

'BRS Cainguá', a blackberry fresh-market cultivar

Maria do Carmo Bassols Raseira¹, Rodrigo Cezar Franzon¹,
Nelson Pires Feldberg², Luis Eduardo Correa Antunes¹ and Ciro
Scaranari³

Crop Breeding and Applied Biotechnology
20(1): e26632014, 2020
Brazilian Society of Plant Breeding.
Printed in Brazil
<http://dx.doi.org/10.1590/1984-70332020v20n1c4>

Abstract: *One of the reasons for the low market demand of blackberries in Brazil is the acid taste of the fresh fruit. The fruits of the newly released cultivar BRS Cainguá taste better and have a very attractive shape.*

Keywords: *Breeding, Rubus, flavor*

INTRODUCTION

Small fruits with high anthocyanin content such as blackberries are becoming very popular due to their positive effect on human health. However, one of the factors reducing the market demand of blackberries in Brazil is the acid taste of the fresh fruit.

Blackberry breeding in Brazil was initiated in the late 1970's, in collaboration with the University of Arkansas (USA). In the following years, a boysenberry from Uruguay and pollen and seeds introduced by USDA (Oregon) and the University of Arkansas were included in the program, resulting in the development of the following cultivars: Ébano in 1981 (Raseira and Moore 1981), Negrita (obsolete) in 1983, Tupy and Guarani in 1988, Caingangue in 1992 (Raseira and Franzon 2012), BRS Xavante, in 2004 (Moore et al. 2004) and BRS Xingu in 2015 (Raseira et al. 2018). All cultivars except Ébano and Xavante have thorny stems. Presently, over 200 selections and about 6000 seedlings are under evaluation, and another few thousand will be included this year.

The most important selections of the breeding program of Embrapa are being evaluated in collections (observation units) by producers and research institutions in Pelotas, Bento Gonçalves, Veranópolis and Vacaria, in Rio Grande do Sul, Videira and Canoinhas in Santa Catarina, Senador Amaral in Minas Gerais and in Avaré, São Paulo.


CULTIVAR CHARACTERISTICS

Origin

Cultivar BRS Cainguá was derived from a cross made in 2004, between Selection 2/96 as female parent and cultivar Caingangue as pollen. The origin of Selection 2/96 is unknown. Cultivar Caingangue is a cross between cultivar Cherokee, introduced from the University of Arkansas, and selection Black 1. Black 1 is a selection made in Embrapa from a cross made at the University of Arkansas, in 1975, between Shaffer tree and Brazos (Figure 1).

***Corresponding author:**

E-mail: rodrigo.franzon@embrapa.br

 ORCID: 0000-0002-0942-9714

Received: 19 March 2019

Accepted: 19 November 2019

Published: 13 February 2020

¹ Embrapa Clima Temperado, 96.010-971, Pelotas, RS, Brazil

² Embrapa Clima Temperado, Estação Experimental de Canoinhas, 89.460-000, Canoinhas, SC, Brazil

³ Embrapa, Secretaria de Inovação e Negócios, 13.070-115, Campinas, SP, Brazil

After scarification and cold vernalization for about three months, the seeds of the above-described cross of 2004 were sown in a greenhouse. In 2006, the seedlings were transplanted to the field and the resulting progenies identified as C 2004-04. During the 2008 growing season, the first plant of this progeny was selected and propagated for further tests, now called Black 212. The flowering and harvest dates were recorded as well as total yield per plant, stem growth habit and plant health. Fruit weight and shape, total soluble solids (TSS) content and fruit quality were also observed (Table 1). Finally, Black 212 clones were planted in observation units in Santa Catarina, São Paulo and Minas Gerais, in 2016.

Plants

The stem of BRS Caingua is erect to semi-erect, with short internodes. It has fewer and smaller thorns than 'Tupy' or 'BRS Xingu'. The plants have low to medium vigor but are very productive. Leaves are light green with small stipules. The plants are not resistant, but less susceptible to rust than 'Tupy'. As the plants are less vigorous than 'Tupy', they can be planted at a higher density.



Figure 1. Fruits and flowers of cultivar BRS Caingua (Photos: Maria do Carmo Bassols Raseira).

Fruits

The fruits of cultivar BRS Caingua are elongated, have a good appearance (Figure 2) and pleasant taste for the fresh market. The firmness and gloss of the fruits are medium, and the size is larger than of those of 'Tupy' (Table 1). Over a 6-year period, the yield of 'BRS Caingua' was very similar to that of 'Tupy'.

Except for the 2014 growing season, the mean total soluble solids (TSS) contents of 'BRS Caingua' fruits were 8.9 ± 1.83 °Brix, i.e., comparable with the cultivars Natchez (8.7 ± 0.8 °Brix), Apache (10.6 ± 1.3 °Brix), Ouachita (9.8 ± 2.2 °Brix), Navaho (10.1 ± 3.0 °Brix) and Arapaho (7.7 ± 1.6 °Brix) (Clark and Moore 2008).

