Original Research Article

Production and characterization of tomato (*Lycopersicon esculentum*) jam

ABSTRACT

Aim: This study was carried out with the aim of developing and characterizing jam based on tomato fruit.

Methodology: Four (04) formulations such as A, 50% pulp, 50% sugar; B, 59% pulp, 40% sugar, 0.5% citric acid and 0.5% pectin; C, 69% pulp, 30% sugar, 0.5% citric acid, and 0.5% pectin; D, 79% pulp, 20% sugar, 0.5% citric acid, and 0.5% pectin, were made and characterized in terms of pH by potentiometer, moisture by desiccation at 105^{o} C, total soluble solids content (°Brix) by refractometry, titratable acidity by titration with 0.1N NaOH, and sensory analysis by effective methods. The data was evaluated using Rstudio 4.2.1 software.

Results: The results showed pH ranging from 4.84 to 5.09, soluble solids content from 39.79 to 66.42 ºBrix, titratable acidity in the range of 0.52 to 1.07%, and moisture content between 10.75 and 41.86%. The acceptance test showed that formulation A had the highest score of around 75%.

Conclusion: Tomatoes proved to be an excellent and viable raw material for jam production.

Keywords: Jam, tomato, physicochemical quality, sensory analysis.

1. INTRODUCTION

Tomatoes are one of the most important and popular vegetables in the world. Tomatoes are rich in vitamins and minerals, and in Mozambique are considered an important food crop for the population, both in rural areas and in urban centers [21].

This fruit contains vitamins A and C and can be eaten in a variety of ways: fresh, *in natura, in* salads, or processed into tomato pulp, dehydrated tomatoes, and jam. The tomato belongs to the *Solanaceae* family and is a herbaceous plant with a flexible stem variable growth. It is a climacteric fruit, and its ripening process is perceived by the color change that begins around the seed and then passes to the skin, it has a high deterioration capacity and cannot be stored for a long time due to its nature [38].

Once harvested, tomato ripeness is the result of a series of physical and chemical transformations that lead to physiological and biochemical changes in the fruit, such as changes in color, appearance, hardness, weight, total soluble solids, pH value, and titratable acidity [5].

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The production of jam is a way of taking advantage of the benefits of fruit consumption and conservation, avoiding losses due to overproduction, and ultimately producing higher-value products [19]. Jam processing follows a relatively simple method, requires very little equipment, and also allows the industry to use fruit that is not suitable for jams and diversification [36].

Jam are attractive healthy foods because they are rich in fiber, vitamins, and carbohydrates [4]. Jam can be defined as a product obtained by concentrating pulp or juice with enough sugar, pectin and acid to reach a concentration sufficient to gelatinize after cooling [14].

Tomato is a climacteric fruit (after harvest it still continues to perform its physiological functions) and is easy to deteriorate. Its deterioration can be accelerated by damage to the fruit during and after harvesting, transportation, storage and marketing. However, the following study focuses on the production and characterization of tomato jam with purpose of helping to minimize post-harvest losses of tomatoes as an alternative way of consuming and preserving food. The choice of producing tomato jam was due to the fact that it is a very versatile product in terms of how it is consumed, and can be used as an accompaniment to bread and cookies. In addition, its production does not involve high production costs and does not require sophisticated equipment. The jam is easy to preserve and can be stored at room temperature and produced locally by the communities. The main aim of the research was to produce and evaluate the physicochemical and sensory properties of tomato jam.

2. MATERIAL AND METHODS

2.1. Study area

This study was conducted in the laboratory of the Higher Polytechnic Institute of Gaza, located in Chókwè district, the administrative post of Lionde. This district is located in the south of Gaza province on the middle course of the Limpopo River, with the Limpopo River to the north separating it from the districts of Massingir, Mabalane and Guijá, the Bilene district to the south and the Mazimuchope River separating it from the Magude district, the Bilene and Chibuto districts to the east and the Magude and Massingir districts to the west [18].

