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Effect of Pasteurization and Storage Temperatures on the Physicochemical Properties and Microbiological Quality of Cashew Apple Juice

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Abstract The effect of pasteurization and storage temperatures on the physicochemical and microbiological quality of cashew apple juice was investigated. Juice was extracted from fresh cashew apples (*Anacardium occidentale L*) and packaged in 50 ml plastic bottles. The bottled juices were divided into three portions: P6CJ (pasteurized at 63°C for 30 s), P7CJ (pasteurized at 72°C for 15 s) and UPCJ (unpasteurized) which served as control. Some were stored at room temperature (25±2°C) in a cupboard and others at refrigeration temperature (4°C) for 21 days. Samples were aseptically withdrawn on day 0, 1, 7, 14 and 21 for analysis. The decrease in pH, TTA (%malic acid), viscosity (Pa.S) and sugar (%Brix) content of unpasteurized sample at both storage temperatures was significantly ($P \leq 0.05$) greater than the pasteurized. There was significant ($P \leq 0.05$) increase in microbial growth ($\log_{10}$CFU/mL) with time in the unpasteurized samples with fungi ($\geq$5.00), and total aerobes ($\geq$6.4 9) and coliform ($\geq$5.60) detected first on day zero at 25±2°C and day 1 at 4°C. Detected levels in pasteurized samples was on day 7 and 14 at 25±2°C and 4°C respectively. At 4°C, P7CJ had no aerobic count while Coliform (5.48±0.16) was detected on day 21. The study revealed that refrigeration storage can extend the keeping quality of pasteurized cashew juice for 14 days with pasteurization at 72°C for 15 s preferred to 63°C for 30 s.

Keywords: *Cashew apple juice, pasteurization, storage temperature, physicochemical and microbiological properties*

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1. Introduction

Fruit juices are important source of nutrients and contain several important therapeutic properties that may reduce the risk of various diseases. They contain large amounts of antioxidants, vitamin C and E, and possess pleasant taste and aroma [1]. Juices produced from tropical fruits have increasingly gained global importance due to their health effect. There are different types of tropical fruits (e.g. orange guava, grape, banana, pineapple and watermelon) readily available for the production of fruit juices. The fruit may be produced from single fruit or combination of fruits and sold by street vendors. There are other underutilized tropical fruits such as cashew apple which have not been fully used for fruit juice production due to its high level of spoilage.

The cashew tree (*Anacardium occidentale L.*) is cultivated in 32 countries around the world with Brazil, India, Vietnam, and Nigeria as the main cultivation centers [2]. The tree bears two kinds of fruits, one the cashew nut (the true fruit) and the other, the cashew apple (pseudo fruit). Cashew nuts are commercially exploited in India and other parts of the world but cashew apples are left to rot and waste on the soil. Cashew apple is fibrous, weighs about 75-80g and is 6-10cm in length [3,4]. It is a non-climacteric fruit and comes in three colours; yellow, orange and red with a pale-yellow pulp [5,6]. For every ton of cashew nut, about 10-15 tons of cashew apples is produced [7].

Cashew apple is a rich source of carbohydrates, minerals, amino acids, caroteniods, phenolics (aurecetin, anacardic acid, and tannin), organic acids and anti-oxidants [2,8,9]. Cashew apple also contains vitamins such as thiamine, riboflavin, niacin hence it is considered as first-class source of energy [10]. Cashew apples are taken as a cure for stomach disorders and are used to treat vomiting, children's diarrhea, worm and syphilis. Cashew apple can be used for the production of dextransucrose, ethanol, biosurfactant, lactic acid, mannitol and many other value-added products [6,11,12,13,14].

A number of processes have been developed for converting the cashew apple into various products such as juice, jam, chutneys, cashew beverages and spirit [15,16]. Cashew apple juice is rich in carbonhaydrate, fibre and excellent source of calcium, phosphorus, iron, carotene as well as B complex vitamins, vitamin C, niacin, thiamin and phenolic compounds [17]. The juice contains five times more vitamin C than an orange, mango, grape, and pineapple. The ability of cashew apples to supply and fortify the nutritional requirement for vitamin C, particularly in Africa was reported by Akinwale, [15].

