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Shelf life extension of peach palm heart packed in different plastic packages

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ABSTRACT

Peach palm heart (*Bactris gasipaes*) is a highly perishable product and, therefore, studies on extending its shelf life are quite necessary. Considering the high demand of this vegetable, this study aimed to evaluate the influence of using different plastic packages in order to extend the shelf life of the peach palm heart *in natura*. Stipes were collected from plants grown on family farms located in the municipality of Seropédica-RJ. Stipes were peeled, sanitized and packed at the Post-harvest Laboratory in Universidade Federal Rural do Rio de Janeiro (UFRRJ). In this experiment, the following treatments were applied: a control without package (C), unperforated polyethylene bag (UPB), perforated polyethylene bag (PPB), microperforated polyethylene bag (MPPB), and styrofoam tray + plastic film (STPF). The material was stored in a cold chamber under controlled temperature (5±2°C) for 24 days and then at room temperature (28±2°C) on the 25th day. Physical, chemical and visual evaluations were carried out for 25 days, with samples submitted to evaluations at 0 (initial characterization), 4, 8, 12, 16, 20, 24 and 25 days of storage. Microbiological evaluations were performed for 18 days, with samples submitted to evaluations at 0, 8, and 16 days of storage. The results indicate that using plastic package combined with refrigeration was efficient in extending the shelf life of *in natura* peach palm hearts, by reducing fresh mass loss, maintaining visual quality and reducing sample contamination. The PPB, UPB and MPPB packages showed good performance considering the shelf life extension of the packed vegetable. Thus, we recommend the acquisition of cheaper packages, so that smallholder farmers could obtain higher profitability.

Keywords: *Bactris gasipaes*, storage, modified atmosphere, postharvest, quality.

RESUMO

Prolongamento da vida útil de palmito pupunha em tolete acondicionado em diferentes embalagens plásticas

O palmito pupunha (*Bactris gasipaes*) é considerado um produto altamente perecível, sendo necessário o desenvolvimento de estudos que visem o prolongamento do tempo de vida útil do mesmo. Diante dessa demanda, esta pesquisa teve como objetivo avaliar a influência da utilização de diferentes embalagens plásticas na extensão da vida útil de palmito *in natura* em tolete. Os estipes foram coletados de plantas em propriedade de agricultura familiar localizada no município de Seropédica-RJ. Estes foram descascados, higienizados e embalados no Laboratório de Pós-colheita da Universidade Federal Rural do Rio de Janeiro (UFRRJ). Nesse experimento foram utilizados os seguintes tratamentos de embalagens: controle sem embalagem (C), saco de polietileno não perfurado (SPNP), saco de polietileno perfurado (SPP), saco de polietileno microperfurado (SPMP) e bandeja de isopor + filme plástico (BIPF), sob armazenamento em câmara fria com controle de temperatura (5±2°C) durante 24 dias e sob temperatura ambiente (28±2°C) no 25° dia. As avaliações físicas, químicas e visual foram realizadas por 25 dias, com amostras submetidas às avaliações aos 0 (caracterização inicial), 4, 8, 12, 16, 20, 24 e 25 dias de armazenamento, e as avaliações microbiológicas foram realizadas por 18 dias, com amostras submetidas às avaliações aos 0, 8 e 16 dias de armazenamento. Os resultados obtidos indicaram que a utilização de todos os tipos de sacos plásticos combinados com refrigeração foram eficientes no prolongamento do tempo de vida útil do palmito pupunha *in natura* em tolete, por reduzir a perda de massa fresca, manter a qualidade visual e reduzir a contaminação dos toletes. As embalagens SPP, SPNP e SPMP apresentaram um bom desempenho no prolongamento do tempo de vida útil das amostras de palmito em tolete. Assim, é indicada a aquisição de embalagem com menores custos para maximização do lucro dos pequenos produtores.

