# PRODUCTION AND QUALITY OF IRRIGATED MELON CULTIVARS IN ORGANIC PRODUCTION SYSTEM †

# [PRODUCCIÓN Y CALIDAD DE CULTIVARES DE MELÓN BAJO RIEGO EN UN SISTEMA DE PRODUCCIÓN ORGÁNICA]

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## SUMMARY

**Background**. The melon plant is herbaceous annual plant with a large social and economic relevance in Brazil, specially to the Northeast in of the country. Given the importance of this culture to the region, there is enormous demand for information trying to define a productive system that presents cost-saving, increases productivity, and achieve the minimum standards of fruit quality. In this scenario, a lot of researches were made as a way of trying to potentialize the organic production systems. **Objective**. The purpose of this work was to verify the different melon cultivars/types behavior, when it comes to the quality and production when cultivated under irrigation in organic production system. **Methodology**. The work was developed between the months of July and October in 2014, in the Hortvida rural propriety. The experimental design was a randomized block with treatments applied to seven different types of melon (Zelala Harpér, Magisto $F_1$ Cant, Medellín Pele de Sapo, Hibrix $F_1$ Amarelo, Yelogal $F_1$ Gália, Magritte $F_1$" and Solarnet Gália) with four repetitions. Morphological, qualitative and yield characteristics of melon fruits were analyzed. **Results**. The highest yields were obtained for cultivars Medellín Pele de Sapo (45.19 t ha$^{-1}$) and Hibrix F1 Amarelo (34.24 t ha$^{-1}$). **Implications**. The system of organic production of irrigated melon in the semiarid region of Rio Grande do Norte maintained the productivity of most cultivars above 25 t ha$^{-1}$, however, the content of soluble solids was higher for only three cultivars. **Conclusions**. The cultivar Medellín Pele de Sapo was the most productive one, but it also presented low soluble solids content.
**Key words**: *Cucumis melo* L.; Cucurbita; Semiarid; Organic Food.

## RESUMEN

**Antecedentes**. La planta de melón es una planta herbácea anual con una gran relevancia social y económica en Brasil, especialmente en el noreste del país. Dada la importancia de esta cultura para la región, existe una enorme demanda de información que intenta definir un sistema productivo que presenta ahorros de costos, aumenta la productividad y alcanza los estándares mínimos de calidad de la fruta. En este escenario, se realizaron muchas investigaciones como una forma de tratar de potencializar los sistemas de producción orgánicos. **Objetivo**. El propósito de este trabajo fue comprobar el comportamiento de los diferentes cultivares/tipos de melón, cuando se trata de la calidad y la producción cuando se cultivan bajo riego en un sistema de producción orgánica. **Metodología**. El trabajo se desarrolló entre los meses de julio y octubre de 2014, en la propiedad rural de Hortvida. El diseño experimental fue de bloques al azar, con tratamientos aplicados a 7 tipos diferentes de melón (Zelala Harpér, Magisto F1 Cant, Medellín Pele de Sapo, Hibrix F1 Amarelo, Yelogal F1 Gália, Magritte F1 y Solarnet Gália) y cuatro repeticiones. Se analizaron las características morfológicas, cualitativas y de rendimiento de los frutos de melón. **Resultados**. Los mayores rendimientos se obtuvieron para los cultivares Medellín Pelé de Sapo (45.19 t ha$^{-1}$) y Hibrix F1 Amarelo (34.24 t ha$^{-1}$). **Implicaciones**. El sistema de producción orgánica de melón de regadío en la región semiárida de Rio Grande do Norte mantuvo la productividad de la mayoría de los cultivares por encima de 25 t ha$^{-1}$, sin embargo, el contenido de sólidos solubles

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ISSN: 1870-0462.

fue mayor para solo tres cultivares. **Conclusiones**. El cultivar Medellín Pelé de Sapo fue el más productivo, pero también presentó bajo contenido de sólidos solubles.
**Palabras clave**: *Cucumis melo* L.; Cucurbita; Semiárido; Alimentos Orgánicos.

## INTRODUCTION

The melon plant is an herbaceous annual plant with a huge social and economy expression to Brazil, specially to the Northeast part of the country (Mesquita *et al*., 2014). This culture spread through the country since the 60's, before that every melon sold in Brazil was from Spain (Paduan *et al*., 2007). In 1970, the culture had a huge increase and started to be cultivated in São Paulo and in São Francisco valley (Pinto *et al*., 2008).

