

Study of Accelerated Aging of Dried Mango Slices Produced in Northern Côte D'Ivoire

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Abstract The production of dried mango slices represents a significant financial opportunity for many cooperatives in northern Côte d'Ivoire. However, the challenge lies in preserving the slices after production, which remains a limiting factor for the sustainable development of this sector. The objective of this study was to improve the shelf life of dried mango slices (*Mangifera indica* L. var. Kent). To achieve this, a number of treatments were applied. UV-C Exposure: The slices were exposed to ultraviolet-C (UV-C) radiation. Packaging: After UV-C treatment, the slices were packaged either in kraft paper or polyethylene. Subsequently, these treated slices underwent an accelerated aging test over three months within a controlled environment maintained at $40^{\circ}\text{C} \pm 2^{\circ}\text{C}$ and a relative humidity of $75\% \pm 5\%$. Regular analyses were conducted at specific intervals (T0: initial time; T3: 3rd month of storage; T6: 6th month of storage; and T9: 9th month of storage). The study found that the microbiological load for the group treated with UV-C and packaged in kraft paper (LMS-UVC-K) showed no significant microbiological load, while the group treated with UV-C and packaged in polyethylene (LMS-UVC-P) experienced a 9% increase (TAMF). Additionally, LMS-UVC-P had a moisture content of 47.98%, whereas LMS-UVC-K had 12.77%. Remarkably, the water activity (A_w) values did not exceed the threshold ($A_w = 0.6$) for LMS-UVC-K. In sensory evaluations, LMS-UVC-K received the highest sensory ratings during the 9-month storage period, with an average score of 6 ± 0.00 . In contrast, LMS-UVC-P scored an average of 4 ± 0.00 . Overall, the combination of kraft paper and UV-C treatment allowed for a minimum shelf life of 9 months for dried mango slices, while the combination of polyethylene and UV-C treatment provided 3 months of preservation. This approach could effectively preserve dried mango slices produced.

Keywords: Stability, Minimum durability date (MDD), Packaging, Dried mango slices, Shelf life, Ultraviolet-C (UV-C)

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1. Introduction

Dried mango slices hold a cherished place in Ivorian culinary tradition, and their production involves small-scale cooperatives as key players. Beyond local consumption, these slices have gained popularity in Europe, serving as a strategic weapon against substantial post-harvest losses (which can reach 40% of total production) [1] and providing a vital income stream for those involved in the sector. Undoubtedly, this activity contributes significantly to enhancing the value of this tropical fruit [2]. These slices are derived from fresh mangoes and undergo several essential steps, including washing, peeling, trimming, slicing, drying, and finally, packaging in polyethylene [3].

From a nutritional perspective, dried mango slices can

serve as a rich source of essential nutrients, including vitamins (such as A and C), minerals (such as calcium, potassium, sodium, and iron), and bioactive compounds [4,5]. Incorporating dried mango slices into dietary habits may contribute to reducing the risk of cardiovascular disease and certain cancers, while simultaneously enhancing overall quality of life [6]. For numerous consumers, these dried slices serve as a convenient and nutritious snacking option—an appealing alternative to heavily processed appetizer products. However, due to the observed variation in moisture content and water activity during post-production storage, dried mango slices may become vulnerable to both microbiological contamination and oxidation. This susceptibility primarily arises from the use of polyethylene-type packaging. As a result, the overall marketability of dried mango slices could be compromised, particularly in terms of taste, aroma, texture, and nutritional value. Furthermore, this packaging-related

vulnerability might lead to a reduction in the slices' shelf life, notably affecting the minimum durability date. Such consequences could have significant economic and health implications. However, it is essential to carefully consider effective preservation measures to ensure the sanitary and marketable quality of dried mango slices. These corrective actions should be readily available and accessible for easy adoption and popularization.

Indeed, ultraviolet (UV-C) irradiation could serve as an effective treatment method for dried mango slices. By applying UV-C, we can prevent microbiological contamination of foodstuffs-either by destroying or inactivating microorganisms and limiting their ability to multiply.

Similarly, kraft paper plays a crucial role as a packaging material for food preservation. Not only is it highly affordable, but it is also biodegradable. Its impermeability to both water and air makes it an excellent choice for safeguarding food products, protecting them from contamination and oxidation [7].

This study aims to evaluate the impact of UVC irradiation and/or kraft packaging on the minimum durability date (MDD) of dried mango slices produced in northern Côte d'Ivoire.

