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Fatty Acid Profiles of Oils Extracted with Water from the Seeds of Three Species of Cucurbits Grown in Congo

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Abstract This study consisted of identifying the differences and similarities between the seed oils of *Lagenaria siceraria*, *Cucurbita pepo* and *Cucumeropsis mannii*, through the comparative analysis of their fatty acid profiles. The oils studied were extracted by the water method. The acid and peroxide values were determined according to AOAC methods. The fatty acid composition of these oils was determined by gas chromatography equipped with a flame ionization detector (FID). The results of this study demonstrated oil content values varying from 14.35 to 19.46% for the seeds of *Lagenaria siceraria* and *Cucurbita pepo* respectively. However, the oil contents of the seeds of *Cucurbita pepo* and *Cucumeropsis mannii* are of the same order of magnitude. These contents vary significantly ($p<0.05$) between the three species studied. The acid and peroxide values were found to comply with Codex Alimentarius standards. The oils studied were found to be very rich in unsaturated fatty acids with cumulative contents of more than 80%. Regardless of the species of seeds considered, four major fatty acids have been identified totaling 99% of the cumulative contents: linoleic (C18:2n-6), oleic (C18:1 n-9), stearic (C18:0) and palmitic (C16:0). The fatty acid profiles of the oils studied differ by their composition in minor fatty acids.

Keywords: *Fatty acids profiles, ACP, water extraction, Lagenaria siceraria, Cucurbita pepo, Cucumeropsis mannii*

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1. Introduction

The exploration of plant resources for the production of edible oils has gained importance, both for their nutritional value and for their industrial applications. Cucurbit seeds are emblematic examples of crops widely grown in the Republic of Congo, where they are potentially rich sources of beneficial fatty acids. Cucurbits have been used for a very long time as a vegetable and as a source of lipids and proteins [1]. The Cucurbitaceae family includes 100 genera and more than 750 species [2], distributed throughout the world, and mainly in tropical and subtropical countries [1]. In Africa, they are present both in the Sahara-Sahelian zone, where they play an irreplaceable role on a utilitarian level, and in the tropical and subtropical zone, where their leaves and seeds are very popular in the diet of the populations. who live there. [1]. In Congo, we cultivate at least seven species of *Cucurbitaceae* for their oilseeds and their leaves, namely *Lagenaria siceraria*, *Citrullus lanatus*, *Cucurbita moschata*, *Cucurbita pepo*, *Cucumropsis manni*, *Luffa cilyndrica* and *Cucurbita maxima*.

Several studies have reported the fatty acid composition of oils extracted with organic solvents from cucurbit seeds of different origins and species [3,4,5,6,7].

In this context, the extraction of oils using innovative methods, such as water extraction, showspromise for valorizing these seeds while preserving their organoleptic and nutritional qualities. Indeed, the profile of fatty acids present in these oils can influence their sensory properties, their stability and their impact on human health. Comparing the fatty acid profiles of these extracted oils offers an opportunity to analyze not only the lipid diversity of these plants, but also to evaluate their economic and nutritional potential in a local context.

This study aims to highlight the differences and similarities between three species of cucurbits cultivated in Congo, namely *Lagenaria siceraria*, *Cucurbita pepo* and *Cucumropsis manni*, and to provide a scientific basis for their valorization in food and other applications. The Congo, with its botanical diversity, presents itself as a privileged place for the study of seed oils, where these plants offer valuable nutritional sources.

Comparing the fatty acid profiles of water-extracted oils from the seeds of these three species constitutes an essential approach to understanding the nutritional and

functional properties of these oils. The richness of fatty acids plays a fundamental role in determining the quality and potential applications of these oils in food and industry. *Cucurbita pepo* seeds, better known as pumpkin seeds, are often prized for their high content of unsaturated fatty acids, including linoleic and oleic acids, which contribute to cardiovascular health. On the other hand, the seeds of *Lagenaria siceraria*, coming from the calabash called gourd or bottle gourd, are renowned for their rich lipid profile, although less documented, which could reveal interesting properties due to their essential fatty acid content. Finally, the seeds of *Cucumropsis manni*, less known but culturally relevant, deserve to be explored for their nutritional potential and their still little-studied chemical composition.

This study will be based on a water extraction method, which has the advantage of preserving the organoleptic and nutritional qualities of the oils, while minimizing the use of chemical solvents. Comparative analysis of fatty acid profiles will not only identify the differences and similarities between these oils, but also highlight their potential applications as sources of nutrients and functional ingredients. Ultimately, this research could contribute to better development of local resources in Congo, by opening new perspectives for sustainable agriculture and the agri-food industry.