Melon is cultivated throughout the year in Brazil's semiarid, allowing the producers to supply specific windows in the international market (Freitas *et al*., 2007), occupying a prominent place in Brazil's vegetables growing and becoming an export product (Pinto *et al*., 2008). Sales Júnior *et al*. (2005) reports that melon adapts well to regions characterized by warm climates and high luminous intensity. Furthermore, is favored by low precipitation indices, once it decrease disease incidence and increases fruit's quality (Mesquita *et al*., 2014).

The Northeast region has a unique characteristic, because it has the only tropical semiarid climate in the world, very different from others semiarid region in located in countries like Chile, Mexico, USA and Australia, this fact represents a differential advantage, because the constancy of heat, high luminosity and low moisture results favorable conditions to agriculture (Pinto *et al*., 2008). Mesquita *et al.* (2014) reinforce that melon adapts better to hot and dry climates, requiring irrigation to supply its water demand, according to the plant's development level, especially in flowering and fruiting.

According to IBGE (2015), Northeast region is responsible for 94,7% melon's national production, and from this total, 52,0% is from Rio Grande do Norte and 21% is from Ceará. Part of Northeast production goes to intern market, where the biggest consumption is in the Southeast region, which directs the exportation to the consumer centers, due to production and fruit's quality, other markets were achieved, like American and European (Pinto *et al*., 2008). The melon's culture expansion in the Northeast region happened because of scientific researches, improvements in cultivation conditions and trade opening (Santos *et al*., 2011).

Rio Grande do Norte is, even more in Mossoró/Assu agropole, favored by soil and climate conditions and also by surface and underground water sources, standing out nationally and intentionally by the melon cultivation (Freire *et al*., 2009), responding for 86,7% of all the cultivate area in Brazil, presenting a 27.24 t ha$^{-1}$ productivity, higher than national (25.03 t ha$^{-1}$) and equivalent to Northeast average (27.33 t ha$^{-1}$) (IBGE, 2015).

Most part of these producer's region develops conventional agriculture and its design is based on higher external inputs. The indiscriminate use of mineral fertilizers and agrochemicals on Brazil's agriculture, besides promoting increase in production costs, also contributes to environment's contamination. Therefore, there's still a need to improve cultivation techniques, with a less expensive production costs and minimum environment impact (Freire *et al*., 2009). And, besides the increase in melon's exportation in the last few years, is still noted melon's with compromised quality in importing countries (Morais *et al*., 2009).

The various of melon hybrid cultivated nowadays have showed differentiated behavior because of climates variations and cultures management, and even though, melon plants have showed a good performance, a lot of issues from a technical nature that worry producers and others involved in the production-marketing process (Freitas *et al*., 2007), one of the problems is, to choose the ideal genotype to be implanted, taking in to account production factors, whether it is from a biotical or even environmental nature.

To Freitas *et al.* (2007), the genotype x environment interaction study, can be very helpful on control of cultivar x local interaction, which is associated to expected environmental changes, therefore, variation compounds can be used to separate the genotype, environment and interaction effects, providing knowledge from the cultivar x local interactions nature. In this context, Mesquita *et al.* (2014) emphasizes the huge diversity of melon botanical variety.

In Brazil, the main types of commercial melons belongs to botanical varieties: Cucumis, which presents fruits without smell (inodorous), non-climacteric, peel smooth or slightly wrinkled, yellow, white or slightly dark green color, which fits the commercial types, Amarelo, Pele de Sapo and Honey Dew, another botanical variety is *Cucumis melo* var. c*antalupensis*, presents aromatic fruits, climacteric, with low transportation resistance, short postharvest life, peel covered with corticosteroids, slightly yellowish to greenish or rough green peel, showing very characteristic buds or sutures in the longitudinal direction (Aragão, 2011).

Given the importance of this culture to the region, there is a enormous demand for information trying to define a productive system that presents cost-saving, increases productivity, and achieve the minimum standards of fruit quality that are demanded in the international market, this being one of Brazilian horticulture biggest challenges (Sales Júnior *et al*., 2005).

Ribeiro *et al*. (2014) after to evaluate the effect of organic and mineral source in melon production and development in Piauí state south region, concluded that manure can be used as unique source to fertilize melon plant, as alternative way to chemical fertilizer, which can give the producer profitability.

