

Nutritional Profile of Cashew Kernel Pastes Produced in Côte d'Ivoire and Analysis of their Oil Quality

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Abstract The objective of this study was to enhance the value of cashew kernel by evaluating the nutritional potential of their pastes and the quality of their oils. The physicochemical characteristics, nutritional properties, and quality indexes of cashew kernel pastes and oils were determined using standard analytical methods. All of the parameters studied showed a significant difference ($p < 0.05$). The results showed that cashew kernel pastes were slightly acidic (6.01 ± 0.02 to 6.33 ± 0.02) with a low moisture content ($1.2 \pm 0.09\%$ to $2.28 \pm 0.13\%$). The samples recorded different mean value macronutrient contents: fat ($36.36 \pm 7.86\%$), carbohydrates ($50.05 \pm 8.03\%$), protein ($8.98 \pm 0.57\%$), crude fiber ($0.59 \pm 0.18\%$), with an average energy value of 563.39 ± 37.57 kcal. The pastes were richest in vitamins C (8.67 ± 1.83 mg/100 g) and E (15.91 ± 2.97 mg/100 g) and the minerals Ca (116.44 mg/kg), K (176.39 mg/kg), and Mg (183.99 mg/kg). The mean values for the quality indexes of the oils obtained were 112.70 ± 1.17 g I/100 g, 1.46 ± 0.005 , and 0.85 ± 0.21 meq O₂/kg for the iodine value, refractive index, and peroxide value, respectively. The pastes are rich in nutrients and constitute a good source of energy with high oil quality. They could be incorporated into certain diets.

Keywords: Cashew kernel, paste, oil, nutritional potential, quality, *Anacardium occidentale*

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1. Introduction

The cashew tree (*Anacardium occidentale* L.), is belonging to the Anacardiaceae family. It is native to Brazil and was introduced to India in the 16th century [1]. Cashew tree is growing at altitudes below 1,000 m in tropical regions in a wide variety of soils, though it prefers light, deep soils [2].

The fruit of cashew tree is composed of a false fruit called the cashew apple and a true fruit, which is the cashew nut. The cashew apple, with its tart and sweet-and-sour flesh, is very juicy and rich in vitamin C. It is used to make fruit juice, vinegar, wine, alcohol, jams, jellies, and compotes [2]. Cashew nuts (kernels) are the main commercial product of this tree, which can produce an average of 200 to 300 fruits per year [3]. They are composed of a shell and a kernel containing 45% fat (35% unsaturated fat), 21% protein, and numerous vitamins and minerals. Cashew nuts are used in the food industry and also in pharmaceuticals and cosmetics [2].

Introduced to Côte d'Ivoire in the 1950 s for reforestation and erosion control, the tree has now become

an important source of money for producers [4], [5]. The cashew tree is now a major export crop for the African continent, which accounts for more than 55% of global cashew nut production [6]. In 2020, according to estimates by the Food and Agriculture Organization of the United Nations (FAO), global production of in shell cashews amounted to 4.18 million metric tons, harvested from 7.10 million hectares, with Côte d'Ivoire, India, Vietnam, the Philippines, and Tanzania being the leading producers [7]. West Africa has been the world's leading cashew-producing region since 2015, with production exceeding 1,350,000 metric tons, and Côte d'Ivoire as the world's leading producer of raw cashews [8].

According to the World Bank [9], between 2018 and 2024, the volume of locally processed nuts rose from 68,515 to more than 345,000 metric tons, representing approximately 30 percent of the national harvest.

The consumption of cashew kernels is becoming increasingly common among the population. Cashew kernels are available in various forms in stores, including dry-roasted or oil-roasted, salted or unsalted [10]. However, cashew paste generally made from roasted cashew kernels is also available in the country's supermarkets. These pastes come from small, local

artisanal processing units. Several studies have highlighted the high nutrient content of cashew nut derivatives [11], [12], [13]. However, the pastes produced from these nuts and sold on supermarket shelves have not been the subject of any studies. Their production is artisanal and unstandardized. It is important to prove their quality in order to attract consumers attention. The aim of this study is to contribute to the value addition of cashew kernels and to encourage consumer interest in cashew kernels pastes. To achieve this, the study will determine the nutritional potential of the pastes as well as the quality of the oils derived from them.