2.2. Acquisition of raw materials

The raw materials (tomatoes, lemons, and sugar, were purchased at the local market in Chókwè city. The tomatoes were bought *fresh,* with characteristics such as uniform red color, placed in a polypropylene plastic bag, and taken to the Agro-Processing laboratory of the Higher Polytechnic Institute of Gaza.

2.3. Jam production

The flowchart (figure 1) shows the production stages for tomato jam with addition of citric acid and lemon pectin. For this purpose, the citric acid was obtained from the lemon juice and the pectin was extracted from the lemon seeds over low heat at 70ºC under constant homogenization until the gel was formed.

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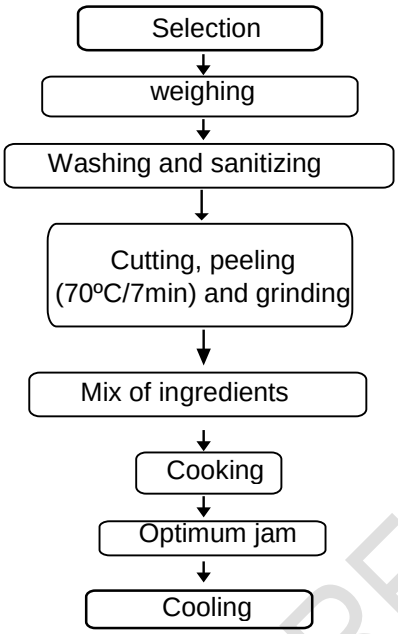

Figure 1. Flowchart of jam production stages.

Source: Authors.

Initially, the tomatoes were selected by observing their external characteristics (hardness, color, ripeness and no physical damage) in order to assess their physical or sensory quality. The tomatoes were weighed using an ADAM analytical scale, pre-washed by immersion in running water for 5 minutes, followed by sanitization with a solution of chlorinated water and water in a ratio of 250mL to 5L for 15 minutes, rinsed in running water to eliminate any residual material present. A stainless steel knife was used to make a transverse cut in the tomato skin, then the fruit was submerged in hot water at 70ºC for 7 minutes to facilitate the process of removing the skin. Finally, the fruit was split in half to remove the seeds and placental tissue, and the pulp was crushed. The pulp was obtained using an ARCTTE1 vegetable shredder. After the tomatoes had been crushed, sugar was added to the pulp and the previously prepared concentration was placed on a low heat, with the pectin added during the boiling time and citric acid added at the end of the concentration. The formulations illustrated in Table 1 were then prepared.

Table 1. Formulation of tomato jam.

Ingredients (%)	Formulations			
	A	**B**	**C**	**D**
Tomato pulp	50	59	69	79
Sugar	50	40	30	20
Citric acid (bioactive)	0	0,5	0,5	0,5
Pectin	0	0,5	0,5	0,5

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(A), 50% pulp, 50% sugar; (B), 59% pulp, 40% sugar, 0.5% citric acid and 0.5% pectin; (C), 69% pulp, 30% sugar, 0.5% citric acid and 0.5% pectin; (D), 79% pulp, 20% sugar, 0.5% citric acid and 0.5% pectin**.**

Source: Authors.

2.3.1. Weighing, mixing and jam production

The ingredients (pulp, sugar, and pectin) were weighed on an ADAM analytical balance, and then the pulp and sugar were mixed using a wooden spoon, and the pectin was added during the cooking process.

After mixing, the mixture was put on low heat to cook, and during the boiling process, the pectin was added. During cooking, homogenization was constantly carried out until a homogeneous paste was obtained, characteristics that dictated the addition of citric acid (natural bioactive). The optimum gelling point of the jam was determined using the refractive index with the aid of an ATAGO refractometer. To do this, a portion of the jam cooled to room temperature (±25^{o}C) was scooped up using a spoon, and a portion of the sample was placed in the prism for reading in degrees ºBrix. The jam reached its optimum gelling point when the soluble solid content was around 64 ºBrix.

2.3.2. Packaging

After the jam had reached its optimum point, it was filled while still hot into transparent glass containers (750g) previously sterilized and labeled. After filling, the jars were inverted and stored at room temperature in a cool and dry place.