This analytical approach aims to highlight the specificities of the fatty acid profiles of these three types of oils, highlighting the importance of their composition for health and nutrition. Indeed, the unsaturated fatty acids present in the seeds of *Lagenaria siceraria*, *Cucurbita pepo* and *Cucumropsis manni* are recognized for their benefits on the cardiovascular system and metabolism. By continuing this analysis, it is possible to determine the potential applications of these oils in various fields, such as functional food and the cosmetic industry. This research thus offers a unique opportunity to explore the nutritional and functional properties of local plant resources, thus contributing to sustainable development and the valorization of Congo's wealth.

2. Materials and Methods

2.1. The Species of Oilseeds Studied

(a) Unhulled seeds of *Lagenaria siceraria*
(a') Hulled *Lagenaria siceraria* seeds

(b) Unhulled seeds of *Cucumeropsis mannii*
(b') Hulled *Cucumeropsis mannii* seeds

(c) Unshelled Seeds of *Cucurbita pep*o
(c') Hulled *Cucurbita pepo* seeds

Figure 1. The species of squash seeds used in this study

The seeds of three species of cucurbits, namely *Lagenaria siceraria* (Nsiya in Lari), *Cucumeropsis manni* (Nzaka in Nzebi) and *Cucurbita pepo* (Bipara in Téké) were used in the extraction of vegetable oils.

2.2. Seed Origins

The seeds of *Lagenaria siceraria* (Figure 1a) from the village Matti (4°11'12" South and 15°19'38" East) in the Pool department were purchased at the Total market in Arrondissement 2 Bacongo (Brazzaville). Those of *Cucumeropsis manni* (Figure 1b) from the village Mbaya (2°27'54" South and 12°43'50" East) in the Niari department were purchased from a supplier in Mfilou (Brazzaville). *Cucurbita pepo seeds* (Figure 1c) from Lekana (2° 19′ 49″ South, 14° 36′ 0″ East) in the department des Plateaux, were purchased at the Mikalou market in District 6 Talangaï (Brazzaville).

2.3. Sample Preparation

The hulled seeds were dried in an oven at 70°C for 24 hours. They were then crushed using a manual mechanical grinder. The powder from each of the seeds obtained was wrapped in polyethylene film, sealed in bags and placed in the freezer at approximately -18°C until the oil extractions.

Three samples were available to us: 1 (one) sample of *Lagenaria siceraria* seed powder (1.61 kilograms); 1 (one) sample of *Cucumerpsis mannii* seed powder (2.52 kilograms) and 1 (one) sample of *Cucurbita pepo* seed powder (2.41 kilograms). Extraction of vegetable oils by the water method.

The extraction of vegetable oil was carried out by the water method. The powder of 250 g of seeds dried in an oven for 24 hours at 70 °C is mixed with 1000 mL of water in an aluminum pan. The mixture is heated for 4 hours at a temperature of 150°C. After boiling we obtain two phases. The oil floats in the upper phase and the rest in the lower phase. The upper phase is taken and placed in a separating funnel for 24 hours and the oily phase is separated from the aqueous phase. The oil obtained is purified by mixing it with 10% salt water and then heating the mixture to boiling for approximately 30 minutes. After which the heating is stopped and the mixture is allowed to cool, which then forms two phases. The upper phase constituting the purified oil is extracted by decantation. The quantity of salt water used is 25% of the weight of the purified oil. The oil extraction rate is then determined in relation to the mass of the ground material.

2.4. Sample Preparation

The chemical indices of the oils such as the acid and peroxide indices were determined following the AOAC methods [8].

2.5. Determination of Fatty Acid Composition by Gas Chromatography (GC)

Gas chromatography is a method of separating gaseous compounds or compounds likely to be vaporized by heating without decomposition of the product.

Its principle is based on the concentration balances of the compounds present between two immiscible phases, one of which, called stationary non-volatile liquid, is trapped in a column and the other, called mobile (inert gas: H_2, N_2, He) is moves in contact with the first and carries the solute [9].