Palavras chave: *Bactris gasipaes*, armazenamento, atmosfera modificada, pós-colheita, qualidade.

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In 2018, palm heart production in Brazil was of 107,923 ton, in a harvest area of 23,905 hectares. The average yield was 4,204 kg/ha, and the production value was 252,850 thousand reais, being the states of Bahia, Goiás, São Paulo, Paraná, Mato Grosso and Santa Catarina the main producers (IBGE, 2020). In this context, although the sector showed a very good financial return and considerable economic importance, Modolo (2017) states that approximately 60% of national production is still obtained in an extractive and predatory way.

Palm heart is considered a non-conventional vegetable, being extracted from a great number of palm tree species. In some species, extraction results in the death of the palm, due to the elimination of its apical meristem. Considering this situation and concerning about a possible extinction of such palm species, peach palm heart (*Bactris gasipaes*) can be considered an excellent alternative to reduce this extinction risk, since it is a precocious palm species, showing good tillering potential, being also rustic, and of excellent quality of palm heart (Fonseca *et al*., 2009).

Palm heart is considered a highly perishable product and studies with the aim of prolonging its useful life are necessary, in order to avoid losses in case the product is not marketed quickly. Thus, plastic packages can be an adequate tool for stipe conservation and to its commercialization even more efficient, since they collaborate to maintain the palm heart quality for a longer time, making it possible to prolong time to market and reduce post-harvest losses. Moreover, cold storage is one of the most commonly used physical methods to improve shelf life of fresh fruits and vegetables, being considered highly efficient, with high energy demand, though (Ma *et al*., 2017).

Yousuf *et al*. (2018) state that vegetal food processing results in metabolic changes in tissues which are still alive and each stage of the processing has a potential effect on the nutritional and quality aspects of plants. Therefore, the useful life of processed products depends on good hygiene conditions during processing and the high quality of the raw material used (Ghidelli & Pérez-Gago, 2016). Villadiego *et al.* (2005) believe that the use of plastic packages is a good alternative for food preservation and consequently for prolonging suitable time for commercialization, *modifying* the *atmosphere surrounding the product*, and associated with refrigerated storage, promotes reduction and delay in microbial growth and chemical and physiological changes in the product. Besides, plastic packages can decrease losses, keeping samples suitable for commercialization for a longer time.

Thus, the aim of this study was to evaluate the influence of using different plastic packages and refrigerated storage extending the useful life of fresh heart of palm *in natura*, allowing producers to have longer time to market their product and better conditions of consumption and health.

MATERIAL AND METHODS

Peach palm stipes were obtained from a producer who commercializes his products in Feira da Agricultura Familiar da UFRRJ (Family Farming Market at UFRRJ). The property, approximately 10 hectares of land, is entirely under non-certified organic management, located in the municipality of Seropédica-RJ (22°44'38"S, 43°42'27"W, 26 m altitude).

Stipes were harvested when diameter reached, near-surface soil, between 9 and 15 cm. Right after harvest, the raw material was taken to Laboratório de Fisiologia da Pós-colheita da UFRRJ (Post-harvest Physiology Laboratory of UFRRJ). The stipes were selected in order to obtain a uniform lot in relation to maturation and to absence of mechanical damages. Then, these stipes were cleaned, washed, peeled, cut into approximately 1-cm thick palm hearts, and immersed in sodium hypochlorite (NaClO) solution at 50 mg L^{-1} for 15 min to be sanitized. Afterwards, they were rinsed with running and chlorinated water, 5 mg sodium hypochlorite, and drip drying, in order to be weighed, packed and stored. Five treatments were used (packages): 1) Control (C – without package), 2) unperforated polyethylene bag (UPB), 3) perforated polyethylene bag (PPB), 4) microperforated polyethylene bag (MPPB) and 5) styrofoam tray + plastic film (STPF).

