

Consumption, preferences and habits of purchasing consumers of peaches and nectarines

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Abstract – In Brazil, there are few studies and information available on consumer preferences for peaches and nectarines. This lack of information, has hindered some aspects of the production chain, as the choice and exploitation of more appropriate cultivars, offer periods, adoption of marketing and marketing strategies, consequently affecting the availability and commercialization of fruits. This study aimed to analyze the consumer preference of peaches and nectarines, evaluate the traits observed for their acquisition, and the marketplace where they are preferably purchased. The research was carried out from November 2016 to February 2017, using the descriptive research methodology, by Survey method and Web 2.0. A structured questionnaire was applied with closed questions. An online form questionnaire was prepared using the *Google docs* application and also distributed online, through the internet social Medias. 610 people participated in the survey, with predominance of consumers living in the South and Southeast regions of the country, in the age groups of 21 to 30 years old, with a predominance of female participants. Consumption is mainly in the *in natura* form, and often predominates certain times a year. Consumers buy these fruits mainly in the supermarkets/hypermarkets. The consumers of peaches and nectarines in Brazil have a higher preference for fruits with yellow flesh and red epidermis, followed by fruits with white flesh and intense red epidermis, both preferably with free stone. The main criteria for the acquisition of peaches and nectarines in Brazil are fruit appearance (presence and/or absence of defects, bruises, etc.); followed by price, color of epidermis and fruit size. **Index terms:** *Prunus persica* Bastch L. var. *vulgaris*, *Prunus persica* Bastch L. var. *nuscipersica*, market analysis, Consumer profile, fruit quality.

Consumo, preferências e hábito de compra de consumidores de pêssegos e nectarinas

Resumo – Há poucos estudos e informações disponíveis no Brasil sobre as preferências do consumidor de pêssegos e nectarinas. Essa falta de informações tem dificultado alguns aspectos da cadeia produtiva, como a escolha e a exploração de cultivares mais apropriadas, períodos de oferta, adoção de estratégias de mercado e marketing, afetando consequentemente a disponibilização e a comercialização de frutos. Esse estudo teve como objetivo analisar a preferência dos consumidores de pêssegos e nectarinas, avaliar quais características foram observadas para a aquisição dos mesmos e onde são preferencialmente adquiridos. A pesquisa foi realizada no período de novembro de 2016 a fevereiro de 2017, utilizando a metodologia de pesquisa descritiva, por método de pesquisa *Survey* e *Web 2.0*. Foi utilizado um questionário do tipo estruturado, com perguntas fechadas. O questionário foi elaborado na forma online, utilizando o aplicativo *Google docs* e distribuído também na forma online, através de redes sociais da Internet. Participaram da pesquisa um total de 610 pessoas, com predominância de consumidores que habitam na região Sul e Sudeste do País, nas faixas etárias de 21 a 30 anos, com predominância de participantes do sexo feminino. O consumo é principalmente na forma *in natura* e com frequência predominante de algumas vezes ao ano. Os consumidores compram esses frutos principalmente em supermercados/hipermercados. Os consumidores de pêssegos e nectarinas no Brasil têm maior preferência por frutos com polpa amarela e epiderme vermelha, seguidos de frutos com polpa branca e epiderme de coloração vermelha intensa, ambos preferencialmente com caroço solto. Os principais critérios para aquisição de pêssegos e nectarinas no Brasil são aparência de frutos (presença e/ou ausência de defeitos, machucados, etc.), seguido do preço, coloração de epiderme e tamanho de fruto.

Termos para indexação: *Prunus persica* Bastch L. var. *vulgaris*, *Prunus persica* Bastch L. var. *nuscipersica*, análise de mercado, perfil de consumidor, qualidade de fruto.

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Introduction

The demand of healthier and more balanced diet is increasing among a large part of the world population. The inclusion of fruits with nutraceutical proprieties in people's feeding is becoming more frequent. Peaches and nectarines fit into these diets due their nutraceutical proprieties and attractive organoleptic traits. These fruits have been consumed *in nature* or processed (GRIGELMO-MIGUEL et al., 1999; GIL et al., 2002; BARBA et al., 2012; DROGOUDI et al., 2016; MONTI et al., 2016; TECHAKANON and BARRET, 2017).