Entrainment at different speeds of the compounds present by the mobile phase leads to their separation. The separation of the compounds depends on the type of column used, and therefore on the polarity of the stationary phase. A flame ionization detector (FID) identifies the different compounds at the outlet of the column. The constituents of the mixture which thus leave the column one after the other are identified and dosed and the signals which they produce at the detector are translated at the level of a recorder by a succession of peaks (chromatogram), characterized by a retention time (identification) and area (dosage). The analysis of the fatty substance is therefore carried out in two stages: the separation of the products contained in the fatty substance and the identification of these products, preceded by a release of the AGs forming the TAGs by methanolysis.

The preparation of fatty acid methyl esters (FAME) and GC analysis for fatty acid composition were carried out according to the method described by [10]. In a 25 mL round bottom flask, oil samples (10 mg) were added to 3 mL of sodium methoxide solution (0.5 M) containing phenolphthalein. The reaction medium was brought to reflux for 10 minutes. 3 mL of hydrochloric methanol solution (0.5 M) was added until discoloration. The mixture was again brought to reflux for 10 min, then cooled to room temperature. 8 mL of hexane and 10 mL of water were added to the mixture and the organic phase was collected, dried over anhydrous sodium sulfate and filtered, for analysis by GC using a FOCUS GC (Thermo Fisher Scientific, Massachusetts, USA) equipped with a CP-Sil 88 column (50 m x 0.25 mm x 0.2 µm ; Chrompack, Middelburg, Netherlands), a split injector (ratio of 1/20). Carrier gas: helium flow rate 1.0 mL/min. Injector temperature: 250°C, FID detector temperature 270°C, the oven was heated from 185°C to 225°C at a rate of 5°C/min and kept at 225°C for 10 minutes. FAMEs were identified by comparing the retention times of each peak to those of the methyl ester mix standard and quantified in relative % using Chromcard 2.3.3 2005 software (Thermo Fisher Scientific, Massachusetts, USA).

2.6. Data Processing

The analysis of the various data from the oil extraction tests and the physicochemical characterization were carried out using the classic statistical method. The calculation of means and standard deviations, analysis of variance (ANOVA), principal component analysis (PCA), ascending hierarchical classification (CHA) were carried out with the XLSTAT software version 2016.02.28451 which is a macro -Microsoft Excel command.

3. Results and Discussion

3.1. Oil Content of Seeds of Three Species of Cucurbits Extracted by the Water Method

The water extraction method was used to study and determine the oil content of different seeds of three species of cucurbits namely *Cucumeropsis mannii*, *Cucurbita pepo* and *Lagenaria siceraria*. Table 1 gives the oil contents obtained for each species.

Table 1. Variation in oil content depending on the species studied

Oilseed species	*Cucumeropsis mannii*	*Cucurbita pepo*	*Lagenaria siceraria*
Essay 1	19,82	20,33	14,63
Essay 2	19,00	19,80	14,26
Essay 3	18,27	18,26	14,16
Average	19,03	19,46	14,35
Standard deviation	±0,78	±1,08	±0,25
Coefficient of variation (%)	4,08	5,52	1,73

The oil content values obtained indicate great homogeneity of the plant material used since the standard deviations of the 3 extraction tests and better still the values of the coefficients of variation for each species are extremely low (CV≤ 5%) with oil contents in oil varying from 14.35 to 19.46% respectively for the seeds of *Lagenaria siceraria* and *Cucurbita pepo*. The yield percentages of vegetable oils show that the oils of *Cucurbita pepo* are more oleaginous than those of *Lagenaria siceraria*; However, the oil contents of the seeds of *Cucurbiuta pepo* and *Cucumeropsis mannii* are of the same order of magnitude.

These contents vary significantly ($p<0.05$) between the

different species of cucurbits studied. The Tukey HSD test was chosen to carry out a multiple pairwise comparison of these different contents (Table 2 and Figure 2).

Table 2. Species / Tukey (HSD) / Analysis of differences between modalities with a 95% confidence interval (Oil content)

Contrast	Difference	Standardized difference	Critical value	Pr > Diff	Significant
CP vs LS	5,113	8,043	3,068	0,000	Oui
CP vs CM	0,433	0,682	3,068	0,782	Non
CM vs LS	4,680	7,361	3,068	0,001	Oui
Tukey critical value			4,339		