2. Materials and Methods

2.1. Origin of Samples and Sampling

In this study, three batches of dried mangoes, each consisting of three 100 g packets of dried Kent variety mangoes, were examined over a 45-day storage period in a climate chamber (40°C and 75% relative humidity). The first batch comprised dried mango slices treated with ultraviolet C (UV-C) rays (at 254 nm) for one minute, then packaged in polyethylene (LMS-UVC-P). The second batch consisted of dried mango slices treated with UV-C (254 nm) for one minute, then packaged in Kraft paper (LMS-UVC-K). Freshly processed mangoes were collected from cooperatives located in northern Côte d'Ivoire. All samples were taken from the two packaging batches obtained. Four analysis points were established: immediately after packaging, after 14 days or 3 months, after 28 days or 6 months, and after 42 days or 9 months (T0, T3, T6, and T9). The accelerated aging conditions in the CTS climate chamber were 40°C ± 2°C and 75% ± 5% relative humidity, in accordance [8,9], over a period of 6 weeks, corresponding to 9 months of storage. Analyses were conducted every 2 weeks (equivalent to 3 months of storage).

2.2. Moisture and Water Activity Analysis

The moisture content was determined in accordance [10] standard. Five grams of the sample were weighed and placed in a ventilated oven at 105°C for 48 hours. The dried sample was then removed, cooled in a desiccator, weighed, and returned to the oven for one hour before being reweighed. This process was repeated until a constant weight was obtained. To determine the water activity (aw), an Awmeter (Aqualab, France) was used.

2.3. Microbiological Analysis

The culture media used to carry out the work were prepared according to the manufacturer's recommendations mentioned on the different boxes. This involved aseptically removing 25 g of the sample primarily at (T0, T3, T6, and T9), placing it in a sterile Stomacher plastic bag, and adding 225 mL of buffered peptone water (BPW). This mixture was then ground for 1 to 3 minutes, then left to stand for 30 minutes to allow for revivification. The dilution stock solution (10^{-1}) was thus formed in accordance with the standard [11]. From the stock solution, dilutions were made in test tubes to facilitate enumeration. To prepare the 10^{-1} dilution, 1 mL of the stock suspension was taken sterile and mixed with 9 mL of buffered peptone water (BPW) in a sterile test tube. Next, 1 mL of the 10^{-1} dilution was taken and homogenized in 9 mL of buffered peptone water to obtain the 10^{-2} dilution. Using the same technique, dilutions from 10^{-3} to 10^{-6} were made. Decimal dilutions were prepared in accordance with the standard [11]. These were carried out using horizontal methods [12]. The following germ groups were enumerated: total aerobic mesophilic flora (TAMF); yeasts and molds; *E. coli* and *salmonella*.

2.4. Vitamins Analysis

Ascorbic acid was extracted using a metaphosphoric acid/acetic acid solution and assayed with 2,6-dichlorophenol indophenol calibrated with standard vitamin C of known concentration [13]. As for vitamin A, it was determined according to the protocol described by [14].

2.5. Minerals Analysis

The minerals calcium (Ca), potassium (K), magnesium (Mg) and sodium (Na) were determined according to the protocol of [10].

2.6. Sensorial Traits

For sensory analysis, dried mango slice samples were evaluated at each analysis period (T0, T3, T6, and T9). The samples were assessed by 60 panelists according to the National Committee for Ethics in Life and Health Sciences (Ref: 00047_24/MSHPCMU/CNESVS-Km). A hedonic scoring test following [15] standard was used to evaluate the acceptability level of dried mango (*Mangifera indica* L. var Kent) slice samples. Thus, sixty (60) untrained assessors aged over 18 were selected to form part of the panel. The panelists were asked to rate the overall appreciation level of the sensory attributes of color, taste, smell, texture, and overall acceptability on a 7-point unipolar linear scale according to the scale prescribed by [16]. Color, taste, texture, and overall acceptability were rated from 1 (extremely disliked) to 7 (extremely liked).

2.7. Statistical Analysis

The analysis of variance (ANOVA) of data from the evaluation of biochemical, microbiological, and sensory parameters was conducted using the statistical software

XLSTAT 11.19. Whenever a significant difference was revealed, the ANOVA test was supplemented by Tukey's post-ANOVA test to identify the variable(s) with significant differences. Data generated by the XLSTAT statistical software were evaluated by significance analysis ($P \leq 0.05$).