Physical, chemical and visual evaluations

After packed, the samples were stored in cold chamber, with temperature control of 5±2ºC, during 24 days. On the 24^{th} day, the samples were taken from the refrigeration and stored at room temperature (28±2ºC), and re-evaluated on the 25^{th} day, to observe the impacts that such action would cause on the samples. So, the samples were submitted to evaluations at 0 (characterization), 4, 8, 12, 16, 20, 24 and 25 days of storage.

Fresh mass loss (FML) obtained through the difference between the initial mass of pieces and final mass on each evaluation day, by weighing using a digital scale, and the results were expressed in percentage;

Instrumental firmness (IF) determined by using an analog penetrometer, model PTR-100, which is an equipment to evaluate the texture in relation to the resistance to deformation presented on the food, with results expressed in Kgf/cm²;

Soluble solids (SS) determined by a direct reading using a manual refractometer, with results expressed in °Brix (IAL, 2008);

Titratable acidity (TA) obtained using 10 g of the sample diluted in 100 mL distilled water under moderate agitation. This solution was titrated with 0.1 N NaOH up to pH ranging from 8.2 to 8.4 (IAL, 2008). The result was expressed in g of citric acid / 100 g of sample;

Visual evaluation (VE) obtained through visual determination of the area affected by postharvest physiological deterioration of palm heart samples (Wheatley *et al*., 1982). Note scale was used in this evaluation (in percentage) where zero = 0% (no deterioration), 1 = 20% (slightly deteriorated), 2 = 40% (partially deteriorated), 3 = 60% (deteriorated), 4 = 80% (very deteriorated) and 5 = 100% (totally deteriorated). From note 3 on, the sample was considered unable to be consumed.

The experimental design (physical, chemical and visual evaluations) was completely randomized in a 5x8 factorial scheme (five packages and eight storage periods). Five replicates were used, being each plot composed of one package containing 100 grams of palm stipes. Data were submitted to variance analysis and averages compared by Tukey test at 5% in order to evaluate the effect of treatments, using the RStudio software to perform statistical analysis (RStudio Team, 2020). Regression was performed in some parameters to evaluate the effect of different packages in relation to storage time, since in some evaluation R^2 showed very low values, not representing the reality.

Microbiological evaluations

After packed, the samples were stored

in a cold chamber, at temperature control (5±2°C), during 18 days, being evaluated at 0 (characterization), 8 and 16 days of storage. At the end of the three periods mentioned above, the following traits were evaluated according to RDC nº 12, 2001**:**

Initial coliforms (IC) total and fecal coliforms were counted using presumptive test, using the most probable number technique (MPN). Using lauril sulfate broth (LSB) in tubes; each tube also contained, at the bottom, a small inverted tube to detect the presence or absence of gas. After inoculated, tubes were incubated (Durhan tube) at 37°C for 48 hours. Afterwards, we could detect gas inside the Durhan tubes (positive tubes);

Total coliforms (TC) when positive, showing presence of gas, the samples obtained in lauril sulfate broth (LSB) were transferred to brilliant green bile broth (BGBB), using a nickel-chrome wire, being incubated at 37°C for 24 hours. After 24 hours, the presence or absence of gas bubbles were observed inside the Durhan tubes (positive tubes);

Fecal coliforms (FC) when positive, showing gas production, the samples obtained in lauril sulfate broth (LSB) were transferred to *Escherichia coli* broth medium (ECB), using a nickel-chrome wire. Then, the samples were incubated in water bath at 45°C for 24 hours. Afterwards, we observed the presence or absence of gas bubbles inside the Durhan tubes.

RESULTS AND DISCUSSION

Physical, chemical and visual evaluations

Fresh mass loss (FML) was significant in relation to packages, storage days and also in the interaction between the two factors ($p<0.05$). All packages showed a gradual increase of FML during 25 storage days. We highlight that, on the 24th day of evaluation, all evaluated samples in the trial were submitted to room temperature. The accumulated FML, at the end of 25 days, was significantly different for treatment C and for STPF, showing maximum values of 17.32% and 10.68%, respectively. The other packages showed average values ranging from 4.12 to 3.36%, not differing among each other. From the 12th day on, C showed the highest averages in the experiment (Table 1).