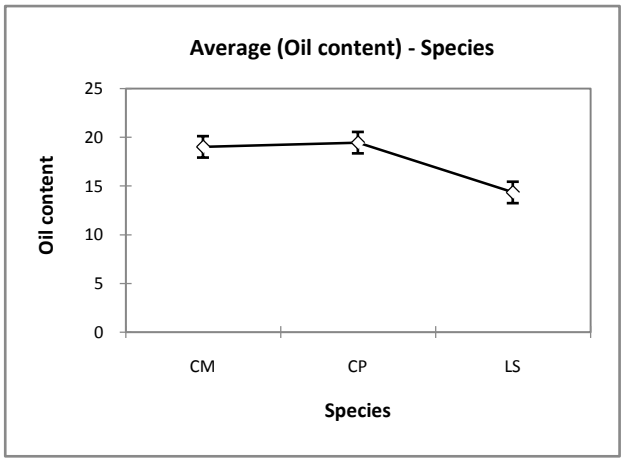

Figure 2. Estimated average seed oil contents of three species (Multiple pairwise comparisons)

Figure 2 and Table 2 show us that the two species of cucurbits studied, namely *Cumeropsis mannii* and *Cucurbita pepo*, give seeds with oil contents which are not significantly different (Anova and Tukey, $p > 0.05$). However, the seeds of *Lagenaria siceraria* have oil contents significantly different from those of the seeds of *Cumeropsis mannii* and *Cucurbita pepo*.

3.2. Physicochemical Characterization of Extracted oils

The physicochemical analysis of the seed oil of *Cumeropsis mannii*, *Lagenaria siceraria* and *Cucurbita pepo* gave the results shown in Table 3. Acid and peroxide values are very important parameters that determine the quality of the extracted oil.

Table 3. Chemical properties of extracted oils

Oilseed species	Acid number (mg of KOH/g of oil)	Peroxide value (meq O_2 /g of oil)
Cucumeropsis mannii	4,05±0,25	7,18±0,11
Lagenaria siceraria	2,91±0,27	8,76±0,39
Cucurbita pepo	3,15±0,30	10,00±0,00

The acid number values found on the three oils comply with the Codex Alimentarus standard [11] which states that the acid number of virgin oils should not exceed the value of 4 mg KOH/ g of oil. The maximum peroxide index values noted are much lower than the maximum value allowed for virgin edible oils, i.e. 15 mg O_2 /g of oil [11]. It should therefore be noted that the seed oils of the three cucurbit species studied have good chemical quality. Fatty acid composition.

Table 4 gives the results of the Gas Chromatography (GPC) analysis of the fatty acid methyl esters of the seed oils of *Cucumeropsis mannii*, *Cucurbita pepo* and *Lagenaria siceraria* extracted by the water method. The seed oils studied were found to be very rich in unsaturated fatty acids with a predominance of linoleic acid, the contents of which were 56.85%; 50.56% and 67.77% respectively for the seed oils of *Cucumeropsis mannii*, *Cucurbita pepo* and *Lagenaria siceraria*. It appears from these observations that the seeds of *Lagenaria siceraria* give the oils with the highest linoleic acid contents.

Table 4. Fatty acid composition of *Cucumeropsis mannii*, *Cucurbita pepo* and *Lagenaria siceraria* seed oils

Nature of fatty acids	*Lagenaria siceraria*		*Cucumeropsis mannii*		*Cucurbita pepo*
	LS1	Standard deviation	CCM	Standard deviation	CP
C14:0	0.08	0.0006	0.05961	0.0001	0.1304
C16:0	12,11	0.008	15,87867	0,000	14.0378
C17:0	0,00	0,00	0.084395	0.0009	0.1869
C18:0	6,86	0.006	11,753865	0.0220	8.5094
C20:0	0.48	0.0046	0.38144	0.0027	0.4733
C21:0	0.12	0.0090	0.0785	0.0006	0,00
%AGS	12.80		16.48		23.3378
C16:1	0.062	0.0002	0.07698	0.0003	0.1251
C17:1	0,00	0,00	0,00	0,00	0.0825
C18:1 (n-9c)	12,04	0.0065	14,41639	0.0044	25.8927
%AGMI	18.96		26.25		26.1003
C18:2n-6	67,77	0.0168	56,845655	0.0447	50.5620
C18:3(n-6)	0.35	0.0004	0.29805	0.0007	0,00
C18:3(n-3)	0.12	0.0010	0.150665	0.0003	0,00
%AGPI	68.25		57.29		50.562
%AGI	87.21		83.54		76.6623