3. Results

3.1. Evaluation of Stability Indicators

3.1.1. Microbiological Characteristics of Dried Mango Slice Preserved by Accelerated Ageing

Table 1. Variation in microbiological loads of dried mango slice during accelerated ageing

Parameters	Average microbiological loads (CFU/g)			
	Time (months) spent in climatic chamber			
	T ₀	T ₃	T ₆	T ₉
LMS-UV-C-P				
TAMF	1.45 ± 0.07 x 10 ^{3d}	1.98 ± 0.01 x 10 ^{4c}	2.16 ± 0.45 x 10 ^{5a}	1.52 ± 0.67 x 10 ^{5b}
Molds	Absent	Absent	1.33 ± 0.01 x 10 ^{1b}	1.45 ± 0.03 x 10 ^{2a}
<i>E. coli</i>	Absent	Absent	Absent	Absent
Salmonella	Absent	Absent	Absent	Absent
LMS-UV-C-K				
TAMF	< 30	< 30	< 30	< 30
Mold	Absent	Absent	Absent	Absent
<i>E. coli</i>	Absent	Absent	Absent	Absent
Salmonella	Absent	Absent	Absent	Absent
Microbiological standards				
FAMT	Mold	<i>E. coli</i>	<i>Salmonella</i> spp	
≤ 1 x 10 ⁴	≤ 1 x 10 ⁵	≤ 1 x 10 ³	*Abs in 25 g	
References				
Guidelines and standards for the interpretation of analytical results in food microbiology (2019)				

The evolution of the microbiological characteristics of dried mango slices during accelerated aging at 40°C and 75% RH is presented in Table 1. Regarding the dried mango slices treated with UV-C and then packaged in polyethylene (LMS-UV-C-P), a significant increase ($P <$

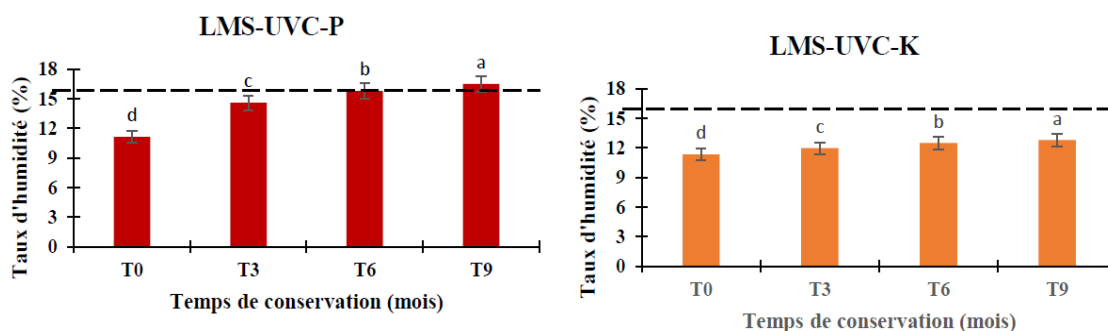
0.05) of 4.8% and 9% was noted respectively for total aerobic mesophilic germs (TAMF) and molds over the 9 months of storage, corresponding to 6 weeks of steaming in the climate chamber. As for molds, no significant difference was observed during this period. Furthermore, the dried mango slices treated with UV-C and then packaged in Kraft paper (LMS-UV-C-K) showed no significant microbial load during the 9 months of storage, equivalent to 6 weeks of steaming in the climate chamber.

Scores on the same line with different superscript letters are statistically different at $P < 0.05$ according to Tukey's test. T₀: time before climatic enclosure; T₃: 2 weeks in climatic enclosure; T₆: 4 weeks in climatic enclosure and T₉: 6 weeks in climatic enclosure. FAMT: total aerobic mesophilic flora. LMS-UV-C-P: dried mango slice treated with UV-C (240 nm) then packaged in polyethylene packaging; LMS-UV-C-K: dried mango slice treated with UV-C (240 nm) then packaged in Kraft packaging; LMS-K: dried mango slice packaged without UV-C (240 nm) treatment in Kraft packaging.