There is the need for farmers to maximize cashew apple in the production of juice and reduce wastage and also help the general public to harness the huge nutrients embedded in cashew apple where the juice can be extracted and stored for a longer period. Though cashew apple possesses nutritional and therapeutic properties, and has some industrial applications, its post-harvest shelf life is very short resulting in great losses. The juice extracted from cashew apples has pleasant flavor and if not consumed fresh, different microorganisms begin to grow and cause spoilage. There are many factors responsible for spoilage of cashew apple juice which includes physical, chemical, enzymatic and microbiological changes. This study was therefore aimed at the effect of pasteurization and storage temperatures on the physicochemical and microbiological properties of cashew apple juice.

2. Materials and Methods

2.1. Cashew Apples

Fresh cashew apples (*Anacardium occidentale L*) were purchased from Mile III market in Port Harcourt, Rivers State Nigeria and transported to the Department of Food Science and Technology, Rivers State University.

2.2. Cashew Apple Juice Extraction and Juice Yield

The wholesome cashew apples were selected, the nuts were detached with hands and the fruit washed in running water. The washed apples were mashed with an electric juice extractor and the juice obtained by pressing the pulp in a double folded muslin cloth.

2.3. Pasteurization and Storage of Cashew Apple Juice

The extracted juice was bottled in a 50 ml plastic bottles and was divided into three portions. A portion was pasteurized at 63°C for 30 s (P6CJ) and another portion was pasteurized at 72°C for 15 s (P7CJ). The third portion were not pasteurized (UPCJ) and served as control. Pasteurization was in a water bath with fitted thermometer for ascertaining the temperatures. After pasteurization, the juice was allowed to cool down to a room temperature. A portion of the differently treated samples was stored at room temperature (25±2°C) in a cupboard and the other portion at refrigeration temperature (4°C) for 21 days.

2.4 Determination of Physicochemical Properties (pH, Viscosity and Sugar Content) of Cashew Apple Juice

The pH, viscosity and sugar content of the samples were determined using a pH meter, a viscometer (NDJ-85, China) and a hand-held portable sugar refractometer (30GS, Hackettstown) according to the standard AOAC [18] methods.

2.5. Microbiological Analysis

One milliliter (1ml) of the juice was aseptically withdrawn from the storage bottle and pipetted into 9 ml of sterile peptone water in a 20 ml sterile tube. This was vortexed for 2-3 s and five-fold (10^{-5}) serial dilution was carried out using the same diluent according to the procedure described by APHA, [19]**.** The inoculum which is 100 µL of the required dilution was plated using the spread plate method on the appropriate media for the microbial enumeration. Bacteria and total Coliform were respectively, enumerated on Nutrient and Macconkey agar incubated at 37°C for 24 h. Yeast and moulds was enumerated on potato dextrose agar supplemented with 0.1ml of chloramphenicol to restrict bacteria growth and the inoculated media were incubated at 25°C for 72 h.

3. Results

3.1. Physicochemical Properties of Unpasteurized and Pasteurized Cashew Apple Juices Stored at Room (25±2°C) and Refrigeration (4°C) Temperatures for 21 Days

3.1.1. pH

The pH of the samples are shown in Table 1. Pasteurization had no significant difference (Ᵽ0.05) on the initial pH (4.48) of the cashew apple juice. The pH of UPCJ decreased significantly ($P \leq 0.05$) to 4.00 and 4.13 at 25±2°C and 4°C respectively on day 1 and had final pH of 3.09 and 3.51 on day 21. At 25±2°C, the decrease in pH of the pasteurized samples ranged from 4.46 – 3.52 and 4.44 – 3.66 for P6CJ and P7CJ respectively. At 4°C, the pH varied from 4.43 - 3.50 and 4.42 - 3.69 for P6CJ and P7CJ respectively. The rate of decrease was significantly (Ᵽ0.05) greater with the unpasteurized juices (UPCJ) and at room temperature than at refrigeration temperature.