Chitarra & Chitarra (2005) state that values above critical range, ranging from 5 to 6%, characterize products as unfit for consumption. Considering such parameters the palm heart sample C would be considered unfit for human consumption already at 8 days of storage, considering that in this period samples showed an average of 5.92% of fresh mass loss.

Low values of mass loss were observed in packages PPB, UPB and MPPB, due to the physical barrier which is provided by these packages. For palm hearts, the stipe is little cut, that means, the sample is submitted to a smaller area to be exposed to the storage environment. In Table 1, an increasing of mass loss was observed during storage period. A great difference was also observed considering mass loss of samples C when compared with the samples packed in plastic packages.

Palm heart samples packed in PPB, UPB and MPPB showed lower FML values, which can be associated with the possibility of gas exchange inside these packages and the environment, without altering expressive concentrations of CO_2 and O_2 inside the packages, increasing the humidity and substantially reducing water loss to environment. In this sense, Kluge & Jorge (1992) showed that the use of package, mainly made of polyethylene film, dramatically reduces FML of fruits and vegetables, both in storage and commercialization.

Instrumental firmness (IF) Significant differences in relation to packages, storage days and also interaction between these two factors ($p<0.05$) were observed. According to the results presented in Table 2, we verified that all palm stipes in different packages showed firmness reduction throughout storage days. The values found in the first period of evaluation ranged from 3.72 to 4.06 Kgf/cm². However, statistical differences were observed in packages in the two last evaluation periods, when C showed the worst performance and STPF the most satisfactory performance, showing values of 3.12 and 2.37 Kgf/cm².

Fonseca *et al.* (2019) found average firmness values close to the values found in this experiment, reporting that average values of firmness were approximately 4.59 Kgf/cm², in the apical region of the stipe, which according to the author indicates that the samples are potentially for human consumption, increasing productivity and economic return of harvested palm heart. We observed that the samples showed a gradual decrease in firmness values (Table 2).

Table 1. Average values in relation to fresh mass loss (FML, %) obtained for peach palm heart *in natura*, packed in different packages, stored for 24 days at temperature of 5±2°C and one day under room temperature (28±2°C). Seropédica, UFRRJ. 2020.

Storage days	Packages				
	PPB	UPB	MPPB	STPF	C
0	0.00 Aa	0.00 Aa	0.0 A a	0.00 A a	0.00 A a
4	0.16 Aa	0.20 Aa	0.40 AB ab	0.80 ABab	2.68 B b
8	1.12 Aab	0.48 Aa	0.60 A ab	2.76 Bbc	5.92 B c
12	1.48 Aab	1.00 Aab	0.80 A ab	4.28 B cd	9.72 C d
16	2.0 Aabc	1.20 Aab	1.40 A abc	5.88 B de	12.00 C de
20	2.52 Aabc	2.04 Aabc	2.16 A abc	7.76 B ef	14.16 C ef
24	3.24 A bc	3.20 A bc	2.80 A bc	9.08 B fg	16.44 C fg
25	4.12 A c	3.80 A c	3.36 A c	10.68 B g	17.32 C g
CV (%)			33.36		

Averages followed by same uppercase letters in lines and lowercase in columns do not statistically differ from each other, Tukey test, 5% probability. Control (C), unperforated polyethylene bag (UPB), perforated polyethylene bag (PPB), microperforated polyethylene bag (MPPB), and styrofoam tray + plastic film (STPF).

Table 2. Average values of instrumental firmness (IF, Kgf/cm²) obtained for peach palm heart *in natura*, packed in different packages, stored for 24 days at temperature of 5±2°C and one day under room temperature (28±2ºC). Seropédica, UFRRJ. 2020.