The purpose of this work is to verify the different melon cultivars/types behavior, when it comes to the quality and production when cultivated under irrigation in organic production system.

## MATERIAL AND METHODS

The work was developed between July and October 2014, in rural propriety Hortvida, which has the certification seal by the International Agriculture Organization – OIA, located in Governador Dix-Sept Rosado county, in Lagoa de Pau's community, (5°18'48''S 37°26'32''O), 65 feet of altitude, staying in banks of the Mossoró river, water source from the referred property. During the development of this work a survey of climatic conditions were made (Table 1).

Before the experiment setup soil samples were taken in 0-20 cm layer, which its fertility was analysed (Table 2). Fertilizing was made based on cattle manure, which its chemical analysis is on Table 2. Water was collected in different parts of the experiment's hydraulic network (Table 3). The sample were analyzed in the Chemistry and Fertility Laboratory from Rural's Semiarid Federal University - UFERSA, to analysis of chemical characteristics, according to EMBRAPA methodology (2009).

**Table 1: Tempeture Averages – T (ºC), Wind speed – V (km h$^{-1}$), Relative Humidity – UR (%), insolation – n (h), photoperiod – N (h) and rainfall – P (mm), in Governador Dix-sept Rosado county – RN, between the months of November 2012 and February 2013. Governador Dix-Sept Rosado, RN, UFERSA, 2014.**

| Months | T | V | UR | n | N | P |
|---|---|---|---|---|---|---|
| | (°C) | (km h$^{-1}$) | (%) | (h) | | (mm) |
| July | 26.6 | 8.25 | 54.37 | 11.13 | 11.72 | 26.6 |
| August | 26.05 | 8.86 | 57.22 | 10.58 | 11.72 | 26.05 |
| September | 27.24 | 9.86 | 55.79 | 8.90 | 11.98 | 27.24 |
| October | 27.55 | 10.48 | 53.68 | 8.69 | 12.12 | 27.55 |

**Table 2: Soil chemical attributes in 0-20 cm profundity and cattle manure. Governador Dix-Sept Rosado, RN, UFERSA, 2014.**

| pH | M.O | P | $K^+$ | $Na^+$ | $Ca^{2+}$ | $Mg^{2+}$ | $H^+Al^{3+}$ |
|---|---|---|---|---|---|---|---|
| Soil | | | | | | | |
| $H_2O$ | g kg$^{-1}$ | ---------------mg dm$^{-3}$------------- | | | --------------cmol$_c$ dm$^{-3}$------------- | | |
| 6.40 | 12.70 | 7.01 | 153.76 | 14,76 | 19.45 | 10.53 | 0.00 |
| Cattle Manure | | | | | | | |
| $H_2O$ | g kg$^{-1}$ | --------------mg dm$^{-3}$-------------- | | | --------------cmol$_c$ dm$^{-3}$------------- | | |
| 8.00 | 38.06 | 46.25 | 1698.51 | 1051.50 | 15.68 | 8.47 | 0.00 |

pH $H_2O$: Hydrogen potential; MO: Organic Matter; P: Phosphorus; $K^+$: Potassium; $Na^+$: Sodium; $Ca^{2+}$: Calcium; $Mg^{2+}$: Magnesium e $H^+$+$Al^{3+}$: Hydrogen + Aluminium.

**Table 3: Chemical tributs determination on water used on irrigation. Governador Dix-Sept Rosado RN, UFERSA 2014.**

| pH | CE | $K^+$ | $Na^+$ | $Ca^{2+}$ | $Mg^{2+}$ | $Cl^-$ | $CO_3^{2-}$ | $HCO_3^-$ | RAS | Dureza | Cátions | Ânions |
|---|---|---|---|---|---|---|---|---|---|---|---|---|
| $H_2O$ | | --------------------------mmol$_c$ L$^{-1}$------------------------ | | | | | | | | mg L$^{-1}$ | ------mmol$_c$ L$^{-1}$------- | |
| 8.24 | 0.55 | 0.12 | 2.20 | 1.80 | 1.80 | 3.00 | 1,20 | 2.30 | 1.40 | 267.50 | 5.91 | 6.50 |

pH $H_2O$: Hydrogen potential; CE: Eletric conductivity; $K^+$: Potassium; $Na^+$: Sodium; $Ca^{2+}$: Calcium; $Mg^{2+}$: Magnesium $CL^-$: Chlorine; $CO_3^{2-}$: Carbonate; $HCO_3^-$: Bicarbonate; RAS: Sodium Adsorption reaction.