3.1.2. Titratable Acidity (TTA)

The TTA of the samples decreased significantly ($P \leq 0.05$) with storage time as presented in Table 2. At 25±2°C, the decrease peaked on day 14 and increase on day 21. The decrease from day zero to day 14 were 0.57 - 0.29, 0.55 - 0.22 and 0.54 - 0.23 respectively for UPCJ, P6CJ and P7CJ, while on day 21 TTA increase to 0.32, 0.31 and 0.30 respectively. At 4°C, the TTA followed a similar trend for the pasteurized samples but the unpasteurized showed a continuous decrease. The values for UPCJ varied from 0.57 – 0.28 on day 21. P6CJ and P7CJ had values of 0.55 - 24 and 0.55 – 0.23 on day 14 with an increase to 0.33 and 0.31 respectively on day 21.

Table 1. pH of unpasteurized and pasteurized cashew apple juices stored at 25±2°C and 4°C for 21 days.

Sample	Storage Temperatures	Initial	Time (Days)			
			1	7	14	21
UPCJ	25±2°C	4.48±0.01	4.00±0.01ᵃ	3.65 ±0.03ᵃ	3.48 ±0.02ᵃ	3.09 ±0.05ᵃ
	4°C	4.48±0.03	4.13±0.05ᵇ	3.81±0.01ᵇ	3.61±0.01ᵇ	3.51±0.010ᵇ
P6CJ	25±2°C	4.48±0.01	4.46 ± 0.01ᵈ	3.62 ± 0.21ᵃ	3.66 ± 0.04ᶜ	3.52 ± 0.02ᵇ
	4°C	4.48±0.00	4.43±0.02ᶜ	3.99±0.11ᶜ	3.61±0.00ᵇ	3.50±0.05ᵇ
P7CJ	25±2°C	4.48±0.01	4.44 ±0.00ᶜᵈ	3.96 ±0.15ᵇ	3.76 ±0.01ᵈ	3.66 ±0.03ᶜ
	4°C	4.48±0.01	4.42±0.02ᶜ	4.00±0.02ᶜ	3.84±0.01ᵉ	3.69±0.02ᵈ

Means with the same superscript in the same column are not significantly (P≤0.05) different. N = 3 ± SD.
UPCJ – Unpasteurized cashew apple juice
P6CJ - Cashew apple juice pasteurized at 63°C for 30 s
P7CJ - Cashew apple juice pasteurized at 72°C for 15 s

Table 2. Titratable acidity (% Malic acid) of unpasteurized and pasteurized cashew apple juices stored at 25±2°C and 4°C for 21 days.

Sample	Storage Temperatures	Initial	Time (Days)			
			1	7	14	21
UPCJ	25±2°C	0.57±0.01	0.57±0.08ᵉ	0.40±0.02ᶜ	0.29±0.00ᵇ	0.32±0.01ᵃᵇ
	4°C	0.57±0.01	0.50±0.⁰¹ᶜᵈ	0.34±0.03ᵇ	0.31±0.01ᵇ	0.28±0.01ᵃ
P6CJ	25±2°C	0.55±0.01	0.48±0.03ᶜ	0.31±0.02ᵇ	0.22±0.01ᵃ	0.31±0.01ᵃᵇ
	4°C	0.55±0.01	0.38±0.01ᵇ	0.31±0.00ᵇ	0.24±0.01ᵃ	0.33±0.01ᵇ
P7CJ	25±2°C	0.55±0.01	0.36±0.01ᵇ	0.30±0.01ᵇ	0.23±0.01ᵃ	0.30±0.01ᵃ
	4°C	0.55±0.01	0.30±0.01ᵃ	0.26±0.02ᵃ	0.23±0.00ᵃ	0.31±0.01ᵃᵇ

Means with the same superscript in the same column are not significantly (P≤0.05) different. N = 3 ± SD.
UPCJ – Unpasteurized cashew apple juice
P6CJ - Cashew apple juice pasteurized at 63°C for 30 s
P7CJ - Cashew apple juice pasteurized at 72°C for 15 s

Table 3. Sugar content of unpasteurized and pasteurized cashew apple juices stored at 25±2°C and 4°C for 21 days.