2. Materials and Methods

2.1. Materials

The biological material used for this study consisted of roasted cashew kernel pastes purchased from convenience stores and supermarkets in the city of Abidjan. A total of five brands of cashew kernels pastes, represented by one container, were selected based on their availability in stores and their production dates. Each brand, constituting a sample, was identified by a code to avoid any advertising (PC1: cashew kernel paste 1, PC2: cashew kernel paste 2, PC3: cashew kernel paste 3, PC4: cashew kernel paste 4, PC5: cashew kernel paste 5). The ingredients list mentioned for each brand was 100% cashew kernel.

2.2. Methods

2.2.1. Determination of the Physicochemical Parameters of Cashew Kernel Pastes

Moisture and dry matter content were determined according to the NF ISO method [14]. A dry porcelain crucible of mass M_0 containing a mass M_1 of sample was placed in an oven at $105 \pm 5^\circ\text{C}$ for 24 hours. The crucible was then removed, allowed to cool in a desiccator, and weighed to give mass M_2 .

The moisture content (% H) was obtained using following expression:

$$\%H = ((M_0 + M_1) - M_2) / M_1 \times 100 \quad (1)$$

The dry matter (% DM) was obtained using following equation:

$$\%DM = 100 - \%H \quad (2)$$

The pH was measured using a pH meter [15]. A 10 g mass of cashew kernel paste was homogenized in 100 mL of distilled water. The filtrate was then collected after filtering the mixture through Whatman filter paper. The glass electrode of the pH meter (HANNA), previously calibrated with a pH 7 buffer and then a pH 4 buffer, was immersed in the filtrate while stirring. The pH value was read directly from the pH meter's display.

The titratable acidity (Ta) was determined using the method described by [16]. This acidity was determined by an acid-base titration. The principle involves measuring the titratable acidity with a 0.1 N sodium hydroxide (NaOH) solution in the presence of 2 to 3 drops of 2% phenolphthalein, which serves as a color indicator. The titratable acidity level was obtained in $\text{g} \cdot 100 \text{ mL}^{-1}$

according to the following formula:

$$Ta = (N_{NaOH} \times V_{NaOH} \times 0.9/V) \times 100 \quad (3)$$

V_{NaOH} = volume of sodium hydroxide required for titration in mL

N_{NaOH} = normality of the sodium hydroxide solution in meq g/L

V = volume of the test sample in mL

0.9 = milliequivalent gram of lactic acid

The ash content was determined according to the method described by [15]. The method involves incinerating organic matter in a muffle furnace at $550^\circ\text{C} \pm 2^\circ\text{C}$ for 24 hours until white ash is obtained.

The ash content (%Ac) was determined as follows:

$$\%Ac = ((M_2 - M_0)/(M_1 - M_0)) \times 100 \quad (4)$$

M_0 : empty crucible mass

M_1 : crucible mass + dry sample

M_2 : crucible mass + calcined sample

2.2.2. Determination of the Nutritional Properties of Cashew Kernel Pastes

2.2.2.1. Dosage of Macronutrients

The fat content was determined using the Soxhlet method [15] with hexane as the solvent. The protein content was determined using the Kjeldahl method [15]. The nitrogen content was multiplied by 6.25 (the nitrogen to protein conversion factor) to determine the protein content of the sample. The total sugar and reducing sugar contents of the cashew kernel pastes were determined by spectrophotometric analysis at 490 nm and 540 nm, respectively by [17], [18] methods. The crude fiber content was determined using the Weende method [15]. The total carbohydrate content of the cashew kernel paste samples was obtained by subtraction according to the method [19]. It was calculated by subtracting the sum of the moisture, fat, protein, and ash contents of the various samples from 100. The energy value of the sample was calculated according to the method of [20] using the following formula:

$$Ev (\text{kcal}) = (\%C \times 4) + (\%F \times 9) + (\%P \times 4) \quad (5)$$

Ev: Energy value

C: Carbohydrates

F: Fat

P: protein

2.2.2.2. Dosage of Micronutrients (Vitamins and Minerals)

The vitamin A, C, and E contents were determined for each of the cashew paste samples. The method used to determine the vitamin C content of the samples was that described by [21], which is based on the reduction of 2,6-DCPIP (2,6-dichlorophenol-indophenol) by vitamin C. Vitamin E concentrations were determined by HPLC analysis. To determine vitamin A concentrations, the procedure first involved measuring β -carotene using the method described by [22]. After extraction and centrifugation of the mixture, the optical density of the supernatant was measured at 450 nm using a spectrophotometer. For each test, the amount of β -carotene was calculated from a calibration curve with the following regression equation: $OD_{450} = 0.0163 Q$, where $R^2 = 0.9988$. The vitamin A content of the samples was determined by dividing the β -carotene contents by 6 [23].