Storage days	Packages				
	PPB	UPB	MPPB	STPF	C
0	3.72 A cd	3.96 A d	3.92 A d	3.92 Ac	4.06 Ad
4	3.96 A d	4.00 A d	4.04 A d	3.98 Ac	4.31 Ad
8	4.02 A d	3.94 A d	3.98 A d	3.90 Ac	4.31 Ad
12	3.92 A d	3.90 A d	3.98 A d	3.88 Ac	4.08 Ad
16	3.61 A cd	3.47 A cd	3.74 A cd	3.55 Abc	3.51 Ac
20	3.37 A bc	3.24 A c	3.33 A c	3.27 Ab	3.37 Ac
24	2.84 AB b	2.67 AB b	2.67 AB b	3.12 Bb	2.37 Ab
25	1.69 A a	1.57 A a	1.74 Aa	2.31 Ba	1.61 Aa
CV (%)			8.06		

Averages followed by same uppercase letters in lines and lowercase in columns do not statistically differ from each other, Tukey test, 5% probability. Control (C), unperforated polyethylene bag (UPB), perforated polyethylene bag (PPB), microperforated polyethylene bag (MPPB), and styrofoam tray + plastic film (STPF).

Table 3. Average values of soluble solids (SS, ºBrix) obtained for peach palm heart *in natura*, packed in different packages, stored for 24 days at temperature of 5±2°C and one day under room temperature (28±2ºC). Seropédica, UFRRJ. 2020.

Storage days	Packages				
	PPB	UPB	MPPB	STPF	C
0	7.29 A b	8.37 A d	8.19 A c	7.29 A c	7.65 Ac
4	6.93 A b	6.39 A c	7.33 Ac	6.93 Ac	7.20 Az
8	3.60 A a	3.42 A ab	3.60 Aa	3.42 Aa	4.32 Aab
12	6.84 AB b	7.20 Bcd	5.58 Ab	5.94 ABbc	7.02 ABc
16	2.16 A a	1.89 A a	2.34 Aa	3.06 Aa	3.06 Aa
20	3.69 A a	4.32 A b	3.87 Aa	4.41 Aab	4.32 Aab
24	3.60 A a	3.96 A b	3.24 Aa	3.78 ABa	4.68 Aab
25	3.06 A a	2.88 A ab	3.06 Aa	3.60 ABa	5.04 Bb
CV (%)			17.29		

Averages followed by same uppercase letters in lines and lowercase in columns do not statistically differ from each other, Tukey test, 5% probability. Control (C), unperforated polyethylene bag (UPB), perforated polyethylene bag (PPB), microperforated polyethylene bag (MPPB) and styrofoam tray + plastic film (STPF).

Soluble solids (SS) Significant differences were observed in relation to packages, storage days, and also in the interaction between these two factors ($p<0.05$), as shown in Table 3. The collected data were analyzed and showed that soluble solid contents presented oscillatory behavior during the evaluation periods, for all the packages used. On day 0 (day when the samples were characterized), values of SS did not present significant difference among them, ranging from 6.84 to 8.37ºBrix. Fonseca *et al*. (2019) obtained similar results for soluble solids, 6.80ºBrix.

In other storage times, this oscillation occurred in values found, as it was previously mentioned and after 16 days of storage, the samples had already shown decrease in SS, with the exception of the control which in the last evaluation showed a significant higher value, which was not possible to be explained in this study, since in the absence of refrigeration it was expected that senescence process would advance with a reduction in SS. Overall, up to the 4th day, SS maintained the same and from the 16th storage day on, it was possible to notice a decrease of these contents in all treatments.

The use of plastic packages for storage can modify the environment atmosphere, since the use of plastic films or edible coatings allows an increase of CO_2 and a decrease of O_2 concentrations due to breath of the packaged product (Chitarra & Chitarra, 2005).