Sample	Storage Temperatures	Initial	Time (Days)			
			1	7	14	21
UPCJ	25±2°C	10.50±0.02	9.00±0.07ᵃ	3.50±0.11ᵃ	3.00±0.21ᵃ	3.00±0.00ᵃ
	4°C	10.50±0.02	10.50±0.10ᵇ	6.00±0.10ᵇ	3.50±0.12ᵇ	3.00±0.02ᵃ
P6CJ	25±2°C	10.50±0.02	10.50±0.06ᵇ	8.00±0.05ᶜ	6.00±0.07ᶜ	3.50±0.05ᵇ
	4°C	10.50±0.02	10.50±0.02ᵇ	10.00±0.00ᵈ	10.00±0.02ᵉ	9.90±0.02ᵈ
P7CJ	25±2°C	10.50±0.02	10.50±0.03ᵇ	10.00±0.02ᵈ	9.50±0.08ᵈ	9.00±0.03ᶜ
	4°C	10.50±0.02	10.50±0.01ᵇ	10.20±0.00ᵈ	10.10±0.02ᵉ	10.00±0.01ᵈ

Means with the same superscript in the same column are not significantly (P≤0.05) different. N = 3 ± SD.
UPCJ – Unpasteurized cashew apple juice
P6CJ - Cashew apple juice pasteurized at 63°C for 30 s
P7CJ - Cashew apple juice pasteurized at 72°C for 15 s

Table 4. Viscosity of unpasteurized and pasteurized cashew apple juices stored at 25±2°C and 4°C for 21 days.

Sample	Storage Temperatures	Initial	Time (Days)			
			1	7	14	21
UPCJ	25±2°C	0.47±07ᵃ	0.38±0.02ᵃ	0.34±0.01ᵃ	0.25±0.01ᵃ	0.17±0.01ᵃ
	4°C	0.47±07ᵃ	0.39±0.11ᵃᵇ	0.39±0.03ᶜ	0.27±0.04ᵃᵇ	0.16±0.02ᵃ
P6CJ	25±2°C	0.46±10ᵃ	0.40±0.01ᵇ	0.36±0.01ᵇ	0.25±0.01ᵃ	0.16±0.01ᵃ
	4°C	0.46±10ᵃ	0.42±0.00ᶜ	0.40±0.00ᶜ	0.26±0.01ᵃ	0.19±0.01ᵇ
P7CJ	25±2°C	0.47±01ᵃ	0.40±0.01ᵇ	0.39±0.02ᶜ	0.25±0.01ᵃ	0.25±0.02ᶜ
	4°C	0.47±01ᵃ	0.44±0.02ᵈ	0.40±0.00ᶜ	0.29±0.05ᵇ	0.26±0.01ᶜ

Means with the same superscript in the same column are not significantly (P≤0.05) different. N = 3 ± SD.
UPCJ – Unpasteurized cashew apple juice
P6CJ - Cashew apple juice pasteurized at 63°C for 30 s
P7CJ - Cashew apple juice pasteurized at 72°C for 15 s

3.1.3. Sugar

Table 3 presents the sugar content of the samples. The initial sugar content was 10.5 %Brix and it did not differ significantly (P≥0.05) between the samples. Significant (P≤0.05) decrease to 9.50 %Brix was observed in UPCJ at 25±2°C on day 1 and was significantly (P≤0.05) reduced to 3.00 % Brix at both temperatures on day 21. At 25±2°C, sugar content of the pasteurized samples ranged from 10.50 – 3.50 and 10.50 – 9.00 % Brix respectively for P6CJ and P7CJ. At 4°C, the sugar content varied respectively, from 10.50 - 9.90 and 10.50 - 10.00 for P6CJ and P7CJ.

