

## Uniformity of Evaluated Descriptors in Tahiti Lemon Fruits

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### Abstract

In Brazil, the Tahiti lemon is one of the most commercially important citrus species. Among its characteristics, it has medium to large size, vigorous and almost without thorns. The fruits for export should have ideal characteristics such as dark green color, partially smooth skin and as few yellowish areas as possible. Thus, this study aimed to evaluate the main characteristics present in the fruit that define whether it is at the ideal point for commercialization. The collected fruits were evaluate through their size, weight, peel thickness, bagasse and peel weight, juice weight and juice yield, in the seed laboratory of the Phytotechnics Department of the Agricultural Sciences Center at UFPI. With the results, it can be see that the analyzed fruits have most of the characteristics within the standards indicated by the literature, except fruit weight.

**Keywords:** Citrus, production, marketing, standards

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### I. INTRODUCTION

Brazil has been standing out as a producer, as well as an exporter, of tropical and subtropical fruits. In this context, citrus stands out [1]. Citriculture is a branch of agriculture that encompasses the cultivation of oranges, tangerines, lemons, sour limes, sweet limes, pomelo, cider, sour orange and grapefruits. The importance of this activity goes beyond the generation of foreign exchange for the Brazilian economy, having major impacts on job creation, capital formation, income generation, value addition and also on regional development [2,3].

The Tahiti lemon (*Citrus latifolia* (Yu. Tanaka) Tanaka), of tropical origin, is actually not a real lemon. Second, [4], is an acid file. Grown since the last century in California, USA, it is admit that its introduction in that state occurred through the fruit seeds brought from Tahiti, hence the current name.

Tahiti lemon is the result of the crossing of Sicilian Lemon with Lima-da-Persia, therefore a hybrid variety, in addition, the fruit also receives the name, mainly in Europe, of Lima Ácida Tahiti [5].

The acid lemon Tahiti, is considered, among citrus species, a culture of great economic importance, both for the export market and for the domestic market, being sold mainly in the fresh form. The Tahiti lemon stands out among citrus for its precocity, since it can start production from the second year of planting. The State of São Paulo is the largest national producer, accounting for 73% of all production in the country, followed by the States of Rio de Janeiro and Rio Grande do Sul.

In the Brazil in 2017, according to data from IBGE Brazil is the second largest producer of Tahiti lemon worldwide. Internally, the main producing states in 2017 were 1 ° São Paulo (978,860 ton. and 25,869 ha), 2 ° Bahia (62,018 ton and 5,829 ha) and 3 ° Minas Gerais (48,020 ton and 2,662 ha). In addition, the cities of Bebedouro, Limeira, Matão and Votuporanga stand out as producing centers in the State of São Paulo.

The Piauí, despite having a small cultivate area and a low percentage share, stands out for the quality of the fruits produced, a production that is mainly exported to countries in the European community and also to markets in the north and northeast regions. Thus, studying fruit morphological descriptors is of fundamental importance to develop better quality products for consumers.

Therefore, the objective of this study was to evaluate the main characteristics present in the fruit that define whether it is at the ideal point for commercialization.

### II. EXPERIMENTAL

The work of quantification and measurement of the sampled indicators was carry out at the Seed Laboratory of the Department of Phytotechnics of the Center for Agricultural Sciences (CCA), located at the Federal University of Piauí, in Teresina.

Ten groups of fruits were evaluate, each group consisting of 100 fruits collected randomly in a single orchard. The orchard was cultivated for commercial purposes, from fresh fruit.

Firstly, the parameters of weight of one fruit, weight of the group of fruits, weight of the bagasse plus the peel of the fruit and weight of the juice were evaluate, obtain through a precision scale and expressed in grams (g). The height of the fruit, diameter of the fruit and thickness of the peel, were obtain through a digital caliper and expressed in millimeter (MM). The number of sections was count. A calculation of the juice yield (%) was performed, the value being obtained after its mechanical extraction and weighing the volume of juice extracted, on an analytical balance, using the formula:

$$\text{Juice yield (\%)} = (\text{juice mass} / \text{fresh fruit mass}) \times 100$$

The data were evaluate and compared with the standards published in the literature for ideal fruits for commercialization.