2.4. Physicochemical analysis

Quality parameters in terms of hydrogen potential (pH), moisture content (%), soluble solids content (°Brix), and titratable acidity (%) were assessed following the procedures described by [15].

2.4.1. Hydrogen potential (pH)

10g of jam was weighed and diluted in 100mL of distilled water and stirred constantly to ensure that the sample was homogeneous, then the Hanna potentiometer, model® HI2214, was immersed to read the pH.

2.4.2. Moisture

5g of sample was weighed into a Petri dish on a pre-weighed ADAM Nimbus® balance and placed in an Eco Therm digital oven at 105°C for 2 hours. After desiccation, the plates were cooled to room temperature (±25^{o} C) for 30 minutes and then weighed. The results obtained were expressed using equation 1.

$$\% \text{ moisture} = \frac{m - m1}{m} * 100 \quad (1)$$

Where:

m- mass of sample taken for analysis in grams;

m_{1}- sample mass after drying.

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2.4.3. Total soluble solids (TSS) content

An aliquot of jam was placed in the prism of the Refractive Index refractometer. Reading was directly done on the ºBrix scale, ranging from 0 to 50 ºBrix.

2.4.4. Acidity titratable

10g of the sample were taken and diluted in 100 mL of distilled water in a 250mL erlenmeyer flask, 3 drops of phenolphthalein solution were added and titrated with 0.1 N sodium hydroxide solution (NaOH) under constant stirring until a persistent pink color was observed for 30 seconds. The results obtained were determined using equation 2.

$$\frac{V\ x\ f\ x\ M\ x\ 0.064\ x\ 100}{P} = \%acidity \quad (2)$$

Where:
V - number of mL of sodium hydroxide solution used in the titration;

f - correction factor for the sodium hydroxide solution;

P - sample mass in grams;

M - molarity of the sodium hydroxide solution.

2.5. Sensory Analysis

The sensory evaluation was carried out according to the IAL methodology [13]. Fifty untrained tasters were randomly selected, with 42% of the tasters being female and 58% male, aged between 20 and 31 years. The acceptability test was applied to the attributes of color, aroma, appearance, texture and taste, using a nine (9) point hedonic scale from 1 "I dislike it very much" to 9 "I like it very much". The samples were coded with three (3) digits. The acceptability index (AI) was calculated using equation 3.

$$(IA)\% = \frac{A*100}{B} \quad (3)$$

Where:
A - Average grade obtained for the product;
B - Maximum score given to the product.

2.6. Statistical analysis

The analysis of variance (ANOVA) was carried out using the general linear model (GLM), using the statistical package RStudio 4.2.1. In the event of significant effects, the difference between the experimental units was evaluated using the Tukey test at a 5% level.

3. RESULTS AND DISCUSSION

3.1. Physicochemical analysis

Table 2 shows the compositions for the fruit pulp *in natura* and the jam formulated with *fresh* tomatoes.

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147 **Table 2.** Physicochemical characteristics of the jam formulations and pulp *in natura*.

Composition	Formulations				
	Pulp	**A**	**B**	**C**	**D**
pH	4.79 ± 0.01[a]	5.09±0.21[a]	4.94 ± 0.21[a]	4.84 ± 0.12[a]	4.91 ± 0.34[a]
TSS (°Brix)	3.60±0.27[d]	66.42±0.15[a]	57.72±0.42[ab]	50.08±0.00[b]	39.79±2.35[c]
ATT (citric acid %)	0.72 ±0.11[a]	0.52 ± 0.18[a]	0.78 ± 0.20[a]	0.91 ± 0.32[a]	1.07 ± 0.38[a]
Moisture (%)	96.13±0.72[a]	10.75±0.62[b]	16.15±0.53[b]	28.00±0.1[b]	41.86±0.40[a]

148 Means ± standard deviation followed by different letters on the same line differ at the 5%
149 significance level of the Tukey test. (A), 50% pulp, 50% sugar; (B), 59% pulp, 40% sugar,
150 0.5% citric acid and 0.5% pectin; (C), 69% pulp, 30% sugar, 0.5% citric acid and 0.5%
151 pectin; (D), 79% pulp, 20% sugar, 0.5% citric acid and 0.5% pectin**.** ATT= Total Titratable
152 Acidity and TSS= Total Soluble Solids.