Mineral content was determined using an Agilent 5800 air-argon flame ICP-OES instrument [15].

2.2.3. Analysis of Cashew Kernel Oil Quality

The quality of oil was evaluated by determining their refractive index, acid value, peroxide value, and iodine value. The refractive index (IR) was determined using a refractometer according to the method described in the French standard NF T-60-212 [24]. First, the refractometer was calibrated with distilled water according to the manufacturer's instructions. Next, the oil was heated to 40°C for 30 minutes before being transferred to the refractometer's cell. Finally, the refractive index and temperature were read directly from the refractometer's display. The tests were performed in triplicate.

The acid value was determined according to the standardized method specified in the French standard NF EN ISO 660 [25]. To do this, 0.5 g of oil was dissolved in a 25 mL mixture of ethanol and ether (50/50 v/v). The resulting solution was titrated with a 0.1 N alcoholic potassium hydroxide (KOH in ethanol) solution in the presence of a few drops of phenolphthalein (color indicator) until the solution turns pink. The acidity of the solvent (ethanol/ether) was neutralized before use with a 0.1 N potassium hydroxide solution. The tests were performed in triplicate for each sample.

The acid value (Av) was given by the following formula :

$$Av = 56.1 \times V \times N/m \quad (6)$$

Av is expressed in mg KOH/g

V: volume of the ethanolic KOH solution in mL used to titrate the sample

N: normality of the KOH solution

M: mass of the oil test sample in grams

The peroxide value was determined in accordance with standard [26]. 2 g of oil were dissolved in 10 mL of chloroform in a flask. To this mixture, 15 mL of acetic acid and 1 mL of potassium iodide solution (10%, v/v) were added, respectively. The flask was capped and shaken for 1 minute, then left in the dark for 5 to 10 minutes. Next, 75 mL of distilled water were added. A few drops of starch paste (a color indicator) were added while shaking vigorously. Next, the mixture was titrated with a 0.02 N sodium thiosulfate solution until the solution was completely decolorized. At equivalence, the color change was observed. A blank test (with oil replaced by distilled water) was performed. The tests were performed in triplicate for each sample.

The peroxide value (Pv) was determined using the following formula :

$$Pv = (V - V_0) \times N \times 1000/m \quad (7)$$

Pv expressed in meq O₂/kg

N: concentration of the sodium thiosulfate solution used

V: volume of the sodium thiosulfate solution added to the test sample, in mL

V₀: volume of the sodium thiosulfate solution added to the blank, in mL

m: mass of the test sample of fat (oil), in grams

The iodine value was determined by titrimetry in accordance with the international standard NF EN ISO 3961 [27]. This method involves titrating a quantity of fat (oil) with an excess of iodine. The excess iodine was then titrated with Na₂S₂O₃ (aq) to determine the quantity of

iodine that reacted (back titration or indirect titration). To this end, 0.5 g of oil was dissolved in 15 mL of chloroform (tetrachloromethane, CCl₄) in a flask, to which 20 mL of Wijs's reagent was added. The flask was sealed, shaken gently, and then placed in the dark for 1 hour. A blank test was also prepared by replacing the sample (oil) with distilled water. After removing the flask from the dark, 10 mL of a 10% (m/v) potassium iodide (KI) solution and 150 mL of distilled water were added. Next, the released iodine was titrated with a 0.1 N sodium thiosulfate solution in the presence of a 1% (m/v) starch paste as a color indicator until complete decolorization occurs. The tests were performed in triplicate for each sample. Thus, the iodine index was calculated using the following formula:

$$Iv = ((V_0 - V) \times N \times 12.69) / m \quad (8)$$

Iv expressed in g/100 g

V₀: volume of sodium thiosulfate added to the blank test (control) in mL

V: volume of sodium thiosulfate added to the test in mL

N: molar concentration of the sodium thiosulfate solution

m: mass of oil weighed in grams

2.2.4. Statistical Analysis

Each test was performed in triplicate. The means of the various parameters studied were determined using Excel (version 2016); analysis of variance (ANOVA) at a 5% significance level was performed using Tukey's test with the XLSTAT software version 2021.

