2	5592.4	41.2	2307.9	11.0
Sta Helena de Goiás/GO	2007/08	5431.2	41.4	2248.5	5119.3	39.5	2022.1	8.5
Chapadão do Sul/MS (VCU)	2007/08	5516.5	42.1	2322.4	5388.7	41.4	2230.9	8.2
Mineiros/GO (VCU)	2007/08	5721.3	41.3	2362.8	5157.4	39.5	2037.1	10.0
Sta Helena de Goiás/GO (VCU)	2007/08	5581.4	40.4	2254.8	5211.4	39.4	2053.3	8.1
Itaquiraí/MS(VCU)	2007/08	5653.2	40.2	2272.5	5579.8	39.3	2192.8	7.4
Aral Moreira/MS (VCU)	2007/08	3381.8	40.3	1362.8	3144.2	39.0	1226.2	16.1
Cristalina/GO (VCU)	2007/08	5975.5	41.7	2491.7	5695.4	40.6	2312.3	8.9
São Desidério/BA (VCU)	2007/08	6345.3	41.6	2639.6	6270.1	40.2	2520.5	14.0
Lucas do Rio Verde/MT (VCU)	2007/08	4229.5	41.3	1746.7	3984.0	39.9	1589.6	13.8
Primavera do Leste/MT (VCU)	2007/08	5509.4	42.5	2341.4	5595.1	40.8	2282.8	9.3
Serra da Petrovina/MT (VCU)	2007/08	5443.6	41.9	2280.8	5500.3	40.4	2222.1	11.9
Vilhena/VCU	2007/08	4667.2	41.1	1918.2	4045.9	40.5	1638.5	15.7
Mean		4980.1	41.4	2060.1	4692.6	40.3	1890.1	

* Coefficient of variation (%) for cottonseed yield (kg ha⁻¹).

** VCU = Field trial of cultivation value and use.

Table 2. Cultivar traits of BRS 293 and Delta Opal (control)

Traits	'BRS 293'	'Delta Opal'
First flower (DAE)	50–55	55–60
First open boll (DAE)	110–120	120–130
Boll weight (g) ^a	6.0–6.5	5.5–6.5
Span Length 2.5% (mm) ^a	28.5–30.5	29.0–31.0
Uniformity index (ML/UHML - %) ^a	83.0–85.0	84.0–86.0
Strength HVI (gf/tex) ^a	28.3–32.9	29.5–32.5
Micronaire reading ^a	3.9–4.5	3.7–4.5
Elongation (%) ^a	8.0–9.5	6.5–8.0
Reflectance – Rd (%) ^a	72–82	73–81
Yellowness (+ b) ^a	6.5–10.0	7.3–8.5
Spinning consistency index ^a	140.0–160.0	145.0–160.0
Short fiber index (%) ^a	3.9–6.3	5.5–8.0
Total seed oil (%) ^b	19.7	21.2
<i>Cotton leafroll dwarf virus</i> (mean incidence) ^c	0.5	0.0
False mildew (severity) ^d	8.7	19.0
Bacterial blight (severity) ^d	2.5	0.0
Ramulosis (disease index) ^e	13.0	11.1

^a Means from 29 field trials in 2005/2006, 2006/2007, and 2007/2008 seasons, in several environments (States of Goiás, Bahia, Mato Grosso, Mato Grosso do Sul, and Rondônia).

^b Total seed oil (%) measured by nuclear magnetic resonance (NMR).

^c Incidence (%) of plants with cotton blue disease symptoms - data from three assays with no control of virus vector (*Aphis gossypii*).

^d Percentage of diseased leaf area - data from three assays with no fungicide application.

^e Amaral disease index calculated (Amaral 1969) – data from three assays artificially inoculated with *Colletotrichum gossypii* var. *cephalosporioides* using methods proposed by Oliveira et al. (2010).

40.5 to 42.5%; micronaire reading ranged from 3.9 to 4.5; fiber length (SL 2.5%) from 28.5 to 30.5 mm; relative strength from 28.3 to 32.9 gf tex⁻¹; reflectance from 72 and 82%; yellowness (+b) from 6.5 to 10.0; short fiber index from 3.9 to 6.3; spinning consistency index from 140 to 160; the fiber spin character could be defined as very good (Table 2).

SEED MAINTENANCE AND DISTRIBUTION

'BRS 293' is catalogued in the MAPA - Ministério da Agricultura, Pecuária e Abastecimento - under the number 25139. Basic seeds are produced by the Serviço de Negócios para Transferência de Tecnologia da Embrapa (SNT), and the Fundação Goiás, working in partnership with Embrapa, are responsible for the certified seed.

ACKNOWLEDGEMENTS

Research leading to the development of 'BRS 293' was supported in part by grants from the Fundo de Incentivo a Cultura do Algodão em Goiás – FIALGO.

BRS 293: Cultivar de algodoeiro de ciclo médio e alto rendimento para o cerrado brasileiro

RESUMO – A cultivar de algodoeiro BRS 293, de ciclo médio, possui ampla adaptação ao Cerrado do Brasil Central, alto potencial produtivo de fibra, estabilidade de produção, reação satisfatória às principais doenças e boa qualidade de fibra. 'BRS 293' atende às demandas do produtor por rendimento competitivo e às da indústria têxtil.

Palavras-chave: *Gossypium hirsutum*, resistência à doenças e produção de fibra.

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