3.1.4. Viscosity

There was significant ($P \leq 0.05$) decrease in viscosity of the samples at both storage temperatures (Table 4). At 25±2°C viscosities decreased significantly ($P \leq 0.05$) from 0.38 - 0.17, 0.40 – 0.16 and 0.47 - 0.25 respectively, for UPCJ, P6CJ and P7CJ. At 4°C, the viscosities varied from 0.39 - 0.16, 0.42 – 0.19 and 0.40 - 0.26 respectively, for UPCJ, P6CJ and P7CJ.

3.2 Microbiological Quality of Unpasteurized and Pasteurized Cashew Apple Juices Stored at 25±2°C and 4°C for 21 Days

3.2.1. Total Aerobic Count

The total aerobic count for the cashew apple juices are shown in Figure 1. At 25±2°C, aerobic count for UPCJ varied from 6.49±0.12 - 7.32±0.28 log_{10}CFU/ml while the pasteurized samples had no growth of bacteria on day 1. The pasteurized samples on day 7 to 21, had counts varying 6.62±0.01 - 7.26±0.08 and 6.5±0.16 - 6.70±0.01 respectively P6CJ and P7CJ. There was increase in bacterial count with increase in storage time except for P7CJ that had a significant ($P \leq 0.05$) decrease after on day 21. At 4°C, UPCJ had aerobic count of 6.60±0.00 and 6.79±0.01 log_{10}CFU/mL on day 14 and 21 respectively. P7CJ had no growth of bacteria, while P6CJ had growth of 6.57±0.47 on day 21. The unpasteurized sample had significantly ($P \leq 0.05$) the highest growth of bacteria.

3.2.2. Total Coliform Count

Figure 2, shows the total coliform count of the cashew apple juices. At 25±2°C, coliform growth varied from 5.60±0.43 - 6.68±0.13 log_{10}CFU/ml on day 1 and 21 for UPCJ. The pasteurized samples had no growth of coliform on days 0 and 1. Detected levels on day 7 to 21 ranged from 5.30±0.01 – 6.08±0.01 log_{10}CFU/ml P6CJ and 5.00±0.01 – 5.90±0.00 log_{10}CFU/ml P7CJ. At 4°C, coliform growth varied from 5.00±0.43 - 6.23±0.28 log_{10}CFU/ml on day 0 and day 21 respectively for UPCJ. Detected levels of coliform in P6CJ was 5.60±0.01 and 6.08±0.23 log_{10}CFU/ml on days 7 and 21 respectively. While P7CJ had coliform growth of 5.48±0.55 log_{10}CFU/ml only on day 21.

3.2.3. Total Fungi Count

The total fungi count of the unpasteurized and pasteurized cashew apple juices are shown Figure 3. At 25±2°C, fungi growth varied from 5. 00±0.47 - 6.65±0.63 log_{10}CFU/ml in UPCJ. Fungi was detected in the pasteurized samples on day 1 but ranged from 4.30±0.59 - 5.90±0.01 log_{10}CFU/ml for P6CJ and 4.15 - 5.90 log_{10}CFU/ml for P7CJ. At 4°C, fungi growth in UPCJ varied from 5.00±0.47 - 6.62±0.13 on day 0 to day 21. In the pasteurized samples, fungi were detected on day 7 and day 21, the count was 5.00±0.13 and 5.30 ±0.00 Log_{10}CFU/ml respectively for P6CJ; and 4.13±0.10 and 5.30 ±0.01 Log_{10}CFU/ml P7CJ.