The experimental design was made in randomized block with treatments applied to 7 different types of melon in four repetitions. Treatments were constituted by melon hybrids: Amarelo ‘Hibrix $F_1$’, Gália ‘Yelogal $F_1$ e Solarnet’, Pele de Sapo ‘Medellín’, Charentais ‘Magisto $F_1$ Cant e Magritte $F_1$’ e Cantaloupe ‘Zelala Harpér’. Each part had a row with seven plants spaced in 1.70 x 0.30 m, being useful five central plants and those of the end were considered border. The total area of plot was 3.57 m² and useful area 2.55 m².

Seeding was made in polypropylene trays with 200 cells (48 mm of profundity x 26 mm of width) in a protected environment putting one seed in each cell in 1 cm profundity. Later, trays were transported to a coop where received micro irrigation daily by a blade with 5 mm. Plant change were transported 14 days after seed. Soil prepare counted on plowing and harrowing, followed by groove in lines, with 20 cm profundity, being used planting organic fertilizer with 10.0 $m^3$ $ha^{-1}$ of Cattle Manure, after closing grooves, ridges were formed with 0.5 m wide and 0.20 m height.

The irrigation system used was dripping, with flexible tape of 16 mm and drippers in 1.5 L $h^{-1}$, to a pressure service of 100 kPa and emitters spaced in 0.30 m, where water distribution was made in 3 hours a day $^{-1}$, where 1.5 h was distributed in the morning and 1.5 h in the afternoon. The application intensity was de 2.94 mm $h^{-1}$ and 8.82 mm daily blade application. After irrigation system installation, was made the silver polyethylene film application (black and silver double sided) above ridges. Later, was made the planting hole opening with a 2.5-inch diameter plunger 0.30 m were spaced. Disease, bugs and weed control was made when necessary respecting the good of integrated management of plagues.

The fruits harvest was made 61 days after the transplantation. At sampling, 5 randomly chosen fruits were taken from useful area per each repetition. After harvest, the following variables were taken: longitudinal and transverse length of fruit, average fruit weight, total productivity, internal cavity and fruit pulp thickness, peel thickness, firmness, soluble solids content, titratable acidity, soluble solids / titratable acidity ratio. Data were analyzed in Physiology and Postharvest Technology Laboratory in UFERSA.

The result was submitted to analysis of variance, where variable description was analyzed according to different melon’s cultivars, and means comparison was made by Scott-Knott test with a 5% probability. Analysis was made with the statistical program Variance Analysis System – SISVAR (Ferreira, 2014).

## RESULTS AND DISCUSSION

Differences were found among melon’s cultivars in the following variables: longitudinal length of the fruit (CLT), transverse length of the fruit (CTF) and average fruit weight (PMF) ($P<0.05$). Means difference varied from two to four distinct classes in different melon cultivars when produced in organic system (Table 4).

**Table 4: Length of the fruit averages (CLT), transverse length of the fruit (CTF), average fruit weight (PMF) and productivity (PROD) of melon produced in organic irrigation system. Governador Dix-Sept Rosado, RN, UFERSA, 2014.**

| Cultivar | CLF | CTF | PMF | PROD |
|---|---|---|---|---|
| | -------------------cm----------------- | | kg | t $ha^{-1}$ |
| Zelala Harpér | 11.52 d | 11.99 b | 0.92 c | 20.64 c |
| Magisto $F_1$ Cant | 12.91 c | 12.45 b | 1.03 c | 24.24 c |
| Medellín Pele de Sapo | 20.62 a | 13.66 a | 1.92 a | 45.19 a |
| Hibrix $F_1$ Amarelo | 17.10 b | 13.20 a | 1.45 b | 34.24 b |
| Yelogal $F_1$ Gália | 12.42 d | 11.85 b | 1.15 c | 27.13 c |
| Magritte $F_1$” | 13.34 c | 13.13 a | 1.10 c | 25.94 c |
| Solarnet Gália | 11.92 d | 11.65 b | 0.88 c | 20.64 c |
| CV | 5.37 | 6.50 | 14.02 | 14.01 |

Average followed by the same lower case in column are not different from each other by Scott-Knott test, to 5% level of probability.