Whatever the species of seeds considered, we note the following four major fatty acids: linoleic acid (C18:2 (n-6)), oleic acid (C18:1n-9), stearic acid (C18:0) and palmitic acid (C16:0). These four fatty acids have cumulative contents of 98.78%, 98.91% and 99% respectively for the seed oils of *Lagenaria siceraria*, *Cucumeropsis mannii* and Cucurbita pepo. Which leads to the following fatty acid profiles:

- *Lagenaria siceraria:* C18:2n-6 > C16:0> C18:1 (n-9) >C18:0 (Figure 3).
- *Cucumeropsis mannii:* C18:2(n-6) > C16:0> C18:1 (n-9) >C18:0 (Figure 4)
- *Cucurbita pepo:* C18:2(n-6) > C18:1(n-9) > C16:0>C18:0 (Figure 5)

The seed oils of *Lagenaria siceraria* and *Cucumeropsis mannii* have identical major fatty acid profiles.

However, from the analysis of Figure 3, Figure 4 and Figure 5, we see that most oils contain at least 11 different fatty acids. In addition to the four major fatty acids totaling 99%, there are approximately 1% fatty acids in trace form, namely: myristic acid (C14:0), palmitoleic acid (C16:1), margaric acid. (C17:0), ginkgolic acid (C17:1), arachidic acid (C20:0), linolenic acid (C18:3 (n-3)) and heneicoslic acid (C21:0).

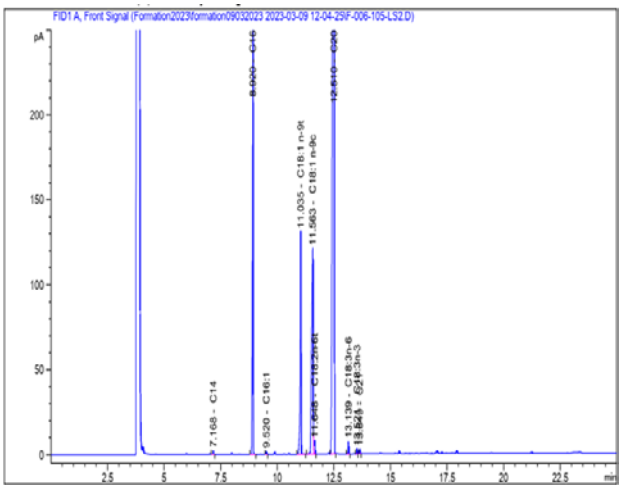

Figure 3. Fatty acid chromatographic profile of *Lagenaria siceraria* seed oils

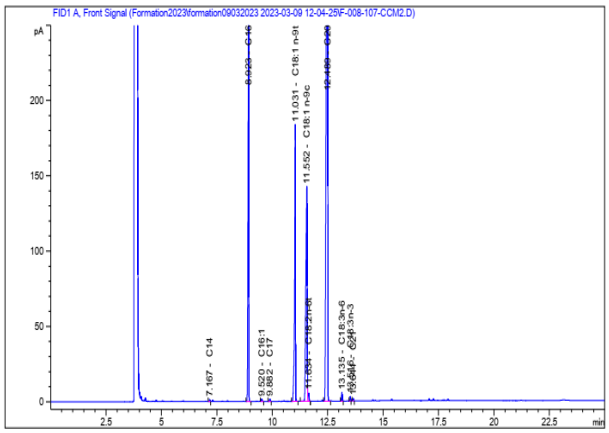

Figure 4. Fatty acid chromatographic profile of *Cucumeropsis mannii* seed oils

Lagenaria siceraria seed oil has the following minor fatty acid profile: C20:0 > C18:3 (n-6) > C18:3 (n-3) > C21:0> C14:0 >C16:1 (Figure 3)

This profile is almost similar to that of *Cucumeropsis mannii* seed oil which is as follows: C20:0 > C18:3 (n-6) > C18:3 (n-3) > C17:0> C21:0 > C16:1> C14:0 (Figure 4)

These two minor fatty acid profiles are differentiated by the absence of margaric acid (C17: 0) in the seed oil of *Lagenaria siceraria* whereas it is present in that of *Cucumeropsis mannii* at a content of 0.08. %. And on the other hand there is a quantitative inversion of myristic and palmitoleic acids in the profiles of the two oils.

The minor fatty acid profile of *Cucurbita pepo* seed oil is as follows: C20:0 > C17:0> C14:0 > C16:1> C17:1 (Figure 5).

This profile is largely distinguishable from those of *Lagenaria siceraria* and *Cucumeropsis mannii* seed oils.