153 **Source:** Authors.

154 ### 3.1.1. *pH*

155 The results in Table 2 show that the pH of the pulp was 4.79 ± 0.01 and that of the
156 formulated jam varied from 4.84 ± 0.12 to 5.09 ± 0.21 but no significant differences ($p < 0.05$)
157 were observed.
158 In the research carried out by [32], the pH values of two tomato jam formulations were
159 between 4.89±0.02 and 5.55±0.05 which are similar to the results obtained in the present
160 study. In the study conducted by [24] for the development of orange jam enriched with oats,
161 pH of 4.22 ± and 4.23 ± were obtained for the 3% and 1.5% oat jellies and these values are
162 close to those obtained in the present study.
163 Lower results were reported by [17] when studying the evaluation of antioxidant capacity,
164 physicochemical and sensory characteristics of different tomato (*solanum lycopersicum mill.*)
165 jam formulations with added gardenias, obtained values of pH ranging from 3.44 to 3. 52, by
166 [22] in his study about formulation and physicochemical characterization of conventional and
167 dietary jam fromacaru and umbu, obtained pH around 3.03 to 3.07, and by [Souza et al.
168 2018)] on the preparation and quality assessment of umbu and mangaba jam, which
169 presented pH values of 2.63.

170 ### 3.1.2*. Soluble solids content*

171 The average content of soluble solids showed that formulation A had the highest total
172 soluble solids content (66.42 ºBrix) followed by formulation B (57.72 ºBrix). A decline was
173 observed in formulations C (50.08 ºBrix) and D (39.79 ºBrix). Statistically, samples A and B
174 did not differ significantly ($p > 0.05$) from each other. There were notable differences between
175 pulp and formulations C and D. The differences observed in the formulations produced
176 correlate with the different concentrations of sugar used (50, 40, 30, and 20%).
177
178 Formulation A had the highest soluble solids content at 66.42±0.15 °Brix, which is within the
179 standard required by law for jams (65 a 75 °Brix) [11].

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Similar values to those obtained in this study were described by [25] when developing strawberry and hibiscus jam with the addition of addition of chia seeds (*salvia hispânica*), obtained a total soluble soluble solids content of around 66 ºBrix.
Divergent results from those obtained in this research were reported by [10] in their study about preparation and sensorial acceptance of tomato in syrup, who obtained 4.50 °Brix. [7] when developing papaya jam under different concentrations, the average TSS levels ranged from 49.46 to 56.7 °Brix, values close to those found in this study. Higher soluble solids values were obtained by [34] in mixed pineapple-papaya (70.5 °Brix) and papaya-orange (72.5 °Brix) jams.

3.1.3. *Titratable acidity*

The Titrable acidity of the formulations evaluated ranged from 0.52 to 1.07%. A high acidity index (1.07%) was observed in formulation D, followed by formulation C with (0.91% acid). Decreasing trends were seen in formulation B (0.78%) and A with (0.52%). Statistically, the TTA of all the formulations (A, B, C and D) did not show significant differences ($p > 0.05$).
According to [13], the recommended acidity levels for jams should not exceed 0.8% and the minimum indicated is 0.3%. [34], in their study on mixed pineapple-papaya and orange-papaya jams obtained acidity content values of 1.04%, which were similar to those found in the present study. Values similar to those obtained in this research were described by [25] when they developed strawberry and hibiscus jam with the addition of chia seeds (*salvia hispânica*), with a total soluble solids content of around 0.91% and acidity.
[39], in their study on the physicochemical and sensory characterization of papaya jam with araçá-boi, attributed the variations found to differences in the acid content of the pulps and their respective proportions used in the formulations. [30], when evaluating jam made with acerola pulp and juice, found values close to those found in this study.