In longitudinal length of fruit, was verified variation among averages, forming four different classes, where, Medellín Pele de Sapo presented the largest dimension to this variable with 20.62 cm average, followed by Hibrix $F_1$ Amarelo with 17.10 cm, the others presented lower results to 13.34 cm, which corresponds to Magritte $F_1$" average (Table 4). This information corroborates with Barreto (2011), that among melon hybrids evaluated, Pele de Sapo Medellín presented the largest longitudinal diameter, with 24.28 cm. Santos *et al*. (2011b) with the purpose of to evaluate melon Amarelo genotypes behaviour developed by EMBRAPA Vegetables, observed mean values of longitudinal diameter variating from 13.62 cm to 17.24 cm. In organic cultive Ribeiro *et al*. (2014) found 26.00 cm CLF in melon type Amarelo Valenciano.

Two classes were verified to transverse length of the fruit (CTF), and the cultivar Medellín Pele de Sapo showed highest average (13.66 cm) however, statistically it was not different from cultivars Hibrix $F_1$ Amarelo (13.20 cm) e Magritte $F_1$" (13,13 cm), while, other cultivars were grouped in a second class, not different from Solarnet Gália that presented lowest average (11.65 cm) (Table 4). Ribeiro *et al*. (2014) in the state of Piauí describes that, melon fruits type like Amarelo Valenciano present CTF average of 14,00 cm. Other authors still report fruits with CTF variating between 11.65 cm and 14.86 cm (Paduan *et al*., 2007, Dalastra *et al*., 2016).

Averages corresponding to CLF/CTF relation indicates the fruits format, therefore, the more the grades are far from 1,0, the more the fruits tend oval shape, and the closest, will present spherical shape. This relation indicates the fruits shape. The fruits Medellín de Sapo and Hibrix $F_1$ Amarelo showed oval shape, while, the others show a spherical shape tendency. According to Dalastra, after comparing quality and production on different types of melon, the highest index was for Pele de Sapo type (1.47), presenting a long shape, typical phenotype from this group.

To Average fruit weight (PMF) the data were grouped in three distinct classes, which, cultivar Pele de Sapo 'Medellín' presented heavier fruits with average values of 1.92 kg. Intermediate means were verefied in hybrid Hibrix $F_1$ Amarelo (1.45 kg), which was significantly different from other genotypes, classified in the third group with lowest average (Table 4). Barreto (2011), also verified average values variation among hybrids from 0,98kg to 3.33 kg, being the lowest and highest to Gália 'Cyro' and Pele de Sapo 'Medellín', respectively. According to Dalastra, after to avaliate different cultivars developments, also were noted fruits from hybrid Pele de Sapo 'Medellín' with weight 3.35 kg. Althought some authors report weight higher than 3.0 kg to Medellín hybrid, Carmo *et al*., (2017) reported the occurrence of melon plants type Pele de Sapo 'Juazeiro' presenting fruits with 2.17 kg, value next to what was observed in the present study.

Melon Gália hybrids are not different from each other, with Yelogal $F_1$ Galia e Solarnet Gália presenting averages of 1.15 and 0.88 kg, respectively. Just like hybrids Charentais Magisto $F_1$ Cant (1.03 kg) and Magritte $F_1$" (1.10 kg) (Table 4). These results correspond to the ones found by Barreto (2011), being verified averages from 1.00 to 1.35 kg. According Araújo Neto *et al*. (2003), melon fruits below Northeast region average (1.78 kg) are most searched by export Market, because of its preference to smallest fruits, and the biggest ones are commercialized in the intern market.

However, in Pele de Sapo Melon type, fruits between 3 and 4 kg are preferred, especially in Spanish and American market (Nunes *et al*., 2011a). This way, the fruits gotten in this work would not correspond this markets demand, however would attend national Market demand with types 5 and 6, that is, number of fruits per 12 kg box (Paduan *et al*., 2007). It is important to mention that Amarelo Melon is the most consumed type in English Market and Brazil is one of it's exported, being commercialization basically concentrated in this kind of fruit (Araujo *et al*., 2001).

According to Mesquita *et al*. (2014), intern market has a preference for melon type Amarelo with Average Weight between 1.0 to 2.0 kg, different from extern market that prefer smallest fruits with 0.5 to 1.5 kg. In this work, Hibrix $F_1$ Amarelo fruits had PMF of 1,45 kg. Soon, according to authors that were quoted, these fruits could be commercialized in both internal and external Market. To Paduan *et al*. (2007), the fruit classification is from fundamental importance in commercialization, once it indicates the products good acceptance by consumers.