According to recent data released by Food and Agricultural Organization of the United Nations (FAO, 2014), world production of peach and nectarines is about 25 million tones in an estimated area of 1,500,000 ha. There is a growth perspective in the world production for the next years. Brazil has been following this prospect of increase in the production, although it is not yet consider a great producer of these fruits, with approximately 211,000 tones production, in an estimated area of 18,000 ha (FAO, 2014).

When compared with European countries, for example, the consume *per capita* of peaches and nectarines in Brazil, is considered low, around 0.8 kg inhabitant year and 0.3 kg inhabitant year, of *in nature* and processed fruit, respectively. However, the national production is considered insufficient to meet the country's domestic demand, requiring an import volume above 14,000 tones year (MADAIL, 2014).

The Brazilian production is mainly concentrated in the South and Southeast regions, in which the states of Rio Grande do Sul and São Paulo are the largest national producers, responsible for more than 70% of the production (FACHINELLO et al., 2011; MADAIL, 2014). The state of Rio Grande do Sul has the greater cultivated area, over 14,000 ha. However, the highest yield is obtained by the states of Minas Gerais and São Paulo, around 22 Mg ha⁻¹ and 21 Mg ha⁻¹, respectively, while the state of Rio Grande do Sul has a yield close to 10 Mg ha⁻¹ (FACHINELLO et al., 2011; MADAIL, 2014; SAINZ and FERRI, 2015). The Rio Grande do Sul production is destined mainly for processing, particularly around Pelotas city, while the other areas produce mainly for fresh consumption (RASEIRA et al., 2010; FACHINELLO et al., 2011; GONÇALVES et al., 2014).

There are some breeding programs of the species in Brazil, mainly focused in obtaining cultivars more adapted to the growth conditions, more resistant to pests and diseases, and with fruit of higher quality (RASEIRA et al., 2010; TREVISAN et al., 2010; FACHINELLO et al., 2011). Consumer preferences are important to guide the breeding programs but also other agents of the productive chain. Consume preferences can change with time. Quality requirements are increasing not only by the handler but

also by traders and transporters.

There are few studies and information available in Brazil on consumer preferences for peaches and nectarines. This lack of information has made some aspects of the productive chain difficult, such as the choice and use of mostly appropriate cultivars, offer periods, adoption of marketing and market strategies, transport and delivery logistics, among other aspects that affect the availability and commercialization of fruits (ARAÚJO and GARCIA, 2012). Studies for these purposes can satisfy both, producers/traders and consumers. These studies also help the genetic breeding programs to select better new cultivars. To the producers, it helps to choose cultivars with high fruit quality, and to provide better marketing and consumer acceptance (CAMPBELL et al., 2004; DROUGOUDI et al., 2016).

This study aimed to analyze the consumer preference of peaches and nectarines, evaluate the traits observed for their acquisition, and the marketplace where they are preferably purchased.

Material and methods

The research was carried out from November 2016 to February 2017, using the descriptive research methodology, by method of research *Survey* and *Web 2.0* as describe by Freitas et al. (2000), Silva et al. (2011) and Neubert and Rodriguez (2012). A structured questionnaire was applied with closed questions, some objective and others multiple choice, in order to establish a profile of the participants. Important characteristics, as describe by Campbell et al. (2004) were taken in account for the identification of the fruit preference by consumers. The questionnaire was prepared in online form using the *Google docs* app and distributed online through social media, shared by the other users of the service, with a totally random sampling.