3.1.4. *Moisture*

The pulp has a moisture content of 96.13±0.72% due to its high amount of water. The moisture content of the tomato jam ranged from 10.75±0.62% (Formulation A) to 41.86±0.40% (Formulation D). Statistically, the formulations that received citric acid (B, C and D) shown significant differences ($p < 0.05$) each other. On the other hand, formulation (A) without citric acid showed no significant differences ($p > 0.05$) compared to formulations (B and C).
Statistically, there was no significant difference between the treatments (A, B, C and D) respectively. [9], when studying the processing of jams and juices using grapes outside the marketing standard (Brazil), obtained a moisture content of around 13.58%. This result is close to that found in the present study. [39] when studying papaya jam with araçá-boi, obtained moisture ranging from 25.99 to 29.93%, similarly, [16], found 25.99% in his study about production of jam bolan: Processing, physical-chemical parameters and sensory evaluation. [1], obtained an average of 41.14%, a result which agrees with that obtained in this study.

3.2. Sensory analysis

The results of the sensorial analysis, based on a hedonic 9-point scale, are shown in figure 2.

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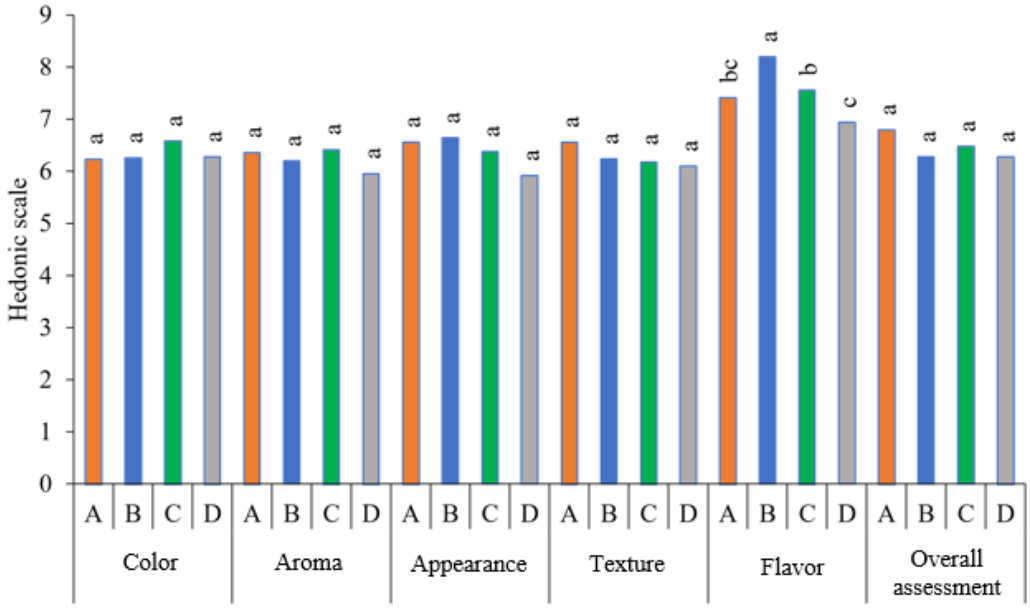

Figure 2. Level of acceptance of the jam formulations on a hedonic scale of 1 to 9 points.

Means ± standard deviation followed by the same letter in the same column do not differ significantly. **(**A), (50%) pulp (50%) sugar; (B), (59%) pulp, (40%) sugar, (0.5%) citric acid and (0.5%) pectin; (C), (69%) pulp, (30%) sugar, (0.5%) citric acid and (0.5%) pectin; (D), (79%) pulp, (20%) sugar, (0.5%) citric acid and (0.5%) pectin. ATT = total titratable acidity and TSS = total soluble solids.
Source: Authors.