Interestingly, being submitted to room temperature on the 25th day, treatment C showed significant higher values for SS when compared with the other treatments, 5.04ºBrix. It is strongly believed that this result can be associated with the fact that the sample had lost mass when submitted to these environmental characteristics, so that the soluble solids present there could have concentrated. The other treatments kept the tendency to reduce SS, since the samples are inclined to use their sources during breathing process and consequent senescence, during storage period.

Valentini (2010) studied conservation of hearts of peach palm (*Bactris gasipaes*) *in natura* under refrigeration and modified atmosphere, where palm heart samples were stored during 15 days, showing average values of soluble solids in peach palm hearts on day zero of approximately 6.8ºBrix. For other periods of storage, the samples also showed an oscillatory behavior with a downward trend on the 15th day of storage.

Titratable acidity Significant differences in relation to storage days were observed ($p<0.05$). No significant difference in relation to packages and interaction between the two factors were verified, though ($p>0.05$). No significant difference was observed for TA values in relation to packages. Average values for TA showed in treatments STPF, MPPB, PPB, UPB and C were 4.11, 3.54, 3.73, 3.75 and 3.68, respectively. For storage days, the data obtained when evaluation was done, demonstrate that TA values maintained the same (with little alterations) during 24 days of storage in refrigeration and a significant increase on the 25th day; when the storage temperature was higher, values ranged from 3.25 to 5.84 g of citric acid / 100g of fresh matter, on day 0 and 25, respectively. Kalil *et al*. (2010) evaluated the quality and shelf life of palm heart *in natura* of two populations and observed that titratable acidity of one of these populations ranged from 1.64 to 2.72 g of citric acid / 100 g of fresh matter, corroborating this study which shows TA ranging a little bit

Table 4. Average values of visual evaluation (VE, ranking criterium) obtained for peach palm heart *in natura*, packed in different packages, stored for 24 days at temperature of 5±2°C and one day under room temperature (28±2ºC). Seropédica, UFRRJ. 2020.

Storage days	Packages				
	PPB	UPB	MPPB	STPF	C
0	0 Aa	0 Aa	0 Aa	0 Aa	0 Aa
4	0 A a	0 Aa	0 Aa	0 Aa	1 Bb
8	0 Aa	0 Aa	0 Aa	0 Aa	2 Bb
12	1 Bb	1Bb	0 Aa	0 Aa	3 Cc
16	2 Bc	2 Bc	1 Ab	1 Ab	4 Cd
20	3 Cd	3 Cd	2 Bc	1 Ac	5 De
24	3 B d	3 Bd	3 Bd	2 Ad	5 Ce
25	5 Ae	5 Ae	5 Ae	5 Ae	5 Af
CV (%)			7.12		

Averages followed by same uppercase letters in lines and lowercase in columns do not statistically differ from each other, Tukey test, 5% probability. Control (C), unperforated polyethylene bag (UPB), perforated polyethylene bag (PPB), microperforated polyethylene bag (MPPB) and styrofoam tray + plastic film (STPF).

with subsequent increase of values. Nevertheless, we should consider that the present study showed slightly higher values of TA than the study mentioned above, which can contribute to product conservation since products with higher acidity are less susceptible to contamination by bacteria, fungi or yeasts.

According to Kapp *et al*. (2003), this increase in TA values can be explained by a possible development of acidifying deteriorating microorganisms and/or by biochemical alterations. We highlight that studying organic acid present in food is quite important, since it influences flavor, odor, color, stability and maintenance of food quality (Cecchi, 2003) and that determining TA in food is essential, inasmuch through this evaluation we can obtain valuable data to assessment of food processing and conservation status.