The following questions were asked:

- 1) Where is the Region you live? North, Northeast, Midwest, Southeast or South;
- 2) Sex: male, female;
- 3) Age group: 15-20 years old, 21-25 years old, 26-30 years old, 31-35 years old, 36-40 years old, above 40 years old;
- 4) Have you consumed or consume peaches and/or nectarines? Yes, no;
- 5) How often do you consume? Never, rarely, sometimes or commonly;
- 6) Have you consumed and/or consume in what form? *In natura*/fresh fruits, processed or industrialized fruit (candies, jams, compote, juices, others);
- 7) Where do you usually buy them? Supermarkets/Hypermarkets, greengrocer, grocery stores, street market, direct from the producer;

8) In order of importance composing three main criteria, which of these characteristics would you use to choose and compare the fruits:

8.1) 1st attribute: fruit size, epidermis coloration, flesh color, aspect (presence or absence of defects, injured, etc.), flavor, smell, price;

8.2) 2nd attribute: fruit size, epidermis coloration, flesh color, aspect (presence or absence of defects, injured, etc.), flavor, smell, price;

8.3) 3rd attribute: fruit size, epidermis coloration, flesh color, aspect (presence or absence of defects, injured, etc.), flavor, smell, price;

9) Do you prefer fruit of the type: yellow flesh and epidermis, yellow flesh and red epidermis, white flesh and intense red epidermis, white flesh with light red epidermis, fruits with red flesh near the stone, fruits with free stone (not adhered to flesh), fruit with adhered stone to flesh.

The data were transformed to percentage and analyzed using descriptive statistics.

Results and discussion

Six hundred and ten people participated on the survey, with a predominance of consumers living in the South and Southeast regions of the country, who together represented more than 87.7% of the interviews (FIGURE 1A). About the consumer profile, the majority was of the female sex, 69.3% (FIGURE 1B). The predominant age group of the interviews was people of 21 to 25 years old, and 26 to 30 years old, which accounted about 59.3% of the research, while the age groups of 15 to 20 and 36 to 40 years old had less number of interviewed, 8.0% and 5.0% respectively (FIGURE 1C). These results corroborate with Trevisan et al. (2010), which also observed greater acquisition of these fruits by female consumers, in study among consumer in different regions of the state of Rio Grande do Sul. In relation to the lower participation of consumers in the age groups above 36 years old, may be due to their smaller use of social media, as exposed by Possoli, et al., (2015).

When asking if the interviewed have already consumed and/or consume peaches and nectarines, 98.0% answered yes, they have already consumed these fruits, and only 2.0% of the interviewed answered that they have not consumed these fruits (FIGURE 1D). The interviewed that make up these 2.0%, most of them inhabit the Northern and Northeastern regions of the country. This result is probably related to the low availability of these fruits among these regions. The South and Southeast regions are the country's largest producing areas, present greater availability and easy logistics delivery of fruits, making these fruits more accessible to consumers. The peach and nectarine supply in the Northern and Northeastern regions needs a more complex transport and storage logistic,

consequently affecting the price, supply, availability and quality of these fruits in these regions.

Peaches and nectarines are consumed sometimes by 54.2% of the interviewed, 22.9% rarely consume, and 20.8% consume them commonly (FIGURE 1E). These results show that these fruits present great seasonal consumption, concentrate mainly in periods of greater fruit supply. However, there is also a demonstration of a market with high absorption and expansion potential for these fruits.

The consumption as fresh fruit (*in natura*) was the preference, as answered by 542 (75.5%) interviewed, and 176 (24.5%) answered the consumption preference of industrialized and/or processed form (FIGURE 2A). However, among the total answers, 108 interviewed answered that consume these fruits in both, *in natura* or processed forms. These results corroborate with that observed by other authors (RASEIRA et al., 2010; FACHINELLO et al., 2011; BARBA et al., 2012; GONÇALVES et al., 2016), which cite that there is greater interest in the consumption of these fruits in the *in natura* form. As these fruits have low to medium shelf life, attention should be paid to harvesting strategies, storage, transportation, packaging and various other security measures, that allow the quality of these fruits to be maintained until they reach the consumer.

The places where the participants usually buy these fruits are in markets or hypermarkets as answered by 482 (55.9%) participants (FIGURE 2B). The acquisition of these fruits in greengrocer, correspond to less than 10.0%, which is 54 of the participants, while the other sites had 109 responses. A point that arouses curiosity, and that deserves more attention, is the number of people who buy these fruits directly from the producer (109 participants, 12.6%), because this modality can be positive in relation to the value per kg of fruit received by the producer, since it dispenses middlemen.