About the productivity (PROD) was verified that cultivars that were being studied were represented by three different classes, being Medellín Pele de Sapo the one who presented a highest PROD index with average of 45,19 t $ha^{-1}$, followed by cultivar Hibrix $F_1$ Amarelo with 34.24 t $ha^{-1}$, which was not different from the results found in cultivars Yelogal $F_1$ Gália (27.13 t $ha^{-1}$) and Magritte $F_1$" (25.94 t $ha^{-1}$) , staying with lowest PROD averages Magisto $F_1$ Cant (24.24 t $ha^{-1}$), Zelala Harpér (20,64 t $ha^{-1}$) and Solarnet Gália (20.64 t $ha^{-1}$) (Table 4).

A lot of different studies report a very expressive variation to melon production, resulting in farming of different genotypes in different edaphic conditions. According to Freitas et al. (2007), a study with cultivars in different places of Brazilian Northeast verify variation from 20.14 to 45.06 t $ha^{-1}$ with commercial melon hybrids type Amarelo ‘Gold Mine, Gold Star, AF 646, AF 682, Yellow Queen, Yellow King, Gold Pride, Rochedo e RML’. Freire *et al.* (2009) in organic system with melon type Amarelo Vereda found average of 51.44 t $ha^{-1}$. Also, in organic system, santos *et al*. (2014) verify that melon Amarelo ‘CLXLH12’ presented 47.68 t $ha^{-1}$ and Gália ‘Mandacaru’ 30.71 t $ha^{-1}$. Sales Júnior et al. (2005) with melon Amarelo AF 646 using organic fertilizer verify productivity of 25.83 t $ha^{-1}$ in control treatment. Other authors still report the occurrence of productions variating between 11.77 a 54.4 t $ha^{-1}$ (Campelo *et al*., 2014; Carmo *et al*., 2017; Embrapa, 2017).

This variation occurred due to the fact that, in a cultivate system, in general formed by different genotypes, roots explore soil in different depth, or leaves may respond different to light competition, therefore, plants from a plant community, either homogeneous and heterogeneous, are subjected to different types of interaction and, most of the cases, interaction é is noted by cultivar’s production reduction (Salvador, 2003).

There were significative difference according to F test in significance level ($P<0.01$), for the longitudinal cavity length characteristics (CCL), transverse cavity length (CCT), thickness of the longitudinal pulp (EPL), thickness of transverse pulp (EPT) and shell thickness (EC) of melon fruit produced in organic production system (Table 5).

When verified longitudinal cavity length (CCL), the information was group in three different classes, cultivar Medellín Pele de Sapo had the highest value (14.53 cm), different from Hibrix $F_1$ Amarelo that presented intermediate value (11.45 cm). Other cultivars were classified with lowest values to CCL (Table 5). To transverse cavity length (CCT) also we got three different classes, and, Medellín Pele de Sapo also presented the highest cavity (6.65 cm), different from cultivars Hibrix $F_1$ Amarelo, Zelala Harpér, Magistro $F_1$ Cant e Magritte $F_1$, grouped in second class, which averages corresponds to 5.65 cm, 5.47 cm and 5.14 cm, respectively (Table 5). The ideal fruit must have thick pulp and, consequently, a small intern cavity, because fruits with this characteristic resists better the transportation and have a postharvest greater durability (Costa and Pinto, 1977).

The highest thickness of the longitudinal pulp (EPL) was in Medellín Pele de Sapo (28.65 mm) and Hibrix $F_1$ Amarelo (28.19 mm), not different from average found in Magritte $F_1$” (26.34 mm). Reduced EPL were observed in other cultivars, with average variating from 23.60 to 19.33 (Table 5). Hibrix $F_1$ Amarelo, Zelala Harpér, Solarnet Gália e Yelogal $F_1$ Gália were cultivars with highest thickness of transverse pulp (EPT) with averages of 36.93 mm, 36.21 mm, 35.79 mm and 34.56 mm, respectively (Table 5).

