

Juice Extraction For Total Soluble Solids Content Determination in Melon

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ABSTRACT

The total soluble solids content (TSSC), expressed as a percentage of fresh matter mass, shows high positive correlation with sugars content, and is therefore generally accepted as an important quality trait of fruits. In melon, this evaluation is usually done by grinding a slice of the fruit's pulp in a household food processor, straining the ground material and then making the TSSC determination in the resulting juice. This evaluation is labor-intensive and takes a long time to complete. As a consequence, an alternative process has been thought up for obtaining the juice. The objective of this work was to compare processes for obtaining juice to evaluate total soluble solids contents in galia- (Solar king cultivar), Yellow- (Gold Pride cultivar) and cantaloupe-type (Torreon cultivar) melons. Fifty, 15, and 15 fruits of the Galia, Yellow, and Cantaloupe type melons were evaluated, respectively. Each fruit was considered as a block, and was split longitudinally into six fractions of approximately equal sizes, which corresponded to the experimental plots. Therefore, the experiment was designed as random blocks with 50, 15, and 15 replicates, respectively. The juice was obtained by means of the following treatments: fraction without cuts, fractions with one, three, five, or seven transversal cuts, and the fraction treated by the conventional process. It was concluded that the procedure by which the melon slices of types Gália, Yellow and Cantaloupe, either cut transversally or not, are pressed for obtaining the juice to evaluate total soluble solids content, can overestimate this content, in relation to the conventional method of grinding the pulp and straining the juice.

Keywords: *Cucumis melo L., Yellow melon, Gália melon, Cantaloupe melon, Brix*

RESUMO

Obtenção do suco para determinação do teor de sólidos solúveis totais no melão

O teor de sólidos solúveis totais (TSST), expresso como percentagem da massa da matéria fresca, apresenta alta correlação positiva com o teor de açúcares e, portanto, geralmente é aceito como importante característica de qualidade dos frutos. No melão,

geralmente, a avaliação é feita triturando-se uma fatia da polpa do fruto em processador doméstico, coando-se o material triturado e determinando-se o TSST no suco resultante. Essa avaliação é trabalhosa e demorada. Em decorrência, pensou-se num processo alternativo de obtenção do suco. O objetivo do trabalho foi comparar processos de obtenção do suco, para avaliação do TSST dos melões tipo galia (cultivar Solar king), Amarelo (cultivar Gold Pride) e cantaloupe (cultivar Torreon). Foram avaliados 50, 15 e 15 frutos dos tipos Galia, Amarelo e Cantaloupe, respectivamente. Cada fruto foi considerado um bloco e foi dividido longitudinalmente em seis frações aproximadamente iguais, que corresponderam às parcelas experimentais. Portanto, o experimento foi realizado em blocos ao acaso com 50, 15 e 15 repetições, respectivamente. O suco foi obtido com os seguintes tratamentos: fração sem corte, frações com um, três, cinco ou sete cortes transversais e fração tratada com o processo convencional. Concluiu-se que o procedimento de pressionar fatias de melão, dos tipos Gália, Amarelo e Cantaloupe, cortadas transversalmente ou não, para obtenção do suco para avaliação do teor de sólidos solúveis totais, pode superestimar esse teor, em relação ao método convencional de triturar a polpa e coar o suco.

Palavras-chave: Cucumis melo L., *melão Amarelo*, *melão Gália*, *melão Cantaloupe*, *Brix*.

The melons produced in the Northeast are imported by countries where the consumer is quite demanding. In addition, a general tendency is observed according to which the domestic consumers are also becoming more demanding.

Due to the importance of the TSSC value as a qualitative attribute of melon, in general the studies involving this crop (Kultur *et al.*, 2001) try to evaluate this trait. Usually, the evaluation is done by grinding a slice of fruit pulp in a household food processor, straining the ground material and then determining the TSSC in the resulting juice (Silva *et al.*, 2002; Silva *et al.*, 2003). This evaluation is labor-intensive and takes a long time to complete; in addition, after each evaluation, the grinder, filter, and so on, need to be washed before new samples can be evaluated. As a consequence, an alternative process has been thought up for obtaining the juice. In this case, the pulp in the fruit slice would be transversally cut one or more times in such a way that the cuts would not separate the fractions (the cuts reaching the endocarp, but not the pericarp). Next, the slice would be pressed longitudinally to obtain the juice.

The objective of this work was to compare six processes for obtaining juice to evaluate total soluble solids contents in galia- (Solar king cultivar), Yellow- (Gold Pride cultivar) and cantaloupe-type (Torreon cultivar) melons.

MATERIAL AND METHODS

Fifty, 15, and 15 fruits of the Galia, Yellow, and Cantaloupe type were evaluated, respectively, obtained from lots destined for export by Mossoró-RN enterprises. The evaluated fruits were weighed and measured, for a better characterization. Each fruit was considered as a block, and was split longitudinally into six fractions of approximately equal sizes, which corresponded to the experimental plots. Therefore, the experiment was conducted as random blocks with 50, 15, or 15 replicates, respectively. The juice was obtained by means of the following treatments: fraction without cuts, fractions with one, three, five, or seven transversal cuts, and the fraction treated by the conventional process (pulp removal, grinding, and so on). In the fractions containing cuts, the cut was performed so as to split the fruit slices into approximately equal parts. The juice obtained from each section was utilized to perform three readings in a digital refractometer.