Principal Component Analysis (PCA) of thirteen variables (oil content (var1), percentages of C14:0 (var2), C16:0 (var3), C16:0 (var4), C17:0 (var5), C17:1 (var6), C18:0 (var7), C18:1 (n-9) (var8), C18:2 (n-6) (var9), C20:0 (var10), C18:3 (n-6) (var11), C18:3 (n-3) (var12), C21:0 (var13), leads to the correlation circle shown in Figure 6.

This principal component analysis was conducted with the fatty acid composition results described previously. Its aim is to explain variations between individuals (the species analyzed) using numerical variables (the fatty acid composition of the extracted oils). Principal Component Analysis allows you to visualize the link between variables and the similarity between individuals.

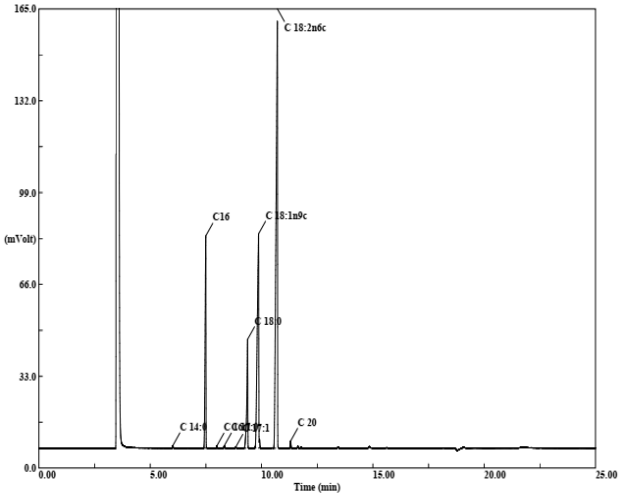

Figure 5. Fatty acid chromatographic profile of *Cucurbita pepo* seed oils

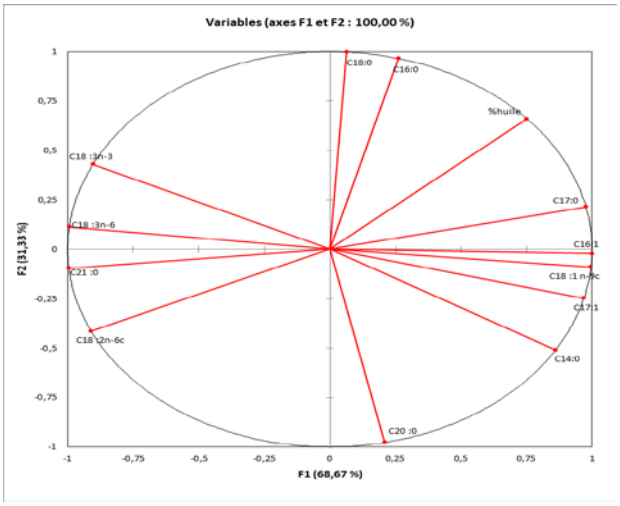

Figure 6. Correlation circle in Principal Component Analysis of the FA composition of *L. siceraria*, *C. mannii* and *C. pepo* oils

Figure 6 shows the relationships between fatty acids. The correlation circles on the F1F2 plane, representing 100.00% information on the total variability, indicate a positive correlation between the contents of palmitic acid (C16:0) and stearic acid, two major saturated fatty acids in seed oils. of the species studied with cumulative contents of more than 20% for *C. mannii* and *C. pepo* and around 18% for *L. siceraria* (Table 4). The contents of linoleic and oleic acids, which are major unsaturated fatty acids with cumulative contents of more than 70% for the three species, are correlated with the contents of the acids in trace form. The content of linoleic acid (C18:2 (n-6)) is positively correlated with those of linolenic (C18:3 (n-3)), gamma-linolenic (C18:3 (n-6)) and heneicoslic (C21:0) while the content of oleic acid (C18:1 (n-9)) is positively correlated with those of myristic (C16:0), ginkgolic (C17:1), palmitoleic (C16:1) and margaric acids. (C17:0). Furthermore, the linoleic acid content is anti-correlated with the oil content. We also observe a negative correlation between the contents of oleic and linolenic acids.

Individuals (oils) were represented in such a way as to maximize inter-individual variation, and according to components which are the linear sum of initial numerical variables. The results should make it possible to identify the fatty acids from the seed oils that best explain the differences between species, that is to say the contents with the greatest variability between the fatty acids of the different seed oils. Thus Figure 7 shows the distribution of oils on the F1F2 plane according to their fatty acid composition.

