

Short Communication

Brazilian peach cultivars growing on the site of origin and in Spain: a comparative study

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The expression of a character is a function of the genotype in interaction with the environment. Some traits are more influenced by environmental factors than others. The present paper discusses some characteristics of four peach cultivars (BRS Libra; Bonão; BRS Kampai and Rubimel) comparing results obtained in Southern Brazil and South of Spain. There were some differences among fruits produced on one side or the other being fruit shape the most noticeable one. Fruits produced in Southeast of Spain, generally, tend to have an oblate shape and did not have a pronounced apex (tip).

Key words: sugar content; size; fruit shape, skin color.

INTRODUCTION

Several economic traits in peach are a function of multiple genes action and as such, environment plays an important role on the phenotype. Peach grows in a sigmoidal curve pattern, with a rapid growth at the beginning, then at a slow rate (coinciding with the pit hardening period) and finally, there is a second period of rapid growth, which ends at maturity (Pereira, 1983).

Differences in fruit size among genotypes are considered to be mainly a function of cell number (Scorza et al., 1991). Thus it drives to the hypothesis that a factor influencing cell division would also influence the number of cells and consequently fruit size. Besides the temperature during the first phase of fruit development, the rootstock has also a considerable influence on fruit size, among with other factors (Pilar et al, 2012; Giorgi et al, 2005). Fruit shape, regarding the tip size and bulge at the suture can vary from year to year and between different locations (Topp & Sherman, 1989). Yet, another character which has the influence of location, temperature, plant nutrition and sunlight hours is the

sugar content of the fruits. Hansche et al. (1972), estimated the heritability for total soluble solids in peaches and nectarines, as being 0.01, which is very low, implying a great deal of environment influence.

The objective of this work was to compare four Brazilian peach cultivars, originated from the breeding program of Embrapa Clima Temperado, under the conditions of Pelotas, in Brazil and Cieza, in Spain.

Cieza, in the Murcia province, is located at 30°17'51,99" latitude and 1°27'30,57" longitude and 755 m of altitude. Murcia is a very important zone in Spain for the production of very early fruits, mainly peaches and nectarines, with nearly 14 500 ha producing 25 000 tons of peach (Reche, 2008). Pelotas – in Rio Grande do Sul - is located at 31°40'47"S latitude and 52°26'24"W longitude and the site where the collection was located is at 60 m of altitude. The State of Rio Grande do Sul is the extreme Southern Brazilian State and is the first national peach producer with an area of 12,975 ha and a production of 129,515 tons.

The four cultivars, used in this study, were: Bonão; BRS Libra, BRS Kampai and Rubimel. Bonão was released in 2007 (Raseira & Nakasu, 2007). It is considered a very low chill clingstone cultivar, with a

chilling requirement estimated as 200 h. It was tested as Conserva 1124 and it was selected from a progeny of a cross made in 1995, having Conserva 594 as female parent and cv. Pepita as the pollen parent. Conserva 594 produces large, round, clingstone fruits but with a soft flesh. Cv. Pepita is an early non-melting yellow flesh cultivar, being used in Brazil for canning.

‘BRS Libra’ is presently, the earliest non-melting flesh cultivar. It is a sib of ‘Bonão’, since it is originated from the same cross. However, it produces firmer fruits than ‘Bonão’, usually not as large, but with better quality and pleasant aroma. It was tested as Conserva 1125 (Raseira et al., 2010).

‘BRS Kampai’ is a cultivar released for fresh market. It produces white flesh, sweet mild acid fruits. Tested as selection Cascata 834, it was originated from a cross of a Brazilian cultivar, Chimarrita, by the low chill cv. Flordaprince, released by the University of Florida, breeding program (Raseira et al., 2010). ‘Chimarrita’ produces white flesh fruits but it is heterozygous for this character.

‘BRS Rubimel’ was selected from the same progeny which gave rise to ‘BRS Kampai’, but produces yellow flesh fruits with low acid, sweet taste (Raseira & Nakasu, 2007). The fruits have a nice roundish shape and an attractive skin color, generally with a high percentage of red as the cover color over a yellow background.