3. Results

3.1. Physicochemical Parameters

Figure 1 shows the physicochemical parameters of the various cashew kernel paste samples. All of the parameters differ significantly among the samples ($p < 0.05$). The samples are slightly acidic, with a mean value of 6.17 ± 0.12 and values ranging from 6.01 ± 0.02 to 6.33 ± 0.02 for PC5 and PC3, respectively. The titratable acidity, which corresponds to the presence of organic acids in the sample, ranges from 6.73 ± 0.03 (g/100 mL) to 8.73 ± 0.1 (g/100 mL), with a mean value of 7.60 ± 1.03 g/100 mL. The average moisture content of the pastes is $1.70 \pm 0.52\%$, with relatively low values ranging from $1.2 \pm 0.09\%$ for PC4 to $2.28 \pm 0.13\%$ for PC5. The dry matter content, which is directly related to the moisture content, ranges from $97.72 \pm 0.13\%$ to $98.80 \pm 0.09\%$ for PC5 and PC4, respectively, with a mean value of $98.30 \pm 0.52\%$. The ash content averages $2.90 \pm 0.25\%$, with a minimum of $2.55 \pm 0.10\%$ and a maximum of $3.25 \pm 0.03\%$ for PC1 and PC4, respectively.

3.2. Macronutrients

Table 1 shows the macronutrient values in cashew kernel pastes. Analysis of variance revealed that all parameters differ significantly ($p < 0.05$) among all samples. Cashew pastes are significant sources of energy, with a mean value of 563.39 ± 37.57 kcal. They are higher in fat and carbohydrates, with mean values of $36.36 \pm$

7.86% and $50.05 \pm 8.03\%$, respectively. However, they are lower in proteins, with values ranging from $8.46 \pm 0.06\%$ to $9.77 \pm 0.06\%$ for a mean value of $8.98 \pm 0.57\%$, and lower in fiber. The soluble sugar contents are also relatively low, with mean value of 0.63 ± 0.18 mg/L for total sugars and 0.09 ± 0.05 mg/L for reducing sugars.

3.3. Micronutrients

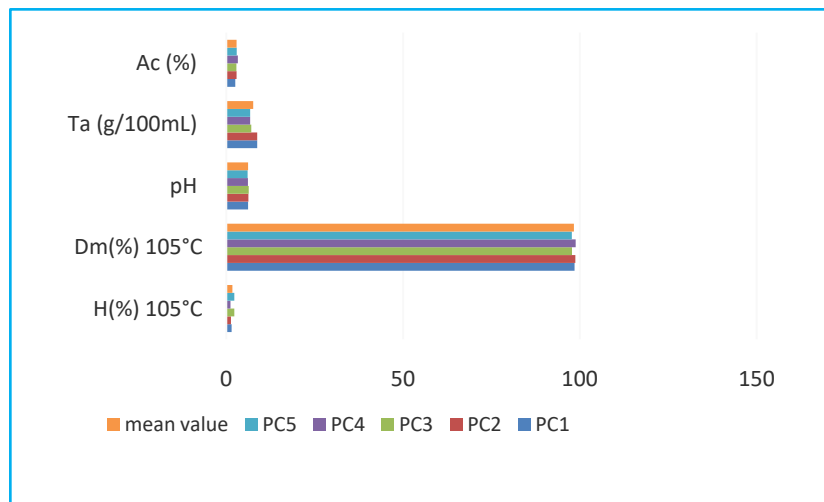
The mineral content of the cashew kernel paste samples is shown in Figure 2. The quantities of minerals present vary from one sample to another, with relatively low mean concentrations of 0.02 ± 0.01 mg/kg, 21.46 ± 8.63 mg/kg, and 22.64 ± 10.18 mg/kg for copper (Cu), manganese (Mn), and phosphorus (P). The concentrations of potassium (K), calcium (Ca), iron (Fe), magnesium (Mg), and zinc (Zn) are greater than 50 mg/kg, for most samples.