The main criterion for fruit acquisition by the consumer was the aspect (presence or absence of defects, injured, etc.), followed by the price, epidermis coloration, and fruit size (FIGURE 3), corroborating with the results obtained by Trevisan et al. (2010) in Pelotas – RS. These results also agree with Shewfelt (1999), which points out as one of the main quality factors of fruits and vegetables being the absence of defects.

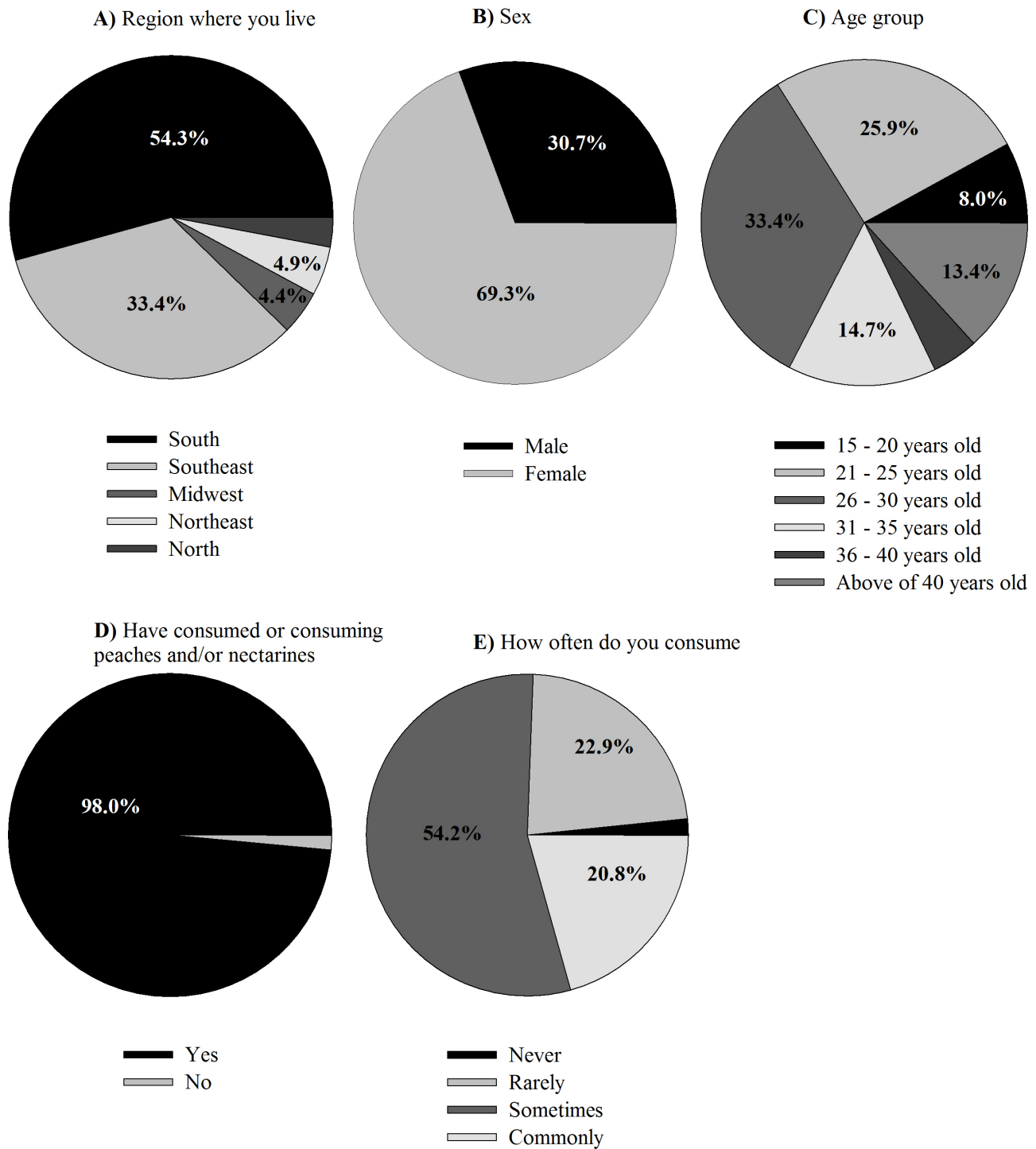


Figure 1 – Consumer profile and frequency of consumption of peaches and nectarines in Brazil. UFV, Brazil, 2017.