For a better analysis of the results obtained in the experiments described above, a fourth experiment was conducted. In this experiment, a fraction of approximately 4 cm × 10 cm of pulp was removed from each of the four “sides” of each one of eight fruits. The pulp in this fraction was split, with cuts made parallel to the epicarp, into three fractions, of approximately equal thicknesses: mesocarp-I = mesocarp fraction closest to the interior of the fruit; mesocarp-E = mesocarp fraction closest to the epicarp; and mesocarp-M = fraction between the two other fractions. The four fractions of each fruit were submitted to the conventional process for TSSC evaluation, and three readings were taken. In this experiment as well, each fruit was considered as a block and each fraction of the mesocarp was a plot.

RESULTS AND DISCUSSION

Variations in length, diameter, weight, and TSSC were observed in the analyzed fruits (Table 1). Comparisons must be avoided between melon types with regard to the measured traits, since the fruits were produced in different areas, evaluated based on different sample sizes, etc.

As to the methods for obtaining the juice to determine TSSC, the conventional method yielded, for the three types of fruits, a smaller content than with the other methods, which were not different among themselves (Table 2). In the Gália, Yellow, and Cantaloupe types, the differences between the mean obtained with the conventional method and the means obtained with the other five methods were, approximately, 50%, 52%, and 35%, respectively. Since there were no differences between the “no cut” and the “with cut” methods, the cuts

become unnecessary, in case the method of only pressing the pulp slice to obtain the juice is to be adopted.

The ventral and dorsal portions of the melon did not differ among themselves and are superior to the lateral portion, with regard to TSSC (Silva *et al.*, 2003). Also, the TSSC in the basal portion is inferior to those in the medial and apical portions (Silva *et al.*, 2002). It is possible, however, that the differences in TSSC observed in the present work between the two types of methods, are related to the fact that, in the conventional method, the juice of all the pulp (mesocarp) is represented, while in the other methods probably the surface part of the pulp is represented in greater proportion. In other words, the juice portion obtained with non-conventional methods is not representative. In the surface portion of the pulp, the TSSC is higher, decreasing as the portions nearer to the pericarp are included in the consideration (Table 3). In support of this observation, it has been verified that, in melon, the exomesocarp has a greater content of sugars, followed by the endocarp, placenta and seeds (Chrost & Schmitz, 1997).

It can be concluded, therefore, that the procedure by which the melon slices of types Gália, Yellow and Cantaloupe, either cut transversally or not, are pressed for obtaining the juice to evaluate total soluble solids content, can overestimate this content, in relation to the conventional method of grinding the pulp and straining the juice.

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Table 1. Fruit weight, length, and diameter statistics, and total soluble solids content in the fruit pulp of three types of melon plants.

Trait	Statistics	Melon type		
		Galia	Yellow	Cantaloupe
Weight (g)	Amplitude	903 – 1288	1575 – 2311	1125 – 1591
	Mean	1024	1921	1389
	Standard error	87	17	31
Length (cm)	Amplitude	12.2 – 14.3	16.1 – 19.1	13.7 – 16.0
	Mean	13.0	17.5	14.8
	Standard error	0.44	0.22	0.17
Diameter (cm)	Amplitude	11.6 – 13.3	14.5 – 16.9	13.1 – 14.6
	Mean	12.3	15.8	13.9
	Standard error	0.37	0.21	0.10
Solids content (°B)	Amplitude	8.5 – 17.8	11.0 – 16.0	8.2 – 12.0
	Mean	12.8	13.9	9.9
	Standard error	1.70	0.36	0.26

Table 2. Total soluble solids contents (°B) of pulp juice from three types of melon, obtained by different extraction methods

Pulp juice extraction methods	Melon type ¹		
	Galia	Yellow	Cantaloup
			e
No pulp cuts + manual pressure	13.5 a	14.6 a	10.2 a
1 pulp cut + manual pressure	13.5 a	14.7 a	10.3 a
3 pulp cuts + manual pressure	13.6 a	14.6 a	10.5 a
5 pulp cuts + manual pressure	13.5 a	14.8 a	10.3 a
7 pulp cuts + manual pressure	13.5 a	14.8 a	10.4 a
Conventional (grinding + filtration)	9.0 b	9.7 b	7.7 b

¹Tukey, 5 %

Table 3. Total soluble solids contents in fractions of the mesocarp of Cantaloupe melon

Mesocarp fraction ¹	Mesocarp-I	Mesocarp-M	Mesocarp-E
Total soluble solids contents (°B) ²	8.5 a	7.8 b	5.8 c

¹mesocarp-I = mesocarp fraction closest to the interior of the fruit; mesocarp-E = mesocarp fraction closest to the epicarp; and mesocarp-M = middle fraction.

²Tukey, 5 %.