Visual evaluation Significant differences were observed in relation to packages, considering storage days, as well as interaction between the two factors ($p<0.05$). The post-harvest deterioration of the samples differed according to the packages used, after the 4th storage day, considering C the treatment which showed the worst performance with greater deterioration of the hearts as the samples of this treatment no longer had ideal visual characteristics for their commercialization on the 12th storage day, scoring 3. Even before the 12th storage day, although peach palm heart is considered to be little susceptible to enzymatic browning, under the tested conditions, some whitish spots (a depreciative characteristic) and/or slightly yellowish spots could be verified on some hearts, which indicates that acidification acted by inhibiting the action of enzymes.

In this context, Egea *et al*. (2018) also observed these depreciative characteristic when evaluating the quality of minimally processed palm heart under different citric acid treatments and combination of citric acid and calcium chloride through microbiological, chemical and sensory analyzes.

Palm stipes stored in other treatments showed gradual physiological deterioration. We can cite the palm heart stored in STPF which obtained better score, showing visual characteristics acceptable for marketing up to the 24th day (Table 4). Kapp *et al.* (2003) observed that water loss of the palm heart inside the package may generate favorable conditions for development of deteriorating microorganisms. Deterioration is considered a determining factor when purchasing *in natura* vegetable food products, making it fundamental for determining the shelf life of peach palm heart.

It also should be highlighted that treatments using plastic bags showed similar behavior, considering that the product packed in PPB and UPB showed visual characteristics favorable for commercialization up to 16th day and MPPB up to 20th day (Table 4).

Microbiological evaluations

Total coliforms (TC) The results were evaluated and all the samples and their replicates showed TC at 37ºC of 10^{-1}, being considered suitable for human consumption. Peach palm heart samples presented satisfactory health conditions, the count of FC at 45ºC (*Escherichia coli*) MPN/g was <3, being their analytical results below those established for the indicative sample or representative sample, according to RDC No. 12 (ANVISA, 2001). Egea *et al.* (2018) associate the achievement of these satisfactory sanitary conditions with the efficiency of the processing adopted for the development of a safe product, with a microbial contamination under control during the studied period and the compliance with Good Manufacturing Practices.

Kalil *et al.* (2010) found results in microbiological analyses similar to the ones found in this study: within minimum counting standards, using peach palm heart samples *in natura* evaluated after nine days of cold storage. Still according to the authors, these adequate values can be associated with the performance for an adequate sanitization of the samples, which resulted in reduction of microbial population present in the processed product.

In this sense, RDC No. 12 determines that maximum tolerance levels and minimum standards for different groups of food products for registration and food inspection purposes. These limits and criteria can be complemented when establishing programs for the surveillance and tracking of pathogenic microorganisms and hygienic-sanitary quality of products.

If the analyzed product (such as the peach palm heart) is not characterized in the existing tables of RDC, we should consider the similarity of the nature and processing of the product, as a basis for its inclusion in the standards established for a similar product, constant according to RDC nº. 12. Thereat, peach palm heart was classified in group 3, which is about roots, tubers and similar products *in natura*, prepared (peeled or selected or fractionated) sanitized, refrigerated or frozen, for direct consumption, with tolerance values for total coliforms at 37ºC of 10^3, within these standards established by RDC.

The fecal coliform index is used as an indicator of fecal contamination, that is, of poor hygienic-sanitary conditions taking into account that the population of this group can indicate other internal pathogens. In general, bacteria in the coliform group are harmful to food and human health (Siqueira, 1995).

Given the above, it was concluded that the use of plastic packages in this study combined with refrigerated storage showed to be efficient in extending shelf life of peach palm hearts *in natura*, acting in FML reduction, maintaining firmness levels, characteristics which significantly contribute to extending shelf life of peach palm hearts *in natura*.

The packages which provided lower fresh mass losses of palm hearts were PPB, UPB and MPPB. Despite being the most used package for fresh palm hearts commercialization, the combination of styrofoam tray + plastic film (STPF) showed a lower performance when compared with the other packages tested in this study.

Therefore, we recommend the use of package with the lowest purchase values among the three which presented the best performance, so that small producers could obtain greater profits when commercializing their products.

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