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Genetics and plant breeding

‘BRS Serenata’: a peach for fresh market

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Abstract- Even though the peach tree was introduced in Brazil during the XVI century, it was only on the 1940’s that the first peach breeding program started in the country. Later on, other programs started being, until now, the largest ones, and the programs that gave more significant contributions to the peach crop development those from the Instituto Agronômico de Campinas and from Embrapa Temperate Agriculture. Presently, peach is cultivated not only in the colder areas of the South but also in the subtropics and high altitude areas of the tropics, due to dozens of cultivars released by these breeding programs. Peaches are sold entirely in the domestic market and in the largest consumers market, State of São Paulo, the preference is for white sweet flesh and low acid peaches with attractive appearance. The ‘BRS Serenata’ cultivar was released to fulfill a gap of white flesh peach between the seasons of ‘BRS Kampai’ and ‘BRS Fascínio’.

Index terms: breeding, low chill requirement, white flesh, adaptation.

‘BRS Serenata’: um pêssego para mercado *in natura*

Resumo- O pessegueiro foi introduzido no Brasil no século XVI; mas, apesar disso, o primeiro programa de melhoramento só teve início no País, no fim da década de 1940. Mais tarde, outros programas foram iniciados, mas os maiores e que mais contribuições deram à cultura do pessegueiro foram o do Instituto Agronômico de Campinas e o da Embrapa Clima Temperado. Atualmente, o pessegueiro é cultivado não apenas nas áreas mais frias do Sul do Brasil, mas também nas áreas subtropicais e tropicais de altitude, graças às dezenas de cultivares lançadas por estes programas de melhoramento genético. A produção de pêssego brasileira destina-se ao mercado interno, e no maior centro consumidor do País, São Paulo, a preferência é por pêssegos com polpa branca, doces, com baixa acidez e aparência atrativa. A cultivar BRS Serenata está sendo lançada com o objetivo de preencher a lacuna de pêssegos de polpa branca, entre a estação de ‘BRS Kampai’ e ‘BRS Fascínio’.

Termos para indexação: melhoramento genético, baixa necessidade em frio, polpa branca, adaptação.

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The peach tree (*Prunus persica*) was introduced in Brazil around the year of 1532, in the area of Capitania de São Vicente, where is now the State of São Paulo (SP). From there, it was spread to several areas of the South and Southeast region. There are records that around the 1880, there were over 100 thousands peach trees in the area of Pelotas, RS (BACH, 2009). However, the first breeding program started at the end of the 1940's by the Instituto Agronômico de Campinas (IAC), SP (POMMER; BARBOSA, 2009; BARBOSA et al., 1993) with the objective of developing cultivars adapted to different conditions, mainly to areas with a chilling accumulation of 50-100 hours at the most. On the decade of 1950, a similar program started in Rio Grande do Sul, first at the Taquari Experimental Station, a State Institution, and later it was moved to the Experimental Station of Pelotas, a Federal Institution, presently part of Embrapa Temperate Agriculture.

Previous to that time, most of the study with cultivars consisted in introductions of germplasm, tests and evaluations. The Embrapa's Breeding Program works for a wider range of chilling accumulation however a larger concentration of genotypes ranges between 200 and 300 hours of chilling requirement (considering temperature ≤ 7.2 ºC). Under warm climate conditions, peaches usually have bad shape with prominent tip and suture (TOPP et al., 2008). In 2016, Embrapa released the 'BRS RubraMoore' (RASEIRA et al., 2017) that produces fresh market fruits with good shape and color. The new cultivar BRS Serenata is another option which produces similar type of fruits.

Origin: 'BRS Serenata' was selected among the seedlings of a progeny obtained from a cross made in 2004, between a selection Cascata 845 and 'Chimarrita' (Figure1). Selection Cascata 845 is a Embrapa genetic accession obtained from a hybridization of 'Chula' and the Florida selection Fla 7-2, whereas 'Chula' resulted from a cross made in Taquari, RS, in 1969, using 'Delicioso' (a peach cultivar) as female parent and pollen of the old nectarine 'Panamint'. The 'Chimarrita' is widely planted in the South of Brazil and also on a few orchards of the Southeast region. It is also originated from the Embrapa's program, selected from seedlings obtained of a cross made in 1978 between the American cultivars Babcock and Flordabella.