### III. RESULT AND DISCUSSION

Below are the results found in the evaluation of the fruits.

**Table 01.** Mean values, standard deviation and coefficient of variation of the analyzed parameters.

Fruit groups	Height (mm)	Diameter (mm)	Shell thickness (mm)	Mean weight of 1 fruit (g)	Total Weight (kg)	Number of buds	Bagasse + shell weight (g)	Juice weight (g)	Juice yield (%)
1	51,51	47,46	3,00	60,60	6,06	10	41,60	19,08	31,5
2	56,86	53,85	3,00	82,10	8,21	10	44,60	37,50	45,67
3	54,53	51,11	3,00	73,70	7,37	11	46,70	27,00	36,63
4	52,21	45,13	2,00	55,70	5,57	09	26,30	29,40	52,78
5	58,49	48,94	3,00	66,50	6,65	10	39,20	27,30	41,05
6	54,30	49,69	4,00	70,70	7,07	10	39,10	31,60	44,69
7	51,04	43,43	2,00	53,50	5,35	10	32,30	21,20	39,62
8	49,83	47,59	2,00	58,70	5,87	11	29,70	29	49,4
9	61,67	51,29	2,00	85,70	8,57	09	44,90	40,8	47,6
10	53,03	48,78	3,00	61,00	6,10	11	37,80	23,20	38,03
<b>Mean</b>	<b>54,35</b>	<b>48,73</b>	<b>2,70</b>	<b>66,83</b>	<b>6,68</b>	<b>10,10</b>	<b>38,22</b>	<b>28,61</b>	<b>42,80</b>
<b>S.D.</b>	<b>3,96</b>	<b>3,04</b>	<b>0,67</b>	<b>11,01</b>	<b>1,2</b>	<b>0,74</b>	<b>6,83</b>	<b>6,80</b>	<b>-</b>
<b>C.V</b>	<b>14,73</b>	<b>16,03</b>	<b>4,03</b>	<b>6,07</b>	<b>7,51</b>	<b>13,65</b>	<b>5,59</b>	<b>4,21</b>	<b>-</b>

S.D.:standard deviation; C.V.: Coefficient of Variation

The mean fruit diameter in the analyzed lots was greater than 47 mm. According to EMBRAPA (1995), the ideal size of the acid file, in relation to the point of collection, is 47 to 65 mm in diameter. Given this perspective, the evaluated fruits are within the ideal size limit for the commercial lemon fruit.

As for the aspect of peel thickness, the fruits evaluated showed, in general, a thin peel. The peel is an evaluated aspect that gives an indication of the juice content of the fruit. A thick, rough skin indicates that the fruit has not reached its ideal maturity point and therefore does not contain the desired amount of juice. Therefore, this characteristic observed in the fruits studied indicates that they are ideal for direct sale to the consumer.

The fruits had a mean weight of 66.83 grams, not being in the characteristic weight range of the culture, according to [6]. In terms of the weight of this work, some of the studied lots did not fully meet international standards in terms of fruit dimensions, according to [7]. Contrary results were observe by [8], studying lots of Tahiti lemon, observed the mean weight of fruits above 90 grams. [9] Goes et al. (2012) observed weights of Tahiti lemon above 120 grams.

With regard to the amount of juice, the greater, the closer it is to ripening. In the case of acid lime, the ideal harvest point in relation to the juice content is 42 to 50%, calculated on the total weight of the fruit [7]. For the evaluated fruits, the mean was 42.8%, indicating that most fruits are within ideal standards.

### IV. CONCLUSION

It was conclude that the fruits evaluated were within the standards suggested by the literature, regarding the thickness of the peel, weight of the juice and juice yield. However, when related to the weight characteristic of one fruit and, consequently, the total weight of the lots, the evaluated fruits were mostly outside the commercial standards required for export.

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