Budwood of these cultivars were sent to Spain and budded on GF 677. This rootstock is a hybrid of almond by peach, obtained at the Estacion de la Grande Ferrade, INRA, France. It is considered to be a very vigorous rootstock and its root system is able to explore large soil volume (in width and in depth). In Brazil, the plants were older and budded on seeds obtained in the Pelotas’ canneries, probably of cv. Capdeboscq. This cultivar had been released on the 70’s because it was very productive and late ripening, at that time. Since peach nurseries found easier to get the pits from the canneries to make their rootstocks, ‘Capdeboscq’, as well as several other clingstone peaches became the main rootstocks on the region.

On the first year of production in Cieza, the following phenologic characteristics were evaluated: time of bud break, leafing, blooming and harvesting. Fruit diameter, epidermis and flesh color, average fruit weight, fruit shape, total soluble solid content (TSS), acidity, firmness of flesh were also recorded. Similar work was conducted at Embrapa, Pelotas, for several years.

The beginning of leafing was estimated by the date when the first small leaves could be seen at the lateral buds. It was considered beginning of blooming when 10% of the flowers were opened. Similarly, the date when more than 50% of the flowers were completely open was recorded as full bloom. The end of the blooming period was the date when practically there were no more flowers left to open.

The average fruit weight was determined based on a

sample of 20 fruits. The shape was classified according to the UPOV descriptors. Fruit diameter was measured transversally on the suture. Flesh firmness was determined by a hand firmness tester with a 8 mm tip. The TSS was measured with a refratometer whereas fruit appearance and taste was judged subjectively.

In Spain, a colorimeter Minolta was used for color evaluation whereas in Pelotas, the ground color was described based on UPOV descriptors. The cover color was estimated by the fruit surface with red color, as compared with the total surface.

The cv. Bonão produced round fruits in Cieza while in Pelotas they can either be round or oblong. The skin color had 60 to 80 % red over a yellow ground color in Cieza, while under Pelotas conditions, the red was absent or covering only 5% of the surface. Firmness was not as desirable for processing peaches, in both places.

‘BRS Libra’ produced slightly flat fruits in the Cieza orchard and round to round conic in Pelotas. In some years, the fruits may present a slight suture. The skin color was completely golden yellow in both places. The pubescence on the epidermis was very light in both locations. The taste is good, mainly considering that this is a very early cultivar and fruits are aromatic.

Cultivar BRS Kampai was described in Cieza as slightly flat (oblate) with a dark red color covering 80% of the epidermis’ surface, over a white greenish background color. It was considered to have very good taste, very sweet and low acid (Rubio, 2008). In Pelotas, fruits of this cultivar were round to roundish conic. The cover color has varied from year to year from 25% to 70% red. Fruits do not usually have a tip, but in some years, a small one can be present.

Fruits of cultivar Rubimel had an oblong shape in Cieza, whereas in Pelotas, they are round or roundish conic. The skin color is yellow with 50 to 60% red, in both locations. Firmness was also good in both places and according to Rubio (2008), the texture was crispy in Cieza.

The data for average fruit weight, suture diameter, TSS and firmness, obtained in Cieza, on the 2008 season and over ten year average data obtained in Pelotas, is presented on Table 1. Dates of beginning of harvest for both places, in the year of 2008, are shown on the same table. Comparing the results obtained in both locations, it is possible to notice that average fruit weight was larger in Cieza, except for cv. BRS Kampai. The differences between locations, however, were moderate, with exception of cv. BRS Libra. This could be possibly explained by the fact that it is a very early ripening cultivar, usually harvested in October, in Southern Brazil and generally there are not many warm, sunny days in September and October. The cool temperature does not favor the fruit growth.

The suture diameter was very similar in both places, except again for the cv. BRS Libra which was larger in Cieza. But it is interesting to point out that the data

Table 1: Some fruit characteristics of four Brazilian cultivars growing in the site of origin and in Cieza, Murcia.