3.2.1. *Color*

The results obtained for the color of the jam formulations showed that formulation C tended to score highly for this attribute with 6.58, followed by sample D with an average of around 6.28, with non-significant variations between the two, followed by a downward trend in the scores of formulations B and C at around 6.26 and 6.24. Statistically, the samples (A, B, C and D) showed no significant differences ($p>0.05$) between them.
Similar results to those of the present study were reported by [2] who obtained 7.88 for the color attribute during the sensory evaluation of mango pulp and pulp jam in different concentrations. [12] obtained 7.40 score for the color of the mixed pineapple and pepper jam, and they stated that the visual impression caused by color when observing a food overrides all others, making color one of the most important attributes in sales and constituting the first criterion for acceptance or rejection of a given product. Higher values than those found in this research were reported by [25] around (8.3) when developing strawberry and hibiscus jam with *salvia hispânica* seeds.

3.2.2. *Aroma*

With regard to the aroma attribute, the results obtained indicated that the averages were anchored in the terms "neither liked nor disliked and "slightly liked", in which highest score was observed for formulation A (6.36) followed by formulations C (6.42) and B (6.2). Formulation D scored the lowest value (5.96). Statistical analysis of the scores revealed no difference ($p>0.05$) in the acceptance of the aroma of the jam formulated.

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[28] obtained mean scores of 6.55 to 6.53 for jam made with acerola pulp and juice, similar results to those found in the present study. In a study of chemical characterization and acceptance of pequi jam, [3] obtained a score of 5.30 for the aroma attribute. Higher results than those found in this research were reported by [25] at around (7.8 to 8.1) when developing strawberry and hibiscus jam with the addition of chia seeds.

3.2.3. *Appearance*

The results for the appearance attribute showed that sample B had the highest score (6.64), followed by samples A (6.56) and C (6.38), and the lowest score was observed for sample D (5.92). However, no statistical difference was observed suggesting that the appearance of all the jam formulated was equally accepted.

Result allied (5.92) to those obtained in this study were reported by [29] who in their study about preparation and sensory analysis of paprika jam, obtained an average acceptance value of 5.74 for the appearance attribute, by [6] in their study on the preparation and physicochemical and sensory characterization of jam formulated from the yellow passion fruit albedo, found a score of 6.82. High values were found by [26] who reported 7.77 to 7.27 respectively, when studying passion fruit jam.

3.3.4. *Texture*

The results obtained for the texture of the jam formulations showed that formulation A tended to score highly for this attribute with 6.56, followed by sample B with an average of around 6.24, with non-significant variations between the two, followed by a downward trend in the scores of formulations C and D at around 6.18 and 6.1 respectively. Statistically, the samples (A, B, C and D) showed no significant differences ($p>0.05$) between them.

In the evaluation carried out by [33] in his study on jam made with a mix of cagaita and mangaba pulp, he reported that he obtained the highest averages between 8.2 and 7.68, respectively, while for formulations A and D, scores of 6.56±2.30 to 6.1±2.26 were found, which is close to what was found in the present study. This indicates that the product was well accepted. Formulations A, B and C had more consistent and firmer gel formation. The possible factors that may have contributed to this effect may be related to the sugar, pectin and acid used during the production process of the jam, with formulation D differing from the others. Similar results were found by [31] who obtained 7.25 to 7.67 respectively, in their study on the preparation and physico-chemical and sensory characterization of jam formulated from the yellow passion fruit albedo. [26] in their study of passion fruit jam obtained average values of 7.67 to 7.77 respectively, a similar result to that found in the present study.

3.2.5. *Flavor*

As for the taste of the formulations analyzed, formulation B scored the highest at 8.2, with considerable variation from the others. This was followed by a permanently constant range of scores for formulations A and C at around 7.42 and 7.56 respectively, and formulation D with the lowest score in the 6.94 range. These scores were at the extremes of "I liked it very much & I liked it slightly". Statistically, formulation B differed significantly ($p<0.05$) from the other formulations. On the other hand, formulations A and D differed from treatments B and C.