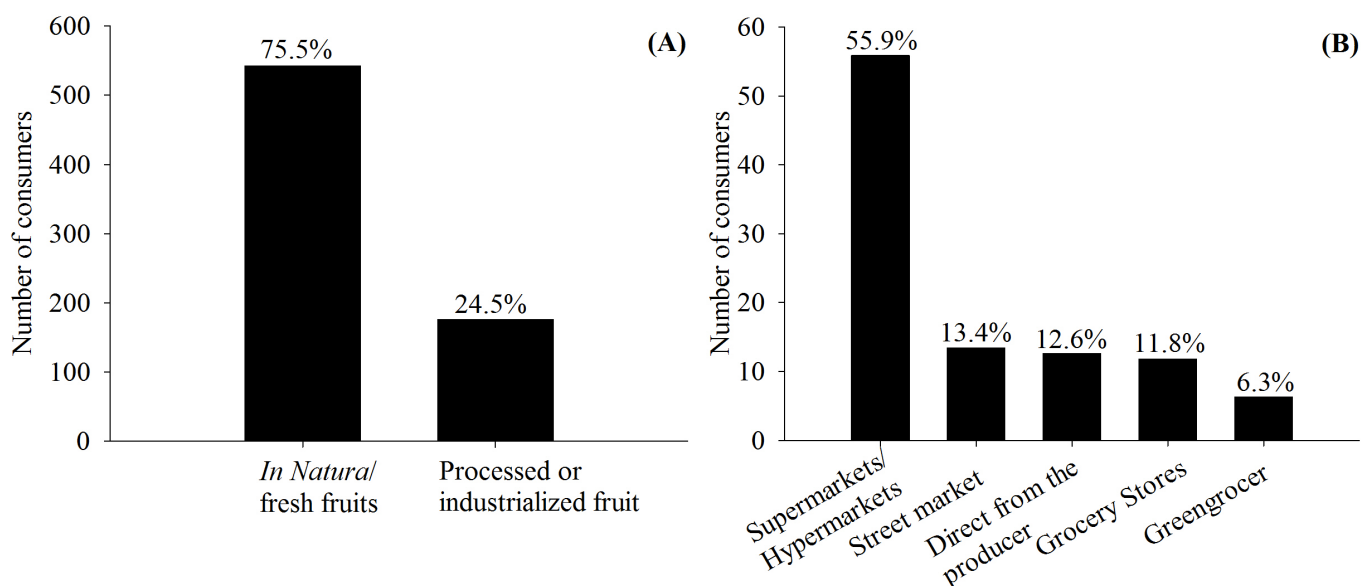


Figure 2 – Form of consumption and where they are purchased preferentially by consumers of peaches and nectarines in Brazil. UFV, Brazil, 2017.