Table 2 presents the different vitamin concentrations of the analyzed pastes. Analysis of variance (ANOVA) revealed that all parameters differ significantly ($p < 0.05$) among all samples. They are rich in vitamins E and C, with levels ranging from 12.56 ± 0.07 mg/100 g to $20.14 \pm$

0.06 mg/100 g and from 5.83 ± 1.44 mg/100 g to 10.83 ± 1.44 mg/100 g, respectively. As for vitamin A, it is present in lower amounts, with a mean value of 373.01 ± 183.97 μ g/100 g.

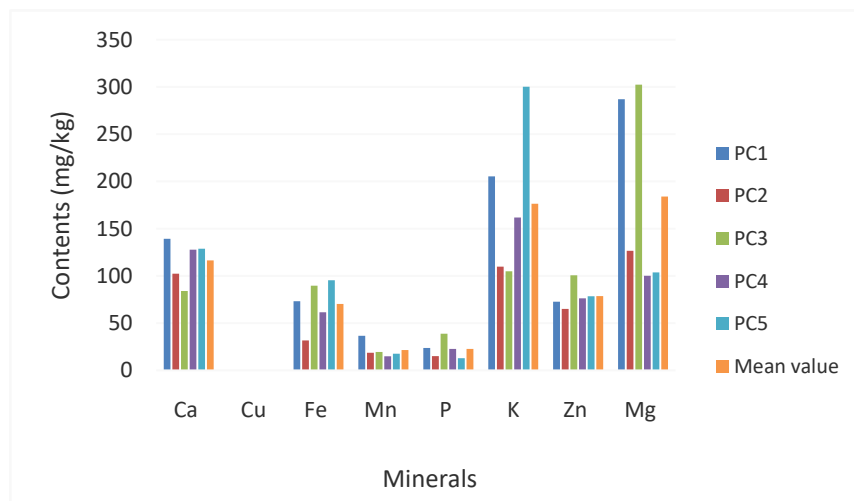
3.4. Oil Quality

The values for the different quality indexes determined are listed in Table 3. All of the parameters differ significantly among the samples ($p < 0.05$). The iodine value ranges from 110.99 ± 0.15 g I₂/100 g for PC2 to 114.21 ± 0.10 g I₂/100 g for PC3, with an average of 112.70 ± 1.17 g I₂/100 g. As for the acid value, the values range from 4.68 ± 0.03 mg KOH/g to 17.77 ± 0.08 mg KOH/g for PC3 and PC4, respectively, with a mean value of 10.32 ± 6.19 mg KOH. Regarding the peroxide value, the samples exhibited low values ranging from 0.57 ± 0.03 meq O₂/kg to 1.13 ± 0.03 meq O₂/kg for PC1 and PC3, respectively, with a mean value of 0.85 ± 0.21 meq O₂/kg. Relative stability was observed for the refractive index, with an average of 1.46 ± 0.005 .



H: humidity, Dm: dry matter, Ta: titratable acidity, Ac: ash content, PC1: Cashew kernel paste 1, PC2: Cashew kernel paste 2, PC3: Cashew kernel paste 3, PC4: Cashew kernel paste 4, PC5: Cashew kernel paste 5

Figure 1. Physicochemical properties of different cashew paste samples



PC1: Cashew kernel paste 1, PC2: Cashew kernel paste 2, PC3: Cashew kernel paste 3, PC4: Cashew kernel paste 4, PC5: Cashew kernel paste 5.