3.1.2. Water Activity and Humidity

Figure 1 illustrates the evolution of water activity (Aw) and moisture content of dried mango slice samples during accelerated aging (40°C and 75% RH). The moisture content increased from 11.15 ± 1.00 g/100 g sample (T₀) to 16.50 ± 0.12 g/100 g sample (T₉), representing a 47.98% increase for dried mango slices treated with UV-C and then packaged in polyethylene (LMS-UV-C-P). For dried mango slices treated with UV-C and packaged in Kraft paper (LMS-UV-C-K), the moisture content increased from 11.35 ± 1.08 g/100 g sample (T₀) to 12.8 ± 0.12 g/100 g sample (T₉), representing a 12.77% increase. Regarding water activity (Aw) values (Figure 2), no increase above the threshold value ($A_w = 0.6$) was observed for dried mango slices treated with UV-C and then packaged in Kraft paper (LMS-UV-C-K).

With the exception of dried mango slices treated with UV-C and then packaged in Kraft paper (LMS-UV-C-K), dried mango slices treated with UV-C and then packaged in polyethylene (LMS-UV-C-P) showed water activity above the threshold value ($A_w = 0.6$) after the 3rd month of storage.



Value only: 15%

Figure 1. Moisture evolution of dried mango slice (a), (b) and (c) during accelerated ageing

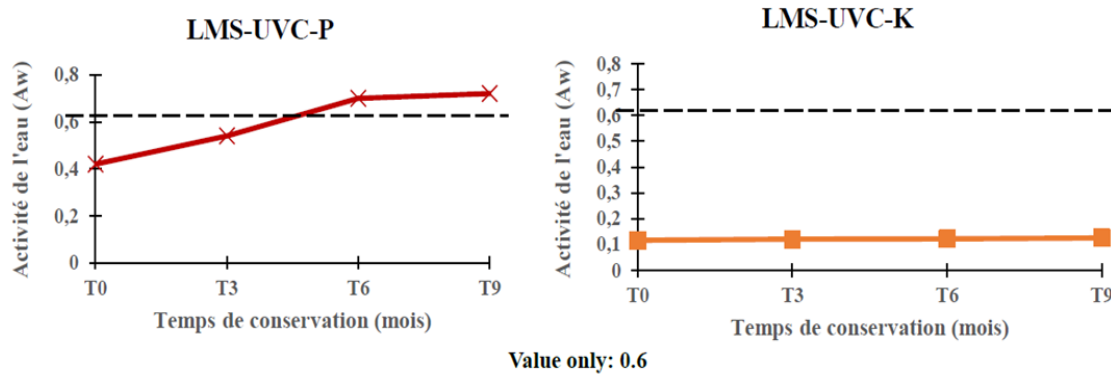


Figure 2. Evolution of water activity in dried mango slice (a), (b) and (c) during accelerated ageing

3.1.3. Changes in Vitamin Content

The vitamin contents of dried mango samples during accelerated aging (40°C and 75% RH) are presented in Table 2. With the exception of vitamin D, the results obtained from statistical processing revealed no significant differences ($P < 0.05$) in the vitamin composition of the different samples. Nevertheless, the vitamin A content remained high, with an average level of 1.26% over the 9 months of storage. Similarly, the vitamin C content remained high over the 9-month shelf-life, with an average level of 31.39%. Regarding the vitamin D content, a significant increase ($P < 0.05$) was observed in the slices of dried mangoes treated with UV-C and then packed in polyethylene-type packaging (LMS-UV-C-P) and those of dried mangoes treated with UV-C and then packed in Kraft-type packaging (LMS-UV-C-K). These values ranged respectively from $1.60 \pm 0.05 \mu\text{g}/100 \text{ g}$ to $1.45 \pm 0.09 \mu\text{g}/100 \text{ g}$ and from $1.63 \pm 0.15 \mu\text{g}/100 \text{ g}$ to $1.40 \pm 0.01 \mu\text{g}/100 \text{ g}$ over the 9 months of storage.