[33] reported that he obtained the highest averages between 8.01 and 8.23, respectively, values close to those found in the present study, for formulation B had the highest average with 8.2±0.90, compared to the other formulations. It was in the "I liked it very much" range. On the other hand, formulations A and C did not differ significantly from each other at the 5% level, with averages in the 7.42±0.91 to 7.56±0.9 range respectively, and were on the "I liked it moderately" scale, similar to [36]. Formulation D was the one with the lowest average, with a value of 6.94±1.43. It differed significantly from the others and its lower value indicates that

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the combination of sugar and pulp had an impact on this aspect, placing it in the "slightly liked" range of the hedonic scale. Similar to [30].

3.2.6. *Overall assessment*

The results of the overall evaluation showed that the highest score was given to formulation A (6.8), where the score given was on the "I liked it slightly" rating scale, followed by formulation C with 6.48 and, consequently, there were permanently constant averages for samples B and D where they obtained a score of 6.28, respectively. Statistically, there were no significant differences ($p>0.05$) between the samples (A, B and C). A significant difference was found between sample (D) and samples (A, B and C).
Similarly, [27] in their study on the development of tamarillo jam containing whole pulp for 40 to 50 °Brix, obtained averages of 6.7 to 6.1, agreeing with the results found in this study. [8] in their study, the overall impression showed the best averages, 7.5 to 7.8, for tomato jam made with different types of pulp. The overall evaluation of all the jam formulations indicated acceptability in terms of the sensory characteristics evaluated, and for the other attributes, there were no significant differences between the treatments. Indicating that the tasters liked it slightly on the hedonic scale, higher averages were found by [2] who obtained a value of 7.70 to 7.35, respectively, allied with [28] in their study on the sensory evaluation of 'Japones' quince jam at different concentrations of total soluble solids, reported that they obtained averages of 6.52 to 7.30 in this attribute.

3.3. Purchase intention test

The results of the purchase intention test for tomato pulp jam are shown in Figure 3.

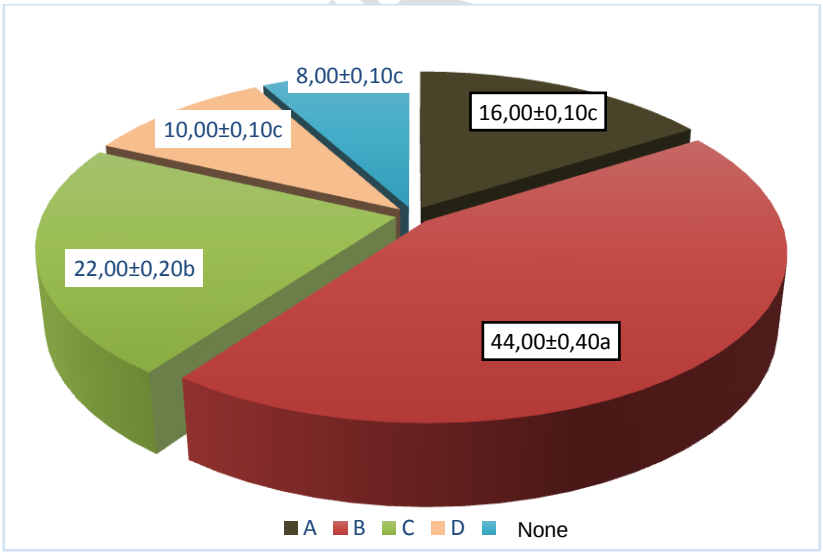

Figure 3. Purchase intention test for tomato jam.

Averages followed by different letters in the same sample differ at the 5% significance level of the Tukey test. **(**A), (50%) pulp (50%) sugar; (B), (59%) pulp, (40%) sugar, (0.5%) citric acid and (0.5%) pectin; (C), (69%) pulp, (30%) sugar, (0.5%) citric acid and (0.5%) pectin; (D), (79%) pulp, (20%) sugar, (0.5%) citric acid and (0.5%) pectin.
Source: Authors.