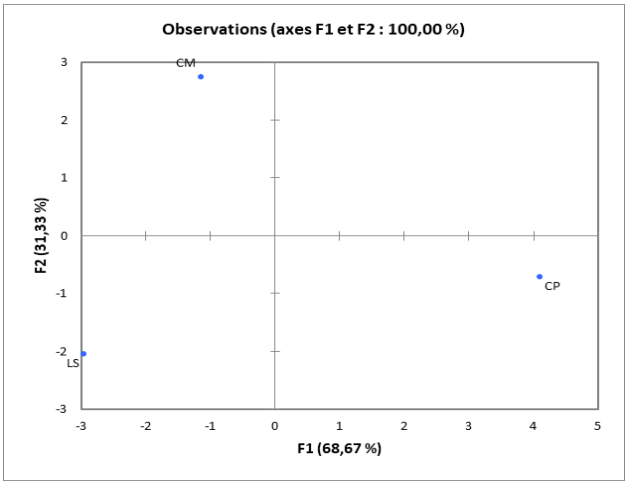

Figure 7. Distribution of individuals in Principal Component Analysis of the FA composition of seed oils of three species

The representation of individuals on the F1F2 plan (Figure 7) highlights a good separation of the three (3) species with *Cucumeropsis mannii* to the left of F2 and at the top of F1; *Lagenaria siceraria* to the left of F2 and bottom of F1 and *Cucurbita pepo* to the right of F2 and bottom of F1. However, *Lagenaria siceraria* and *Cucumeropsis mannii* are closer because they are located on the same side to the right of F2 while *Cucurbita pepo* is on the left. In relation to this occupation of space, the species are distributed according to the fatty acid composition of the oils of their seeds. Which clearly shows that the fatty acid composition of the seed oils studied is not the same.

Figure 8 gives the representation of the two main components F1 and F2 of the oil samples analyzed. The segments on the right represent the observed trends in fatty acid contents.

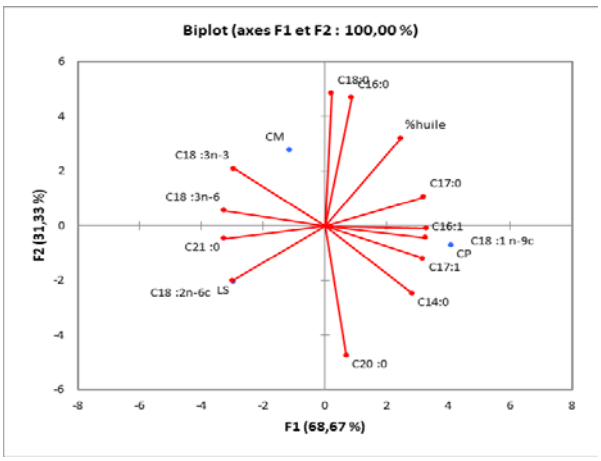

Figure 8. Effect of species on fatty acid composition

The first two components F1 and F2 represent 68.67 and 31.33% of the variance between species, respectively, for a total of 100.00%. The species explains the variations between oils only on the main component F1 ($p<0.05$) which is therefore relevant to analyze.

Lagenaria siceraria seed oil shows the highest linoleic acid content (C18:2 (n-6)), while *Cucurbita pepo* seed oil shows the highest oleic acid content (C18:1 (n-6)), while *Cucurbita pepo* seed oil shows the highest oleic acid content (C18:1 (n-9)) the highest. The seeds of *Cucurbita pepo* and those of *Cucumeropsis mannii* show the highest contents of oil, stearic and palmitic acids. On the other hand, the highest contents of alpha-linolenic and gamma-linolenic acids are found in the seed oil of *Lagenaria siceraria* and *Cucurbita pepo*.

Ultimately, *Lagenaria siceraria* and *Cucurbita pepo* seed oils are those that contain the highest levels of polyunsaturated fatty acids.

The ascending hierarchical classification (CHA or CAH in English) (Table 5 and Figure 9) confirms, from the point of view of fatty acid composition of the extracted oils, the distinction of three species of cucurbits studied.