Figure 2. Mineral content of various cashew kernel paste samples

Table 1. Macronutrient contents of cashew kernel pastes

Parameters	Samples					Mean value	p
	PC1	PC2	PC3	PC4	PC5		
Lipids (%)	30.54±0.51c	27.60±0.02 d	37.49±0.33 b	38.34±0.7 b	47.83±0.7 a	36.36±7.86	< 0.0001
Carbohydrates (%)	56.95±0.52b	58.41±0.16a	48.09±0.41c	48.32±0.62c	38.50±0.68d	50.05±8.03	< 0.0001
Proteins (%)	8.46±0.06c	9.77±0.06a	9.33±0.06ab	8.9±0.06bc	8.46±0.06c	8.98±0.57	0.0003
Crude fiber (%)	0.68±0.02b	0.45±0.02d	0.84±0.02a	0.61±0.02c	0.39±0.02e	0.59±0.18	< 0.0001
Energy content (kcal)	536.52±1.87d	521.12±0.55e	567.1±0.87c	573.88±2.51b	618.31±3.66a	563.39±37.57	< 0.0001
Total sugars (mg/L)	0.62±0.003b	0.57±0.001c	0.94±0.001a	0.53±0.002d	0.47±0.003e	0.63±0.18	< 0.0001
Reducing sugars (mg/L)	0.04±0.007c	0.05±0.003c	0.14±0.009a	0.1±0.008b	0.15±0.02a	0.09±0.05	< 0.0001

Values are expressed as mean ± standard deviation (n = 3). On the same row, two means sharing at least one common letter are not significantly different at the 5% significance level (Tukey HSD test)

PC1: Cashew kernel paste 1, PC2: Cashew kernel paste 2, PC3: Cashew kernel paste 3, PC4: Cashew kernel paste 4, PC5: Cashew kernel paste 5.

Table 2. Concentrations of vitamins A, C, and E in the different samples of cashew kernel paste

Vitamins	PC1	PC2	PC3	PC4	PC5	Mean value	p
C (mg/100g)	9.17 ± 1.44 ab	10.83 ± 1.44 a	9.17 ± 1.44 ab	8.33 ± 1.44 ab	5.83 ± 1.44 b	8.67±1.83	0.0202
A (µg/100 g)	319.02 ± 4.09 b	577.03 ± 10.09 a	200.07 ± 11.81 c	558.62 ± 5.81 a	210.29 ± 3.87 c	373.01±183.97	< 0.0001
E (mg/100g)	17.32 ± 0.02 b	12.56 ± 0.07 e	13.89 ± 0.04 d	20.14 ± 0.06 a	15.66 ± 0.26 c	15.91±2.97	< 0.0001

Values are expressed as mean ± standard deviation (n = 3). On the same row, two means sharing at least one common letter are not significantly different at the 5% significance level (Tukey HSD test)

PC1: Cashew kernel paste 1, PC2: Cashew kernel paste 2, PC3: Cashew kernel paste 3, PC4: Cashew kernel paste 4, PC5: Cashew kernel paste 5.

Table 3. Quality indexes values of the different samples of cashew kernel paste

.Parameters	PC1	PC2	PC3	PC4	PC5	Mean value	p
Peroxyde value (meq O ₂ /kg)	0.57 ± 0.06 c	0.87 ± 0.06 b	1.13 ± 0.06 a	0.77 ± 0.06 b	0.90 ± 0.00 b	0.85±0.21	< 0.0001
Acid value (mg KOH/g)	5.98 ± 0.65 bc	6.92 ± 0.32 b	4.68 ± 0.32 c	17.77 ± 0.86 a	16.27 ± 0.56 a	10.32±6.19	< 0.0001
Iodine value (g I ₂ /100g)	112.86 ± 0.29 b	111.00 ± 0.78 c	114.21 ± 0.51 a	113.11 ± 0.15 ab	112.35 ± 0.29 b	112.70±1.171	0.0001
Refraction index	1.4586 ± 0.0015 c	1.4689 ± 0.0019 a	1.4647 ± 0.0001 b	1.4621 ± 0.0005 b	1.4695 ± 0.0006 a	1.46±0.005	< 0.0001

Values are expressed as mean ± standard deviation (n = 3). On the same row, two means sharing at least one common letter are not significantly different at the 5% significance level (Tukey HSD test)

PC1: Cashew kernel paste 1, PC2: Cashew kernel paste 2, PC3: Cashew kernel paste 3, PC4: Cashew kernel paste 4, PC5: Cashew kernel paste 5.