In 2018, due to a very hot dry season (unirrigated cultivation) with maximum temperatures of 34.5 °C and 36.7 °C, in November and December, respectively, and hotter than 30 °C on several days, the production of all cultivars and

Table 1. Harvest time, yield, fruit size and weight, total soluble solids (TSS) content and ratio of fruits of the cultivars BRS Caingua and Tupy (2012 to 2017)

Year	Cultivars	Beginning of harvest	End of harvest	Fruit weight (g)	Yield (g pl ⁻¹)	Fruit length (cm)	Fruit width (cm)	TSS (°Brix)	Ratio ⁺
2012	Tupy	11/09	-	-	2110	2.7	2.2	9.1	-
	BRS Caingua	11/19	01/09	6.5	1520	3.3	2.1	8.3	-
2013	Tupy	11/19	12/18	6.1	2226	2.6	2.4	9.0	-
	BRS Caingua	11/19	01/02	8.7	1780	3.6	1.9	12.7	-
2014	Tupy	11/12	01/05	5.5	2826	2.3	1.9	8.2	-
	BRS Caingua	11/21	01/12	6.5	1717	3.0	1.9	6.7	-
2015	Tupy	11/16	01/29	5.5	1980	2.5	2.2	9.3	-
	BRS Caingua	12/08	01/25	8.1	2873	2.8	1.7	8.7	-
2016	Tupy	11/09	12/29	5.0	813	2.1	1.6	7.9	6.00
	BRS Caingua	11/11	12/29	6.9	1456	2.8	1.6	8.9	5.62
2017	Tupy	11/17	01/30	4.6	1510	2.1	2.0	9.2	7.08
	BRS Caingua	11/21	01/19	5.0	1751	2.5	1.8	8.1	8.24
Average	Tupy	11/14	01/10	5.3*	1910.8	2.4*	2.1	8.8	6.54
	BRS Caingua	11/22	01/11	7.0	1849.5	3.0	1.8	8.9	6.93

⁺ TSS/titrable acidity; (-) not evaluated. * Averages significantly different according to the t test ($p \leq 0.05$)

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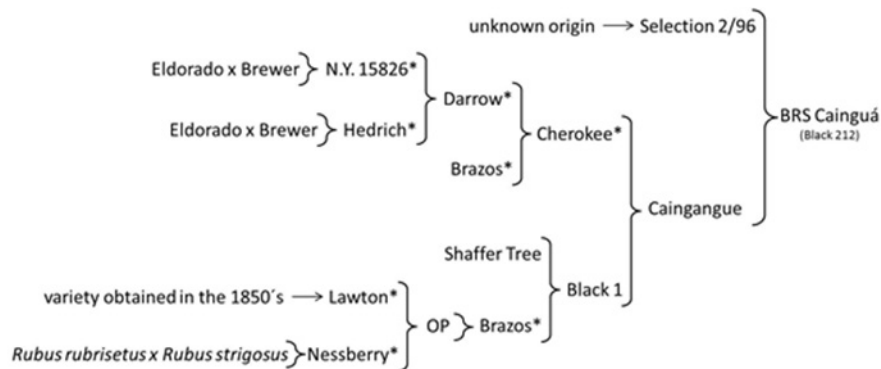


Figure 2. Genealogy of cultivar BRS Caingua (OP = open pollination; * = according to Brooks and Olmo 1997).

selections of the Embrapa collection decreased. Since this was a very atypical year, the data were not considered (Table 1).

The titrable acidity was 1.47% and citric acid 0.99%, in the growing seasons 2016 and 2017, respectively. According to Threlfall et al. (2016), a desirable fresh-market blackberry should have an average fruit weight of 8 - 10 g, soluble solids around 9 - 10 °Brix and titratable acids of 0.9-1.0%. Thus, fruits of cultivar BRS Caingua are lighter and slightly more acid than desirable, according to the international standards for fresh market blackberry (Table 1). However, the same authors considered fruits with soluble solids of 8 - 11 °Brix, titrable acidity of 0.7- 1.4% and a berry weight of 6 - 14 g as commercially acceptable. Thus, 'BRS Caingua' is within these ranges.

The post-harvest quality of 'BRS Caingua' fruits is similar to that of 'Tupy'. In a small postharvest trial in the 2017 growing season, 'BRS Caingua' had 7.5% color reversion after seven days of storage at 5 °C; 16.25% after 14 days and 17.31% after 21 days. On the other hand, under the same conditions, a color reversion of cultivar Tupy fruits of 11.25%; 15.0% and 23.08% was observed after 7, 14 and 21 days storage, respectively.

Adaptation


The range of adaptation of 'BRS Caingua' is similar to that of 'Tupy'. The former is well adapted to areas with 200 - 300 h chilling (≤ 7.2 °C). Further evaluations under different conditions are required, however based on the results of the 2017 growing season, it is believed that the chilling requirement of the cultivar is < 200 h.

Availability

Plants or root cuttings of this cultivar can be purchased at licensed nurseries; list available at <<https://www.embrapa.br/cultivares>>.

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