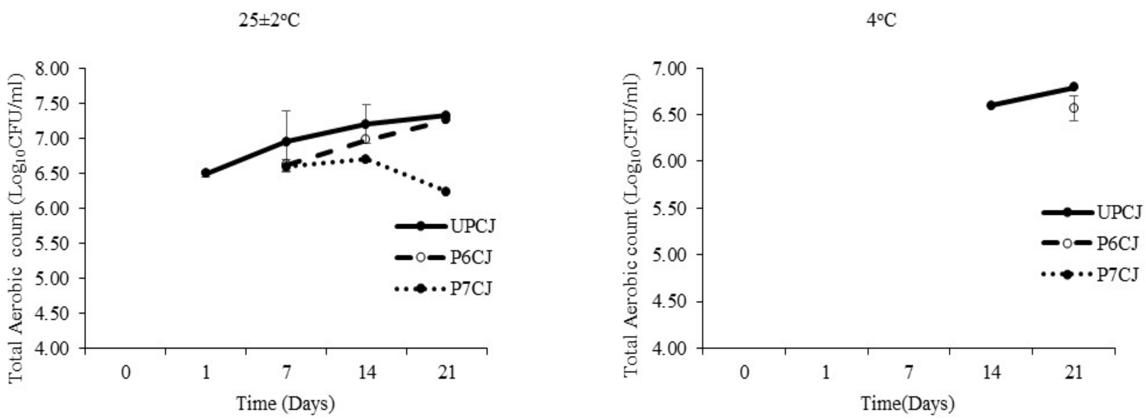

Figure 1. Total aerobic count of unpasteurized and pasteurized cashew apple juices stored at 25±2°C and 4°C for 21 days. (UPCJ – unpasteurized cashew apple juice; P6CJ - cashew apple juice pasteurized at 63°C for 30 s; P7CJ- cashew apple juice pasteurized at 72°C for 15 s)

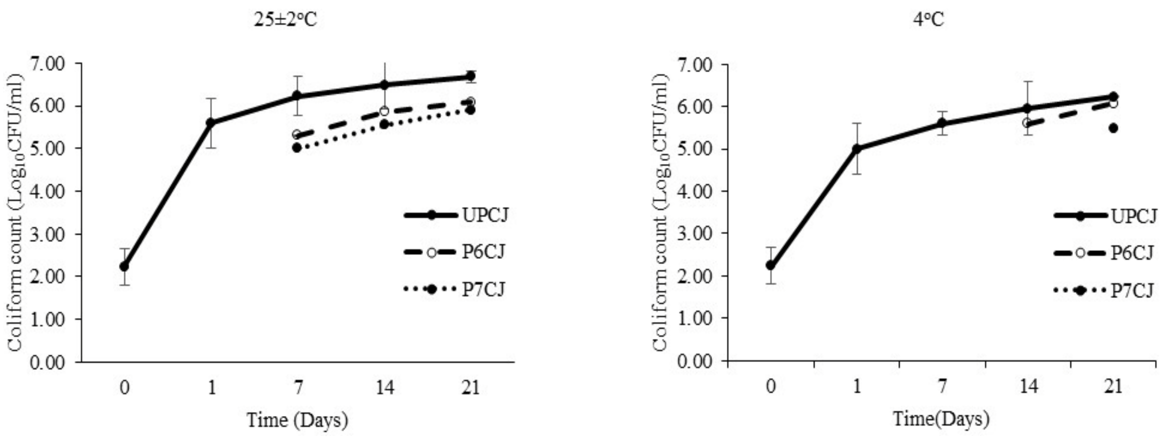

Figure 2. Total coliform count of unpasteurized and pasteurized cashew apple juices stored at 25±2°C and 4°C for 21 days. (UPCJ – unpasteurized cashew apple juice; P6CJ - cashew apple juice pasteurized at 63°C for 30 s; P7CJ- cashew apple juice pasteurized at 72°C for 15 s)