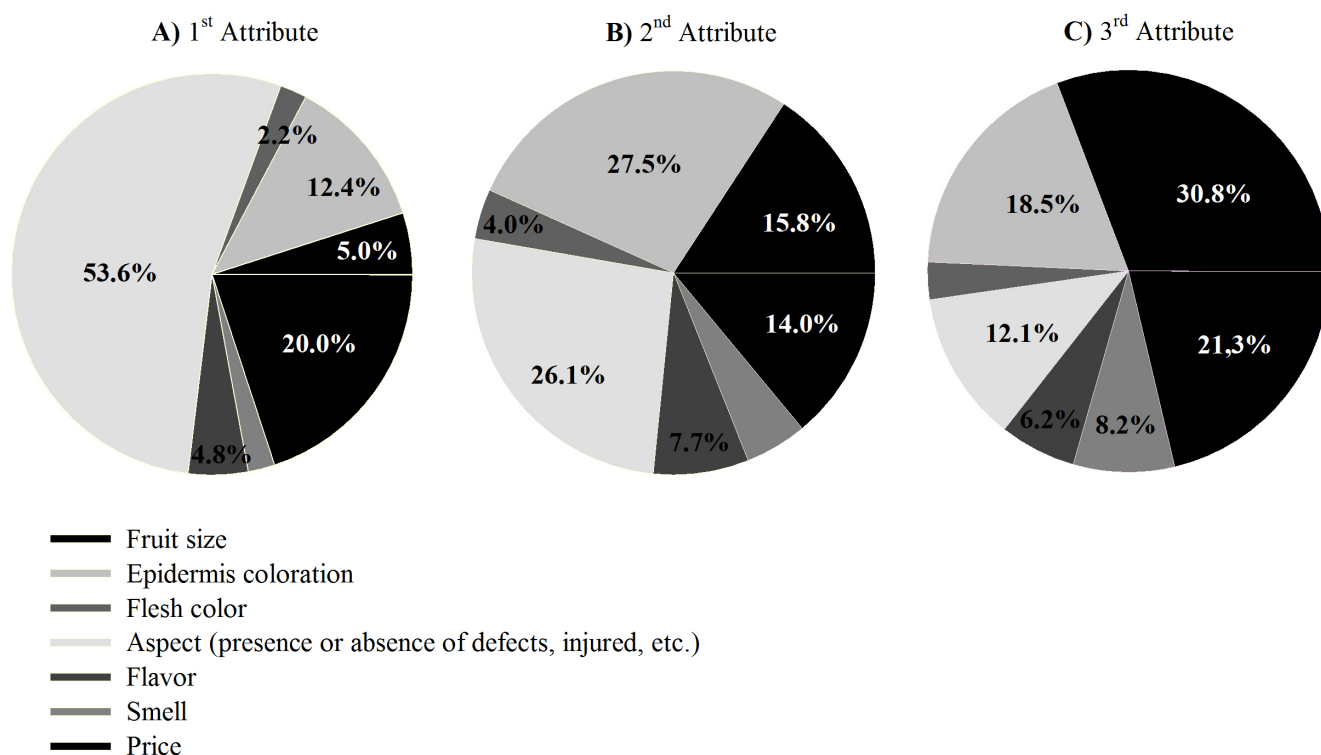


Figure 3 – Criteria for the consumer to acquire fruits of peaches and nectarines in Brazil. UFV, Brazil, 2017.

The visual attributes, like appearance, epidermis coloration, size, firmness, are the main criteria for the acquisition of fruits in particular to stimulate the first purchase. While sensory attributes such as flavor, aroma, flesh coloration, are more associated with consumer satisfaction. As coupled with commercial features, like price and supply, it causes the consumer to buy them again (ZEITHAML, 1988; MANALO, 1990; HARKER et al., 2002; HARKER et al., 2003; CAMPBELL et al., 2004; HARKER et al., 2008; TREVISAN et al., 2010; BONORA et al., 2014; GONÇALVES et al., 2016; DROGOUDI et al., 2017).

Taking into account the type of fruit preferred by the consumer, fruits of yellow flesh and epidermis of red color were the ones of greater preference, chosen by 273 participants (31.9%), together with white flesh fruits with epidermis with intense red color, opted by 124 participants (14.5%) (FIGURE 4).

Consumers can associate intuitively and unconsciously fruit with red-pigmented epidermis with greater nutritional value, high concentration of bioactive compounds, higher concentration of antioxidants, phenolic compounds, among other compounds. These traits are appealing to consumers, because increase the organoleptic attributes of the fruits and are thus preferred by consumers (CAMPBELL et al., 2004; BARBA et al., 2012; GONÇALVES et al., 2016; MONTI et al., 2016; SILVA et al., 2016; DROGOUDI et al., 2017; TECHAKANON and BARRETT, 2017).