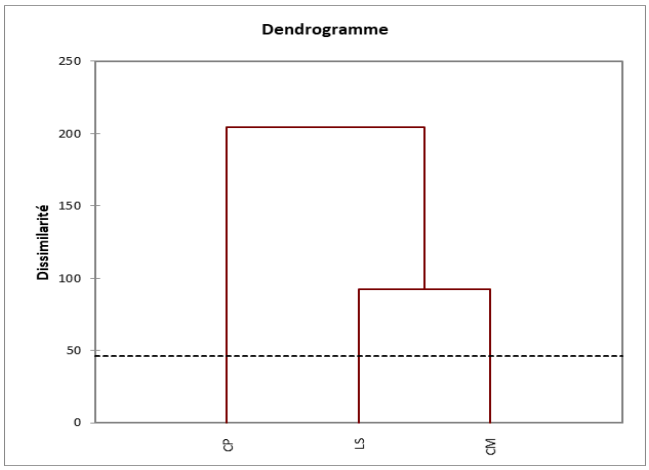

Figure 9. CAH dendrogram of *Cucumeropsis mannii*, *Lagenaria siceraria* and *Cucurbita pepo* grain oils

Table 5. Class distribution by CAH of cucurbit seed oils studied

Class	1	2	3
Objects	1	1	1
Sum of weights	1	1	1
Intra-class variance	0,000	0,000	0,000
Minimum distance to barycenter	0,000	0,000	0,000
Average distance to barycenter	0,000	0,000	0,000
Maximum distance to barycenter	0,000	0,000	0,000
	LS	CM	CP

The results of the Ascending Hierarchical Classification (CAH) recorded in Table 5 and Figure 3 clearly show the three classes of seed oils studied. These three oils having almost similar chromatographic profiles clearly reflect their differences in the quantitative composition of their constituent fatty acids. The “radar-plots” representation built on the oil contents, the cumulative contents of saturated, unsaturated, monounsaturated and polyunsaturated fatty acids of the oils of three species highlights the similarities and differences (Figure 10) of these results of the composition in fatty acids of these oils.

Figure 10 shows three non-superimposable geometric shapes. This reflects the dissimilarity of the quantitative fatty acid composition of the three oils. This Figure 10 best represents the seed oils of *Cucumeropsis mannii*, *Lagenaria siceraria* and *Cucurbita pepo* which are essentially differentiated by the presence in significant quantities of polyunsaturated fatty acids, notably omega 3 and saturated fatty acids.

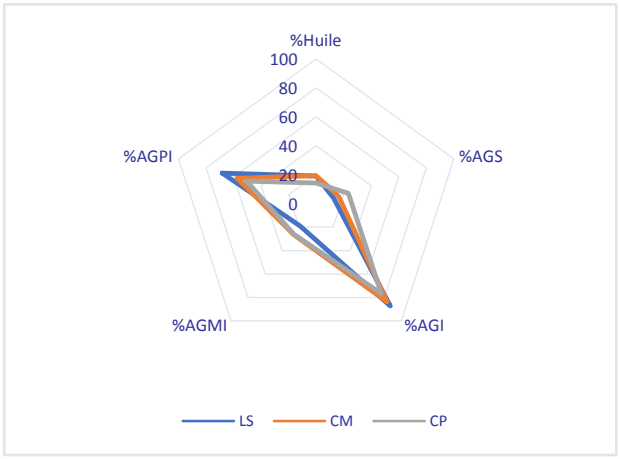

Figure 10. "Radar plots" representation of seed oils from three species

4. Conclusion

The oils extracted by the water method from the seeds of three species of cucurbits, namely *Lagenaria siceraria*, *Cucumeropsis mannii* and *Cucurbita pepo*, were studied with the aim of comparing their fatty acid profiles. The oil content of the seed oils of *Lagenaria siceraria*, *Cucumeropsis mannii* and *Cucurbita pepo* was determined by the water method and then gave respectively 19.03; 14.35 and 19.46%. The acid and peroxide indices of vegetable oils were determined according to IUPAC standards to determine the quality of the extracted oils. These two quality indices have proven to comply with Codex Alimentarius standards. The fatty acid composition of these oils was determined by gas chromatography equipped with a flame ionization detector (FID). The analysis shows that whatever the species of seeds considered, four major fatty acids are identified: linoleic acid (C18:2(n-6)), oleic acid (C18:1(n-9)), stearic acid (C18:0) and palmitic acid (C16:0). Polyunsaturated fatty acids have cumulative contents of 88.25%, 57.29% and 50.56% respectively for the seed oils of *Lagenaria siceraria*, *Cucumeropsis mannii* and *Cucurbita pepo*.

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