Table 2. Variation in vitamin content of mango slice during accelerated ageing

Parameters	Units	Time (months) spent in the climatic chamber			
		T ₀	T ₃	T ₆	T ₉
LMS-UV-C-P					
β carotene	mg /	1.82 ±	1.92 ±	2.01 ±	2.08 ±
	100 g	0.05 ^b	0.01 ^b	0.02 ^a	0.03 ^a
Vitamin E	mg /	1.72 ±	1.67 ±	1.62 ±	1.58 ±
	100g	0.01 ^a	0.03 ^a	0.00 ^a	0.03 ^a
Vitamin C	mg /	28.34 ±	25.20 ±	23.48 ±	21.57 ±
	100 g	0.34 ^a	0.04 ^b	0.01 ^c	0.26 ^d
Vitamin A	μg / 100	146.25 ±	147.16 ±	148.84 ±	148.09 ±
	g	0.08 ^a	0.01 ^b	0.16 ^c	0.11 ^d
Vitamin D	μg / 100	1.60 ±	1.52 ±	1.41 ±	1.45 ±
	g	0.05 ^a	0.06 ^a	0.11 ^a	0.09 ^a
LMS-UV-C-K					
β carotene	mg /	1.80 ±	1.93 ±	2.00 ±	2.10 ±
	100 g	0.01 ^b	0.02 ^b	0.05 ^a	0.08 ^a
Vitamin E	mg /	1.70 ±	1.59 ±	1.67 ±	1.64 ±
	100g	0.03 ^a	0.09 ^a	0.05 ^a	0.01 ^a
Vitamin C	mg /	28.32 ±	25.28 ±	23.44 ±	21.56 ±
	100 g	0.04 ^a	0.01 ^b	0.06 ^c	0.07 ^d
Vitamin A	μg / 100	146.21 ±	147.10 ±	148.80 ±	149.00 ±
	g	0.01 ^a	0.09 ^b	0.01 ^c	0.13 ^d
Vitamin D	μg / 100	1.63 ±	1.42 ±	1.43 ±	1.40 ±
	g	0.15 ^a	0.02 ^a	0.00 ^a	0.01 ^a

Scores on the same line with different superscript letters are statistically different at $P < 0.05$ according to Tuckey's test. T₀: time before entering climatic chamber; T₃: 2 weeks in climatic chamber; T₆: 4 weeks in climatic chamber and T₉: 6 weeks in climatic chamber; LMS-UV-

C-P: dried mango slice treated with UV-C (240 nm) then packed in polyethylene-type packaging; LMS-UV-C-K : dried mango slice treated with UV-C (240 nm) then packaged in Kraft-type packaging; LMS-K: dried mango slice packaged without UV-C treatment (240 nm) in Kraft packaging.

3.1.4. Changes in Mineral Content

The mineral composition of dried mango slices during accelerated aging (40°C and 75% RH) is presented in Table 3. The minerals analyzed included calcium, potassium, magnesium, sodium, and iron. Among the macro-elements, potassium (K) was the most predominant mineral in each sample, with contents ranging from $861.52 \pm 0.06 \mu\text{g}/100 \text{ g}$ to $865.85 \pm 0.25 \mu\text{g}/100 \text{ g}$ for dried mango slices treated with UV-C and then packed in polyethylene-type packaging (LMS-UV-C-P) during the 9-month storage period. For dried mango slices treated with UV-C and then packed in Kraft packaging (LMS-UV-C-K), these levels ranged from $862.55 \pm 0.01 \mu\text{g}/100 \text{ g}$ to $864.75 \pm 0.08 \mu\text{g}/100 \text{ g}$ over the 9-month shelf-life. Depending on the storage period (T₀, T₃, T₆, and T₉), the levels of Ca, Mg, and Na increased significantly ($P < 0.05$), peaking in the 6th month of storage (T₆) for each sample.

Table 3. Variation in mineral content of dried mango slice during accelerated ageing

Parameters	Units	Time (months) spent in the climatic chamber			
		T ₀	T ₃	T ₆	T ₉
LMS-UV-C-P					
Ca	mg /	22.04 ±	23.10 ±	24.00 ±	23.05 ±
	100 g	0.02 ^c	0.20 ^b	0.05 ^a	0.30 ^b
Na	mg /	15.10 ±	16.80 ±	17.10 ±	16.35 ±
	100 g	0.03 ^c	0.00 ^b	0.01 ^a	0.02 ^b
Fe	mg /	2.13 ±	2.44 ±	2.69 ±	2.58 ±
	100 g	0.01 ^a	0.02 ^a	0.18 ^a	0.05 ^a
K	µg /	861.52 ±	866.41 ±	870.01 ±	865.85 ±
	100 g	0.06 ^d	0.00 ^c	0.18 ^a	0.25 ^c
Mg	µg /	86.53 ±	87.65 ±	88.23 ±	87.50 ±
	100 g	0.01 ^c	0.03 ^b	0.01 ^a	0.04 ^b
LMS-UV-C-K					
Ca	mg /	23.14 ±	24.60 ±	25,11 ±	24,05 ±
	100 g	0.05 ^c	0.20 ^b	0,05 ^a	0,00 ^b
Na	mg /	14.23 ±	15.72 ±	16,50 ±	15,65 ±
	100 g	0.01 ^c	0.20 ^b	0,04 ^a	0,02 ^b
Fe	mg /	2.28 ±	2.57 ±	2,62 ±	2,57 ±
	100 g	0.01 ^a	0.09 ^a	0,11 ^a	0,03 ^a
K	µg /	862.55 ±	864.47 ±	869.08 ±	864.75 ±
	100 g	0.01 ^d	0.2 ^c	0.04 ^a	0.08 ^c
Mg	µg /	85.71 ±	86.53 ±	87.10 ±	86.05 ±
	100 g	0.04 ^c	0.02 ^b	0.01 ^a	0.05 ^b