According to Melo *et al*. (2012), the results referred to pulp thickness, ally to transverse and longitudinal diameter of the locule, allows to estimate the pulps yield, showing better improvement of consumable part. Santos *et al*. (2011b) reports that the ideal fruit must present thickness mesocarp larger, because provides better transportation resistance and postharvest greater durability, this way, fruits with thick pulp in the styling region have a highly desirable characteristic.

**Table 5: Longitudinal cavity length average (CCL), transverse cavity length (CCT), thickness of the longitudinal pulp (EPL), thickness of transverse pulp (EPT) and shell thickness (EC) of melon fruit produced in organic system production. Governador Dix-Sept Rosado, RN, UFERSA, 2014.**

| Cultivar | CCL | CCT | EPL | EPT | EC |
|---|---|---|---|---|---|
| | ---------------cm-------------- | | ---------------------mm---------------------- | | |
| Zelala Harpér | 7.59 c | 5.47 b | 19.90 b | 36.21 a | 0.90 c |
| Magisto $F_1$ Cant | 8.09 c | 5.41 b | 21.75 b | 30.20 b | 0.87 c |
| Medellín Pele de Sapo | 14.53 a | 6.56 a | 28.65 a | 30.70 b | 1.57 a |
| Hibrix $F_1$ Amarelo | 11.45 b | 5.65 b | 28.19 a | 36.93 a | 0.76 d |
| Yelogal $F_1$ Gália | 8.15 c | 4.47 c | 19.33 b | 34.56 a | 0.89 c |
| Magritte $F_1$” | 8.40 c | 5.14 b | 26.34 a | 28.06 b | 1.22 b |
| Solarnet Gália | 7.35 c | 4.40 c | 23.60 b | 35.79 a | 0.77 d |
| CV | 8.63 | 7.81 | 14.74 | 6.36 | 8.62 |

Average followed by the same lower case in column are not different from each other by Scott-Knott test, to 5% level of probability.

When verified cultivars behaviour referring to shell thickness (EC) it is observed that cultivars are different in four classes, and, Medellín Pele de Sapo presents biggest thickness com 1.57 mm, followed by Magritte $F_1$" with 1.22 mm. Other cultivars were grouped in classes with thickness below 0.90 mm (Table 5). Paduan *et al*. (2007) after working with melon cultivars also verified divergencies about shell thickness, reporting values variating from 3.88 to 9,74 mm. The more thickness is the shell, the more it will be protected against plague attack, also providing a better protection in fruits management and its stage between postharvest and consumers table.

The pulps firmness is another important variaty in fruits quality, because it indicates transportation resistence and longest life in a shelf (Menezes *et al*., 1998a). This character, besides being a physical parameter, its related with solubilization of pectic substances, which, according to Chitarra and Chitarra (1990) when occur in a huge amount, confer fragile texture to fruits.

In thickness (FIR) was observed the difference between four classes. The fruits that showed the biggest FIR were the ones from cultivar Magritte $F_1$" (33.11 N), staying in the second class of cultivars fruits Yelogal $F_1$ Gália (24.83 N), Zelala Harpér (23.63 N) and Magisto $F_1$ Cant (23.24 N). The smallest FIR was verified in cultivar Solarnet Gália with only 11.66 N, not different from cultivar Hibrix $F_1$ Amarelo with 14.49 N average (Table 6). Melons considered as having good postharvest conservartion, like Zelala Harpér, Magisto $F_1$ Cant, Yelogal $F_1$ Gália and Magritte $F_1$", presented high values to FIR pulp, being that the minimum requirements in harvest are 22 N. In literature are found reports to this characteristic, variating from 14.05 to 45.01 N (Melo *et al*., 2012; Campelo *et al*., 2014; Dalastra *et al*., 2016).

Freitas *et al*. (2007) studying the genotype x environment interaction in commercial melon Amarelo hybrids cultivated in Ceará and Rio Grande do Norte, observed a variation from 17.91 to 26.08 with 20.98 in average. Authors reports that pulps resistance presented higher estimates to environment effect, followed by hybrids variance effect. According to Nunes *et al*. (2011b), different genotypes respond to distinct ways to stimulus caused by environment covariates, being expected divergent results to each one of this.