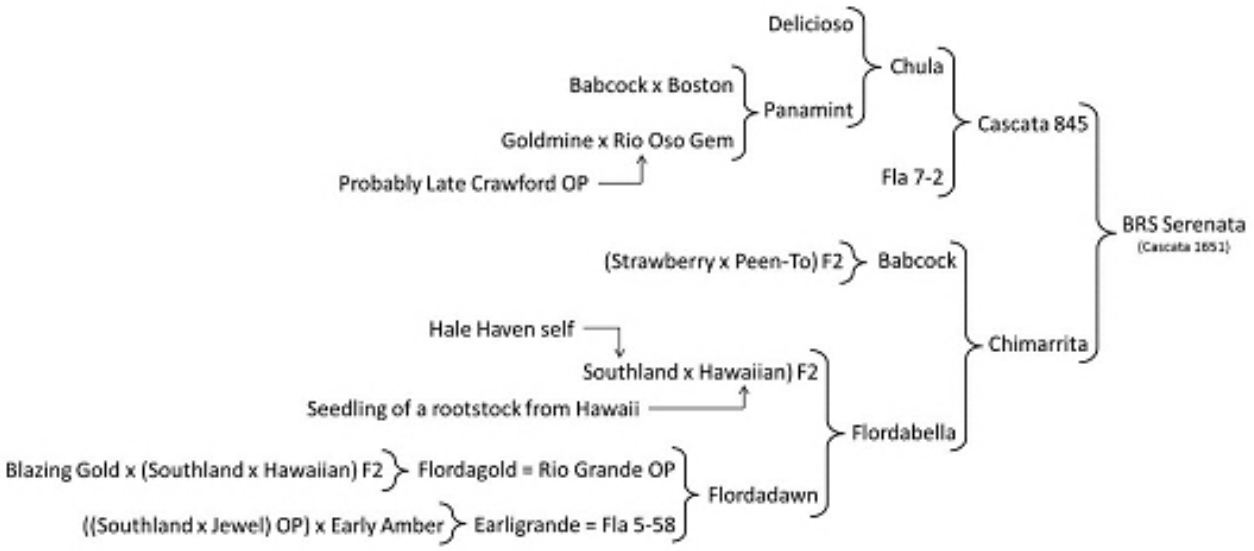

Figure 1. Genealogy of peach cultivar BRS Serenata. (OP = Open Pollination).

Seedlings of the 2004 cross of Cascata 845 by 'Chimarrita' were identified as C.2004-139 and were submitted to evaluation in 2007. However only in 2010, the seedling number 18 of this progeny was selected as Cascata 1651. It was grafted on seedling rootstocks and planted at Embrapa's collection. Four years later, in 2014, further propagation was made in order to have trees for some observations units located in the South and Southeast States of Brazil.

Plant description: trees of 'BRS Serenata' at Embrapa's experimental field were trained as an open vase. The soil is very shallow and poor, around 30 cm deep and no irrigation was used. Under such conditions, trees of 'BRS Serenata' are of medium vigor and smaller size than trees of 'BRS Kampai' (RASEIRA et al., 2010) or 'BRS Fascínio' (EMBRAPA, 2019a). The growth habit is semi-vertical. The flowers are rosacea type and the full bloom (under Pelotas conditions) generally occurs in the first week of August. Fruit harvest usually starts between the second and third week of November, beginning between 'BRS Kampai' and 'BRS Fascínio' (Table 1). Harvest can be anticipated in years of warmer winters. It usually coincides with the season of 'BRS Rubimel' (EMBRAPA, 2019b), however in spite of all the positive qualities of 'BRS Rubimel', it produces yellow flesh fruits whereas 'BRS Serenata' produces white flesh fruits which is the preference of the Brazilian largest markets.

Table 1. Comparison of full bloom and beginning of harvest dates among 'BRS Serenata' and commercial cultivars with similar season at Embrapa Temperate Agriculture collection, Pelotas, RS, Brazil.

Cultivar	2010	2011	2012	2013	2014	2015	2016	2017	2018	Means[1]	
	Full bloom data										
BRS Kampai	Jul 28	Jul 28	Jul 30	Jul 08	Jul 19	Jul 24	Jul 13	Jul 18	Aug 02	Jul 22	b
BRS Serenata	--	--	--	Aug 08	--	Aug 08	Aug 04	Aug 03	Aug 04	Aug 05	a
BRS Fascínio	Aug 23	Aug 13	Aug 13	Aug 12	Aug 10	Aug 12	Aug 02	Jul 31	Aug 15	Aug 11	a
BRS Regalo	Aug 24	Aug 09	Aug 09	Aug 12	Aug 06	Aug 08	Aug 06	Aug 10	Aug 16	Aug 11	a
Chimarrita	Aug 24	Aug 15	Aug 05	Aug 12	Aug 10	Aug 28	Jul 30	Aug 04	Aug 15	Aug 12	a
	Beginning of harvest date										
BRS Kampai	Nov 25	Nov 18	Nov 27	Nov 05	Oct 31	Nov 13	Nov 16	Oct 27	Nov 14	Nov 13	c
BRS Serenata	Nov 25	Dec 07	--	Nov 26	Nov 10	Nov 13	Nov 16v	Nov 06	Nov 13	Nov 18	b
BRS Fascínio	--	Dec 08	Dec 06	Dec 05	Dec 02	Nov 30	Dec 05	Nov 07	Dec 07	Dec 01	a
BRS Regalo	Dec 08	Dec 08	Dec 06	Nov 26	Dec 02	Dec 07	Dec 05	Nov 16	Dec 07	Dec 03	a
Chimarrita	Dec 06	Dec 12	Nov 26	Dec 08	Dec 02	Nov 30	Nov 28	Nov 09	Dec 07	Dec 01	a

-- Missing data.

[1] Dates followed by distinct letters differ statistically by the Scott-Knott test ($p \leq 0.01$).