Scores on the same line with different superscript letters are statistically different at $P < 0.05$ according to Tuckey's test. T0: time before entering climatic chamber; T3: 2 weeks in climatic chamber; T6: 4 weeks in climatic chamber and T9: 6 weeks in climatic chamber; LMS-UV-C-P: dried mango slice treated with UV-C (240 nm) then packed in polyethylene-type packaging; LMS-UV-C-K : dried mango slice treated with UV-C (240 nm) then packaged in Kraft-type packaging; LMS-K: dried mango slice packaged without UV-C treatment (240 nm) in Kraft packaging.

3.1.5. Sensory Characteristics of Dried Mango Slice Preserved by Accelerated Ageing

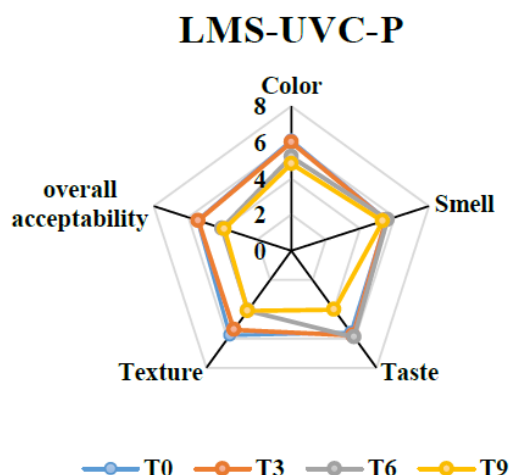


Figure 3 illustrates the degree of appreciation of the sensory parameters of dried mango slices during accelerated aging (40°C and 75% RH). A significant depreciation ($P < 0.05$) in the overall acceptability and texture of dried mango slices treated with UV-C and then packaged in polyethylene (LMS-UV-C-P) was recorded from the 6th month of storage, with an average score of 3 ± 0.00 . Conversely, descriptors such as color and taste showed a significant decline ($P < 0.05$) from the 9th month of storage, with an average score of 4 ± 0.00 . As for dried mango slices treated with UV-C and then packaged in Kraft paper (LMS-UV-C-K), they were appreciated throughout the 9 months of storage, with an average score of 6 ± 0.00 .

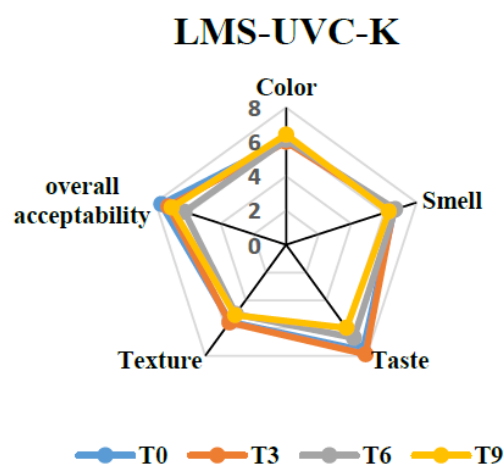


Figure 3. Variation in sensory parameters of dried mango slice (a), (b) and (c) during accelerated ageing