Cultivar	Ave. Weight (g)		Suture diameter (cm)		SST (°Brix)		Firmness (kg/cm ²)		Harvesting	
	Spain	Brazil	Spain	Brazil	Spain	Brazil	Spain	Brazil	Spain	Brazil
Rubimel	122.5±13.5	113.8±11.8	6.2±0.3	6.2±0.5	10	12.2±3.0	4.5±0.4	4.3±1.8	04/06	18/11
Bonão	147.9±29.3	131.7±41.7	6.3±0.3	6.8±1.0	10	10.4±1.5	2.0±0.9	2.9±0.6	25/05	21/10
Libra	143.7±15.2	69.0±17.5	6.5±0.3	5.4±0.8	11	10.0±1.3	2.3±0.5	3.4±0.6	20/05	14/10
Kampai	94.9±21.2	108.2±34.1	5.8±0.4	5.8±0.7	11	11.3±2.1	3.3±0.8	4.1±2.4	05/06	03/11

collected in Cieza was from fruits produced by young plants, on the first year of production and fruits tend to get larger in adult plants. As Sharpe (1969), points out the early varieties are difficult to size well, particularly in young plants. Thus the differences could be even larger on following years. Also the standard deviation was larger in fruits of the Pelotas orchard, where plants suffered more the weather influence, mainly the precipitation pattern.

Fruit firmness was not very different but with exception of 'Rubimel' it was higher in Pelotas. This could be in part, because of the fertilization scheme as well as absence of irrigation in the Pelotas orchard, where data was taken. The TSS was very similar or slightly higher in Pelotas, except for 'BRS Libra', which could be expected due to the cool temperatures and cloudy days (Torralles et al, 2008) that often occur before end of October, in Southern Brazil.

The titratable acidity was only measured in Spain and it was expressed as g.L⁻¹ of malic acid. The lowest values were, as expected, for cvs. Rubimel and BRS Kampai (4-5 g.L⁻¹). Both had been released as low acid cultivars. Cv. Bonão had 8 g.L⁻¹ whereas BRS Libra had around 9 g.L⁻¹. In Brazil, the two first cultivars are used for fresh market whereas 'Bonão' and 'BRS Libra' are mainly used for processing.

Considering the dates for beginning of harvest, and making the correspondence - because of the different hemispheres - the four cultivars ripen about 20 to 30 days later, in Southeast Spain as compared to Southern Brazil. This could be explained by the longer winter in Spain, causing longer ecodormancy.

This paper has the objective to point out the need of testing a cultivar in the place where it is intended to plant, prior to establish a commercial orchard. It is important to emphasize that the data is based upon one single harvest in Cieza, whereas in Pelotas, it was used an average of several years of evaluation and the climatic conditions there varied from year to year. Thus the numeric differences showed here are not so dramatic but when the fruit appearance of these cultivars plus other genotypes (not showing here) were observed in both places, the fruits looked a lot more attractive, in Spain. According to Topp and Sherman (1989a,b) peach fruit

size declines as peach growing season temperature increases but firmness and flavor increase. Summarizing, there were some differences among the fruits produced in Cieza and in Pelotas. The most noticeable were on fruit shape. It seems that when it is more than enough chill hours, shape tends to be flatter. The fruit development period was generally larger in Cieza. Cover color was similar in both locations or, as in the case of cv. Bonão, was superior in Cieza. On the average, the differences between day and night temperatures were 4.7°C in Pelotas, whereas in Cieza, it was 7.5°C. This could account for the skin color differences. As demonstrated by Diaz et al 1986, in some apple cultivars, the red color is related to cool temperatures prior to maturation. Low night temperatures also improved color in grapes (Kliever and Torres, 1972).

However, these observations give only a rough idea since, as already explained, we are comparing the first production in one site with several years on the other and the yearly differences were not considered, as well as other factors. Among them are: differences in the orchard management as well as the rootstock, used in each location. GF 677 is indicated to alkaline soils, which is not the case of Pelotas area. The differences in fruit size could have been even greater if another rootstock was used, considering that Giorgi et al (2005), concluded, after several years of studying cv. Suncrest on different rootstocks, that GF 677 reduced fruit size and improved quality and nutritional values.

As seen, this paper is aiming only to incite the curiosity for further studies and it is far from being conclusive.

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