Statistical analysis of the means was performed using the Rbio software (Bhering, 2017). Prior to statistical analysis, the dates were converted to number of days after June 1st for full flowering, and after October 1st for beginning of harvest.

Fruit description: The fruits of 'BRS Serenata' have around 80% of the skin covered by dark red color over a white creamy ground color (Figure 2). Skin hairiness is light. The flesh is melting, semi- freestone, white greenish, medium sweet taste with low acidity.

The fruits have roundish shape and medium size (Table 2), without prominent tip and very small bulge on the suture. Fruit diameter is usually between 5.4 and 6.1 cm.

Figure 2. Fruits of 'BRS Serenata'.

Table 2. Total soluble solids content (°Brix), average fruit weight (g) and productivity of 'BRS Serenata' and commercial cultivars with similar season at Embrapa Temperate Agriculture collection, Pelotas, RS, Brazil.

Cultivar	2010	2011	2012	2013	2014	2015	2016	2017	2018	Means[1]
	Total soluble solids content (°Brix)									
BRS Kampai	10.5	9.2	13.9	--	11.8	9.7	11.3	11.6	7.6	10.7 b
BRS Serenata	11.2	12.8	--	11.3	10.8	8.1	10.3	9.3	--	10.5 b
BRS Fascínio	--	11.4	13.9	12.7	--	10.9	13.1	12.4	14.0	12.7 a
BRS Regalo	13.7	10.8	14.0	10.2	11.2	12.0	11.0	14.3	14.0	12.4 a
Chimarrita	--	11.1	--	--	12.0	12.2	12.0	11.8	14.0	12.5 a
	Average fruit mass (g)									
BRS Kampai	73.0	109.0	87.0	107.0	120.0	165.0	118.0	163.0	158.0	122.2 a
BRS Serenata	--	100.0	--	76.0	--	77.0	98.0	84.0	104.0	89.8 b
BRS Fascínio	--	200.0	105.0	88.0	--	154.0	145.0	153.0	123.0	138.3 a
BRS Regalo	82.0	135.0	100.0	140.0	120.0	115.0	120.0	102.0	123.5	115.3 a
Chimarrita	105.0	160.0	86.0	125.0	105.0	124.0	110.0	99.0	125.0	115.4 a
	Average productivity[a]									
BRS Kampai	4.0	3.5	4.5	1.0	2.0	4.0	3.0	1.5	--	2.9 [ns]
BRS Serenata	--	--	--	1.5	--[b]	3.5	3.0	4.5	--	3.1
BRS Fascínio	2.0	4.5	5.0	3.5	2.0	1.0	4.0	2.5	--	3.1
BRS Regalo	5.0	4.0	5.0	5.0	4.5	--	5.0	3.5	--	4.6
Chimarrita	4.0	4.0	5.0	2.5	4.0	2.0	3.0	2.5	3.0	3.3

-- Missing data.
[a] Evaluations using 1 to 5 scale, where 1 is none or very light and 5 is excessive production)
[b] In this year was registered a light incidence of *Xanthomonas* in the leaves and anthracnosis on the fruits.
[1] Averages followed by distinct letters differ statistically by the Scott-Knott test ($p \leq 0.05$)
[ns] Averages non significantly different ($p \leq 0.05$).

In evaluations made in trees of nine observation collections, using the 1 to 5 scale (where 1 is none or very light production or very poor flavor or appearance and 5 is excessive production or very good appearance and quality), 'BRS Serenata' had, on average, 4.7 in color; 3.9 in shape; 3.8 for production; 3.9 for taste; 4 for sanity and 3.4 for fruit size. On the season of 2017, the fruit diameter ranged from 6.0 to 7.5 cm and the total soluble solids content was around 11 °Brix. In the evaluations in the Embrapa Temperate Agriculture collection, the average of production was 3.1, and the TSS average was 10.5 °Brix (Table 2). Although the fruits of 'BRS Serenata' are smaller and less sweet than 'BRS Fascinio', 'BRS Regalo' and 'Chimarrita', it is important to point out that they are very atractive and they ripe before these three cultivars, following 'BRS Kampai'.

Adaptation: this cultivar is adapted to areas of South and Southeast region of Brazil, in areas with a chilling accumulation equal or higher than 300 chilling hours. 'BRS Serenata' was tested in observations collections, located in the following counties: Guaíba and Pinto Bandeira, in RS; Canoinhas, Descanso, Petrolandia, Itaiópolis and Videira, in SC; Araucária, PR; Jarinu and Pilar do Sul, SP; Barbacena, MG; and Venda Nova do Imigrante, ES. This cultivar showed better adaptation to the colder areas such as highlands of Rio Grande do Sul and Vale do Rio do Peixe, in Santa Catarina. Leafing was not as good as desirable in Jarinu, SP, and Descanso, SC, indicating lack of adaptation or a marginal adaptation to these areas. On the other tested areas the adaptation was fairly good, however in some years there might be a need to use chemical dormancy breaking agents.

Availability: budwood or nursery plants of this cultivar can be obtained with licensed nurseries, listed in: https://www.embrapa.br/cultivar/pessego

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