The purchase intention test showed that formulation B had the highest purchase intention (44%) compared to the other formulations. This is because the addition of citrus bioactive

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includes a firm texture, a balanced and pleasant taste, as well as the eating habits of the tasters.

[27] found that the purchase intention for 40 °Brix obtained averages of 2.6 to 3.4, with lower acceptance and lower purchase intention, for the high concentration jam were the most accepted and higher purchase intention parts of the tasters. According to [1] in their study on obtaining and characterizing jam from melon rinds with orange juice, where it was reported that in the sensory analysis of the jam it was accepted by the majority of the tasters, with scores higher than 4.27, referring to the purchase intention is related to the attribute of flavor and color of the jam. [12] obtained a better purchase intention result for mixed pineapple and pepper jam with a value of 80 to 74.4%, respectively. According to [31], who obtained averages of 3.37 to 3.75 in the purchase intention test for yellow passion fruit albedo jam, they were classified as "not positive and probably would buy", a similar result was found in this study.

3.4. Jam acceptability index

The results of acceptability index of jam are shown in Figure 4.

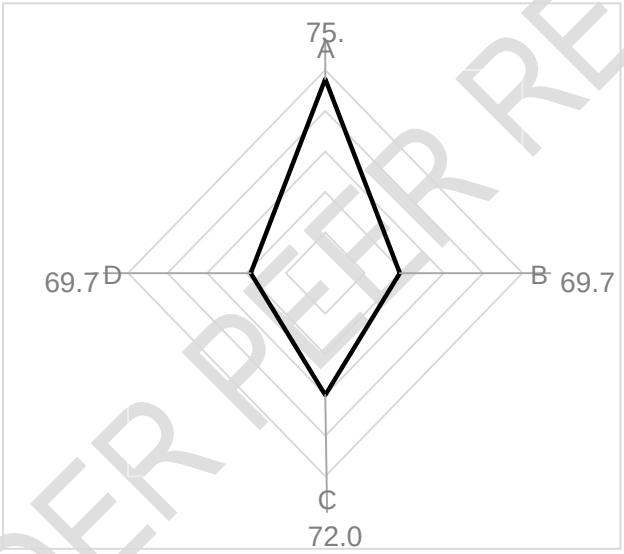

Figure 4. Acceptability index (%) of tomato jam in percentages.
(A), (50%) pulp (50%) sugar; (B), (59%) pulp, (40%) sugar, (0.5%) citric acid and (0.5%) pectin; (C), (69%) pulp, (30%) sugar, (0.5%) citric acid and (0.5%) pectin; (D), (79%) pulp, (20%) sugar, (0.5%) citric acid and (0.5%) pectin.
Source: Authors.

The acceptability index for formulations B and D was low at 69.78% and 69.78%, respectively. With the averages obtained, the jam has acceptable sensory properties, but for the formulations with the highest indices, A (75.56%) and C (72%) had acceptable indices, while B had a higher percentage in the purchase test, and had a low index that was not acceptable.

According to [23], for a given product to be considered accepted in terms of sensory properties, it must achieve an acceptance rate of 70% or more. In this way, we can see that formulations A and C produced in this study had values higher than those recommended. According to [33], the attributes most observed in the acceptance by tasters are appearance,

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flavor, aroma and texture, affecting the choice of product. When preparing the cagaita and mangaba jam mix, the percentage was higher than 70%, with 90.89%, showing that it had greater acceptance in all attributes by tasters. [13] obtained an acceptability index of 83.33% when he developed mixed passion fruit and acerola jam. It can be seen that the acceptability indices are almost similar, indicating that the product was well accepted by consumers.

4. Conclusion

The physicochemical parameters of the tomato-based jam showed similarities in terms of pH, titratable acidity and moisture content. Differences were seen in the soluble solids content. Sensorially, formulations A and C were the best, achieving the highest sensory acceptance ratings. The results obtained demonstrate the viability of producing tomato-based jams, showing that tomatoes can be used as a raw material for producing fruit jams.

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COMPETING INTERESTS

This study was carried out with the consent, contribution and approval of its authors. There are no conflicts of interest.

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