4. Discussion

The aim of this study was to assess the effectiveness of the combined use of UV-C and packaging on the minimum durability date (MDD) of dried mango slices (*Mangifera indica* L. var Kent). This study shows that the use of Kraft paper, UV-C lamps, and the combined use of these actions have had different impacts on the shelf life of packaged dried mango slices. These differences are reflected in the variations in stability indicators (moisture content (H%), water activity (Aw), and microbial count (N)) that determine the minimum durability date (MDD) of dried mangoes. As a reminder, a dried mango slice is considered stable if and only if $H\% < 15\%$, $Aw < 0.6$, and $N \leq 10^4$ CFU/g TAMF according to the standard [20] relating to the marketability of dried mango slices. Thus, for an expected result estimated at 9 months of shelf life, the investigations showed that all stability indicators had values above the threshold values recommended by the standard for the use of UV-C lamps. These observations indicate that the single use of the UV-C lamp is not recommended for the 9-month conservation of dried slices. Indeed, although the positive effect of UV-C on microbial growth is proven (reduction rate estimated at 72.27% at 6 months (T6)), their action did not limit the proliferation of mesophilic aerobic germs in dried mango slices after 3 months (T3 = 1.98×10^4). This proliferation of mesophilic aerobic flora would be linked to the increase in water activity (Aw rises from 0.54 (T3) to 0.7 (T6)) due to the permeability of the polyethylene packaging used to

package the dried mangoes produced. Based on these analyses, the minimum durability date (MDD) of dried mango slices treated with UV-C and then packaged in polyethylene-type packaging (LMS-UV-C-P) could be estimated at 3 months (Best before 3 months). Similar indications were observed when evaluating the quality of yêkè-yêkè (corn couscous) and gambari-lifin (refined corn flour) during storage [17]. This evaluation revealed that the variation in water activity (from 0.40 at the start to 0.67 after 9 months) favored the proliferation of total aerobic mesophilic flora germs (4.0×10^4 to 4.4×10^6 CFU/g). The lower quality of dried mango slices could be linked to the cooling time adopted during packaging. However, rapid cooling of mango slices after drying (rapidly lowering the temperature) could limit bacterial growth. Indeed, the faster food is cooled, the less time it will remain in the danger zone and the less risk there will be of bacterial growth [18]. Regarding the combined use of Kraft paper and UV-C lamps in the preservation plan for dried mango slices, analyses indicated that in addition to the absence of total aerobic mesophilic flora germs, an estimated humidity of 12.8 and a water activity (Aw) equal to 0.13 were observed after 9 months of storage. Concerning the quality standard for dried mangoes, these results suggest that the combined use of Kraft packaging and UV-C could be recommended for the preservation of dried mango slices. The observed compliance with the standard's requirements would depend primarily on controlling the development of mesophilic aerobic flora during the cooling of dried mango slices under the action of UV-C radiation. Indeed, UV-C radiation destroys the

DNA of yeasts and bacteria, leading to their death or annihilating all their reproductive functions, eventually resulting in the death of the microorganisms. Based on this assertion, [19] recommend the use of UV-C radiation to sterilize musts and wines without altering their physicochemical characteristics, in order to limit the risk of microbial development. Furthermore, given these qualities (microbicidal action), [20,21] suggest the use of UV-C radiation for decontamination/disinfection purposes post-harvest. Based on these various analyses, the minimum durability date (MDD) of dried mango slices treated with UV-C and then packaged in Kraft-type packaging (LMS-UV-C-K) could be estimated at 9 months (Best before 9 months). However, dried mango slices treated with UV-C and then packaged in Kraft packaging (LMS-UV-C-K) showed significant mean scores ($P < 0.05$). These scores, obtained from descriptors such as color, odor, taste, and texture throughout the 6 weeks of climatic aging, ranged from (7.65 ± 0.66) to (7.00 ± 1.71) for overall acceptability. Thus, dried mango slices packaged without UV-C treatment in Kraft-type packaging (LMS-UV-C-K) were appreciated throughout the 9 months (6 weeks of aging) of storage.

5. Conclusion

At the conclusion of this study, actions were undertaken to improve the preservation plan for dried mangoes in order to extend their shelf life (MDD). Three actions were implemented to enhance the shelf life of dried mango slices. The combined use of the aforementioned actions limited microbial proliferation during the 9 months of preservation. From a sensory perspective, the corrective actions favored an overall appreciation of dried mango slices treated with UV-C and then packaged in polyethylene-type packaging (LMS-UV-C-P) for up to 3 months, and dried mango slices packaged without UV-C treatment in Kraft-type packaging (LMS-UV-C-K) for up to 9 months. In light of the results, the combined use of UV-C and Kraft paper could be recommended in the implementation of the preservation plan for dried mango slices produced in Côte d'Ivoire.

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Conflict of Interest

The authors declare that there is no conflict of interest in this article.

CRedit Authorship Contribution Statement

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