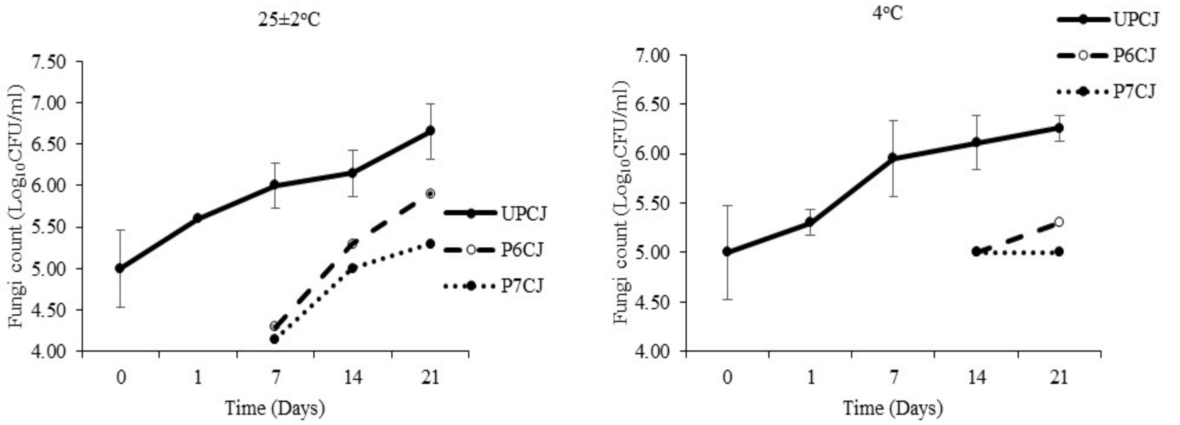

Figure 3. Fungi count of unpasteurized and pasteurized cashew apple juices stored at 25±2°C and 4°C for 21 days. (UPCJ – unpasteurized cashew apple juice; P6CJ - cashew apple juice pasteurized at 63°C for 30 s; P7CJ- cashew apple juice pasteurized at 72°C for 15 s)

4. Discussion

4.1. Physicochemical Properties of Unpasteurized and Pasteurized Cashew Apple Juices Stored at 25±2°C and 4°C for 21 Days

Cashew apple juice is an acid food and acidity may vary depending on the location and the stage of maturity. The pH (4.48) of the freshly extracted cashew juices could be attributed to the acidic content in the cashew apple juice. Most spoilage bacteria will not grow at low pH and this aids in maintaining the good quality of the juice [20]. There was no significant ($P \geq 0.05$) difference in the initial pH of the samples after pasteurization implying that heat processing had no effect on the initial acid content of the juices. The decrease in pH with storage is attributable to activities of fermentative microorganisms that can tolerate the low pH and this was significantly ($P \leq 0.05$) greater in the unpasteurized samples. The change in pH of the cashew apple juices after day 1 in this study is comparable with the report of Lowore and Agyente, [21] for cashew apple juices from four regions of Ghana and Souza and Goncalaves [22] but were lower than the values of 4.86 - 5.54 in five ecological zones of India [23].

Similar to pH, there was significant ($P \leq 0.05$) decrease in titratable acidity (TTA) of the juice samples. The decrease was significantly ($P \leq 0.05$) higher at 4 °C than at 25±2°C. Pasteurization temperatures had no significant ($P \geq 0.05$) effect on the TTA at both storage conditions. pH is the total acidity while TTA measured only malic acid content of the cashew apple juice. The decrease in pH with decrease in TTA is an indication that other organic acids where responsible for the total acidy while malic acid was on the decrease in the samples. This is similar to the report of Adou *et al*., [24].

The sugar content which is a representation of soluble solid in the juice decreased with storage. The values obtained were similar to the report by Adou *et al*., [24]. Sugar been a substrate metabolized by microorganisms to alcohol or organic acids, the decrease is attributable to its utilization by the organisms present in the juice. The rate of decrease was significantly ($P \leq 0.05$) greater in the unpasteurized samples and at 25±2°C, as there was no heat treatment to destroy the microorganism present in the freshly extracted juice and the room temperature provided and optimum growth condition for the microbes especially the fungi. Decrease in sugar content could also be attributed to the precipitation of tannins and colloids [25].