Sugars acummulation during melons development is from a huge importance to fruits quality, because participate in the sweet taste formation, besides it influences in market and price regulation (Santos *et al*., 2011a). Also known as soluble solids, are an important quality factor, values higher than 9.00 ºBrix are demanded, because low sugar content in melon fruits, can unfeasible commercialization in both extern and intern Market (Menezes *et al*., 1998b, Filgueiras *et al*., 2000, Menezes *et al*., 2000, Faria *et al*., 2003). The SS content is used as classification index of melon according to its sweetness degree, being lower than 9.0 ºBrix considered non-commercial and higher than 12.00 ºBrix melon extra type (Santos *et al*., 2011b).

**Table 6: Firmness average (FIR), soluble solids (SS), tritable acidity (AT) and soluble acids/tritable acidity (SS/AT) relation from melon in organic production system. Governador Dix-Sept Rosado, RN, UFERSA, 2014.**

| Cultivar | FIR | SS | AT | SS/AT |
|---|---|---|---|---|
| | N | ºBrix | % | |
| Zelala Harpér | 23.63 b | 8.64 b | 0.06 e | 134.03 a |
| Magisto $F_1$ Cant | 23.24 b | 10.92 a | 0.09 d | 122.15 a |
| Medellín Pele de Sapo | 18.74 c | 7.21 c | 0.11 c | 61.31 b |
| Hibrix $F_1$ Amarelo | 14.49 d | 10.01 a | 0.17 b | 61.44 b |
| Yelogal $F_1$ Gália | 24.83 b | 10.75 a | 0.36 a | 29.95 c |
| Magritte $F_1$" | 33.11 a | 7.93 c | 0.09 d | 83.90 b |
| Solarnet Gália | 11.66 d | 8.84 b | 0.12 c | 72.12 b |
| CV | 9.89 | 8.71 | 3.10 | 15.11 |

Average followed by the same lower case in column are not different from each other by Scott-Knott test, to 5% level of probability.

In this work SS average varieted from 7,21 ºBrix (Medellín Pele de Sapo) to 10.92 ºBrix (Magisto $F_1$ Cant). Genotypes Zelala Harpér, Medellín Pele de Sapo, Magritte $F_1$" e Solarnet Gália, showed low amplitude among averages and reduced SS content, with values lower than the minimum demanded by export Market (Table 6). Melons quality is influenced by several factors, among them, luminosity has a huge influence in SS, which means that places with high luminosity produces fruits with higher content (Larcher, 2006). Freitas *et al*. (2007) says that to get a better quality fruit and a good sugar contente, is necessary that the fruit stays in the plant until it's complete maturity.

In Assu-Mossoró Agropole conditions, Freire *et al*. (2009) after leading cultivar of melon type Amarelo 'Vereda' in organic production system, verified that SS average content was 11,06 ºBrix. To Mesquita *et al*. (2014), the SS average value to type Gália demand by extern market is around 12.00 ºBrix, yet, values reported in this work are out of this pattern. This result can be supposedly explained by the fruits harvest being done before physiological maturation achievemnt (Ribeiro *et al*., 2014).

In most cases, acidity represents one of the main flavor's compound, because it acceptance depends on the sugars and acids balance, being that preference affects high contents of these constituents, however, to melon, acidity levels variation has low impact due to its low content, and acidity presence is not too expressive in the fruits flavor (Morais *et al*., 2009). This information justifies absence in studies about acids metabolism during melon maturation (Santos *et al*., 2011a).

According to Pinto *et al*. (2008), soluble solids content and total acidity relation is used to evaluete both maturation state and fruits palatability, being that, in case this relation is above 25 and total acidity is under 0.5%, the fruit will have good flavour and colouring. In the present study, values found in the soluble solids and titrated acidity (SS/AT) variated from 29.95 (Yelogal $F_1$ Gália) a 134.03 (Zelala Harpér), like titrated acidity, with values between 0.36% and 0.06%, respectively (Table 6). The fruits then, satisfies brazilian consumers preference, that demand sweeter and less acid fruits (Menezes *et al*., 1998a).

## CONCLUSION

The culture of melon when cultivated in an irrigated organic system in the semiarid region of Rio Grande do Norte demonstrated a good productive pattern for several cultivars, especially Medellín Pele de Sapo (45.19 t $ha^{-1}$) and Hibrix F1 Yellow (34.24 t $ha^{-1}$). The cultivar Medellín Pele de Sapo was the most productive one, although presented low soluble solids content.

**Conflict of interest.** The authors confirm that there are no known conflicts of interest associated with this publication.

**Data availability.** Data are available with the corresponding author (leoagrozoo@hotmail.com) upon reasonable request.

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