Fruits with yellow epidermis and yellow flesh are mainly destined for processing, but can also be sold to niche markets, as we can observe in the option of 102 participants (11.9%). Fruits with these characteristics, usually meets the requirement of consumers who prefer fruits with more acidic flavor characteristics. However, the great majority of consumers prefer fruit with a better balance between sweetness and acidity or higher soluble solid/ acidity ratio, as is the case of the association of fruits with yellow flesh and red epidermis, observed this study. Another large proportion of consumers prefer fruit of low acidity and sweet flavor, which is usually associated with fruits of white flesh.

There is also greater preference of free stones fruits (FIGURE 4), possibly because it facilitates the consumption of fruits *in natura* and avoids certain waste. The red pigmentation of the pulp around the stone seems to be irrelevant as a trait to be taken in account to consume the fruit, since it was chosen only by 82 interviewed (9.6%) (Figure 4), and apparently it is not intuitively associated by consumers with nutritional characteristics as decisive as epidermal pigmentation.

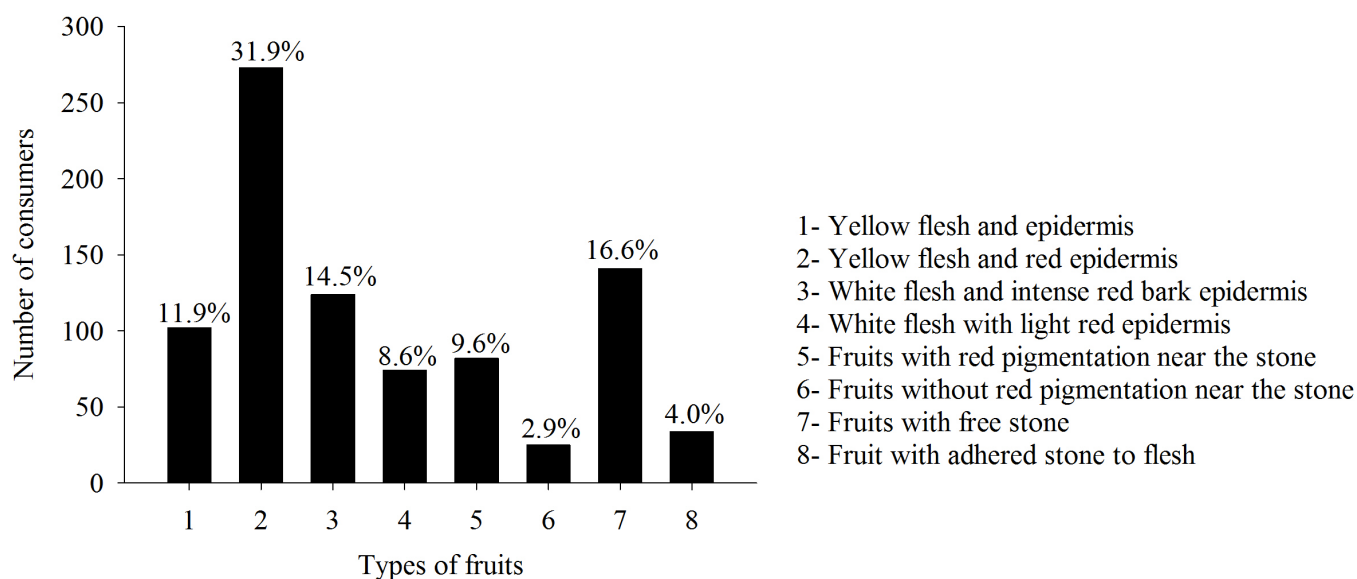


Figure 4 – Characteristics of fruits desired by consumers of peaches and nectarines in Brazil. UFV, Brazil, 2017.

Conclusions

1 – Consumers of peaches and nectarines in this study have a higher preference for fruits with yellow flesh and red epidermis, followed by fruits with white flesh and epidermis of intense red color, both preferentially with free stone.

2 – The main criteria for the acquisition of peaches and nectarines in this study is fruit appearance (presence and / or absence of defects, bruising, etc.), followed by price, color of epidermis and fruit size.

3 – Consumers buy peaches and nectarines mainly in supermarkets and/or hypermarkets.

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