4. Discussion

The analyzed cashew kernel paste samples had an average moisture content of 1.70%, corresponding to a high dry matter content of 98.30%. This value was both lower and higher than roasted cashew kernels studied in Nigeria (5.90%) [28] and in Côte d'Ivoire (1.48 ± 0.01%) [13], respectively. This low moisture content could be an advantage for extended shelf life. The cashew kernel pastes were slightly acidic, with an average pH of 6.17 and an average titratable acidity of 7.60 g/100 mL. This value was lower than cashew kernel pastes studied (3.75) by [13]. Since titratable acidity is related to the organic acids in the sample, these results suggest a higher concentration in the samples studied. The average ash content found (2.90%), indicating the presence of minerals, was roughly equal to that reported for pastes made from cashew kernels in Ethiopia [29].

The determination of macronutrient contents revealed heterogeneity in the composition of the different samples. The average fat content found was lower than the kernel pastes studied by [30] and [31]. According to [32], the lower fat content may be related to the roasting conditions of the kernels. The carbohydrate content was the highest

in nearly all samples, with an average of 50.05 ± 8.03%, which was significantly higher than peanut pastes solded in Ouagadougou [33] and Côte d'Ivoire [13]. The average protein content observed in this study was lower than that reported by [34]. This would suggest that proteins were denaturated due to heat during the roasting of the kernels [12]. The crude fiber content was low compared to that obtained by [30]. This could be explained by the complete removal of the skins from the almonds prior to grinding. Indeed, according to [11], the skins are removed from roasted almonds to prevent their astringency and the tingling sensation they would cause in the mouth. The low soluble sugar contents could be explained by limited degradation of polysaccharides during the heat treatment of cashew kernels. The results show that cashew kernel pastes were high energy (mean energy value = 563.39 kcal). It could therefore be incorporated into certain diets.

Cashew kernel pastes contained various minerals and vitamins in varying amounts. These micronutrients play an essential role in the body's physiological functioning. The high levels of calcium (Ca), magnesium (Mg), and potassium (K) could be a benefit of these pastes. Indeed, calcium is necessary for the strengthening of bones and teeth [35]. Magnesium is important in the synthesis of carbohydrates, lipids, nucleic acids, and proteins, as well

as in other functions within various organs of the cardiovascular and neuromuscular systems [36]. The average magnesium content of cashew pastes (183.99 mg/kg) could meet the needs of adults, which range from 5 to 7 mg/kg/day [13]. The average copper content (0.017 mg/kg) was below the toxicity threshold defined by the WHO [37]. The cashew kernel paste samples contained vitamins A, C, and E in varying rates. These levels were higher than those found by [31] and [38] in their studies.

The iodine value reflects the degree of unsaturation of fats [39], which indicates the presence of unsaturated fatty acids. The average value found (112.70 ± 1.17 g I/100 g) was lower than that of sesame, soybean, and sunflower oils [40]. However, it was higher than the values reported by [41] for cashew kernel oil (41.30 g I/100 g) and palm oil (20.70 g I/100 g). This would suggest that the oils studied were rich in unsaturated fatty acids. The peroxide value, on the other hand, indicates the degree of oxidation of the oils. The oils studied had an average peroxide value of 0.85 ± 0.21 meq O₂/kg, which was well below the maximum value (10 meq O₂/kg) accepted for edible oils [42]. The acid value is related to the presence of free fatty acids in the sample. It also indicates the degree of lipid deterioration. The average value obtained (10.32 mg KOH/g) was lower than that reported by [28]. The refractive index indicates the purity of the oil and is proportional to the molecular weight of the fatty acids as well as their degree of unsaturation [43]. The average value obtained (1.46 ± 0.005) fell within the range established by [40].

5. Conclusion

The objective of this study was to contribute to the promotion of commercially available cashew kernel pastes by evaluating their nutritional potential. Analysis of the physicochemical characteristics showed that the pastes were slightly acidic (6.17 ± 0.12) with a low moisture content ($1.70 \pm 0.52\%$), which would be advantageous for a long shelf life. The pastes were good sources of macronutrients and energy (563.39 kcal). They could therefore be incorporated into certain diets. They contain various minerals (calcium, magnesium, potassium, iron, manganese, zinc) and vitamins (A, C, E) necessary for the proper functioning of the body and the prevention of certain diseases. Analysis of the oil quality would suggest that they were pure (1.46 ± 0.005), rich in unsaturated fatty acids (112.70 ± 1.17 g I/100 g) and had not undergone oxidation (0.85 ± 0.21 meq O₂/kg). Regular consumption of cashew kernel pastes would be beneficial for consumers.

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