The viscosity of the juices decreased significantly ($P \leq 0.05$) at both storage temperatures and the increase was significantly ($P \leq 0.05$) higher in the unpasteurized samples and the samples at 25±2°C. The decrease implies a reduction in the soluble solids as increase in soluble solid will increase hydrogen bonding with hydroxyl groups [26]. Viscosity is important in the human perception of quality of juices as viscous juices will be termed spoilt. The decrease therefore could be seen as a better physical stability for the juices [27].

4.2. Microbial Analysis of Unpasteurized and Pasteurized Cashew Apple Juices Stored at 25±2°C and 4°C for 21 Days

Juices contain essential nutrients which support the growth of acid tolerant bacteria, yeasts, and moulds [28]. Fresh juices are not heated before consumption, so knowledge of its shelf stability is important for public health. Microbial growth in fruit juices will have adverse effect on fruit juice quality. Aerobic count represents the total number of bacteria that are able to grow at moderate temperature in an aerobic condition. It is an indicator of quality highlighting the potential problems of storage and handling [29]. Coliform count in foods is an indication of poor hygiene practices, inadequate processing, contamination and improper storage temperature. Although coliforms are nonpathogenic, there could be the growth and rapid proliferation of pathogens [30], this can pose health risks. The absence of detectable levels of aerobes and coliform in the freshly extracted juice and the delayed detection of bacteria in the pasteurized samples to day 7 and day 14 for storage at 25±2°C and 4°C respectively, was an indication of the effectiveness of the heat treatment. Heat denatures proteins and inactivates microbial enzymes such that the cell will be unable to carry out metabolic activities. The initial absence of bacteria could also be attributed to good hygiene practices during the production of the juice. pH of the juice may have also played a significant role in the absence of aerobes and coliforms in the fresh samples and delayed growth in the pasteurized samples. Malic acid like other organic acids remain in an undissociated form in acid conditions, this undissociated form permeates the cell membrane of the bacteria into the cytoplasm, where it dissociates and changes the metabolic system from that of growth to expulsion of protons [31]. The implication is that at 25±2°C and 4°C the cashew apple juices will be best before 7 and 14 days respectively and samples pasteurized at 72°C for 15 s may keep for more than 14 days at cold storage.

The presence of fungi in the fresh sample before pasteurization confirms the predominance of fungi in acid fruit juices and a normal microflora in fruit orchards [32]. The total acidity and storage at room temperature gave an ideal condition for the growth of yeast hence the significantly ($P\leq0.05$) higher yeast counts in samples at 25±2°C. The absence of detectable levels of fungi in the pasteurized samples on day 1 and 7 was an indication of the effectiveness of the heat treatment. However, significant growth was observed with increase in storage time. Fungi growth in the cashew juice is an indication of spoilage as yeast and moulds are the main causes of spoilage characterized by formation of CO_2 and alcohol in juices [28]. In addition to spoilage, the presence or growth of fungi in the cashew apple juice may pose health risk as some moulds are known for the production of mycotoxins. The detection of fungi in the pasteurized samples on day 7 and 21 respectively, at 63°C for 30 s 72°C for 15 implies that with heat treatment, the shelf-life of the cashew apple juice can be extended to 7 and 14 days at refrigeration storage depending on the choice of pasteurized temperature.

This study on the physicochemical and microbiological quality of cashew apple juice revealed that pasteurization of cashew apple juice conferred higher storage stability and at refrigeration temperature as samples were without microbial growth for 7 and14 days at 25±2°C and 4°C respectively. More research is needed to expatiate on the specific bacteria and fungi present in the cashew apple juices and the utilization of available natural spices in the extension of shelf life of the juice. Cashew apples are still underutilized mainly due to its perishable nature, processing of cashew apple into juice will offer a means of utilizing the huge harvest in Nigeria.

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