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Post-harvest Treatment and Quality Assessment of Cashew Nuts (*Anacardium occidentale L*) Produced in Four Localities of the Poro Region (Côte d'Ivoire)

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Abstract Mastery of post-harvest operations by producers is essential for obtaining quality cashew nuts. It is in this context that this study was carried out with a view to contributing to improving the quality of the cashew nuts produced in 4 localities in the Poro region. A survey was carried out among producers of foundo, lataha, ziemogokaka and gbambanubokaha in order to describe their post-harvest treatments. Quality parameters of the cashew nuts produced were determined and the grade classification was carried out according to the quality criteria defined by the Ivorian standard. The study revealed non-compliance with certain CCA instructions. Indeed, in the 4 localities the majority of producers complied with certain post-harvest operations procedures. While 67.50% of producers stored their nuts in houses; 50% stored them directly on the ground. In addition, the minimum drying time of 3 days was not respected by 45.80% of producers. Determination of quality parameters revealed that cashew nuts classified grade II varied from 37.5% to 55.56% unlike those of grade I which was between 12.50 and 25%. On the other hand, at Foundo, nuts classified out of grade were 37.5%. KOR of the different localities varied from 47.77±1.23 to 49.01±1.11 Ib. Ultimately, non-compliance with the application of post-harvest operations had a negative effect on the quality of the nuts cashews produced. Also, producers in the 4 localities of the Poro region, in particular those Foundo, must be made aware of respect for post-harvest operations.

Keywords: *poro, cashew nuts, post-harvest treatments*

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1. Introduction

Cashew tree is native to the coasts of Brazil. It was introduced to Africa and Asia by the Portuguese [1]. The Cashew tree (*Anacardium Occidentale L*) was introduced into Cote d'Ivoire in the 1960s mainly in the northern part of the country. It was initially planted in this area as a reforestation tree with the aim of combating erosion and reducing desert encroachment. Today, it has become an important cash crop due to the high demand for cashew nuts in the international market [2]. Côte d'Ivoire records large productions of cashew nuts with production increasing from 702,000 tons in 2015 to more than 900,000 tons in 2021, making it the world's leading producer and exporter of cashew nuts [3,4].

Today, cashew is the most dynamic crop in the Central and Northern regions, surpassing the traditional export crop of cotton in terms of production volumes and export revenues [5]. It generates significant income from which the rural populations of northern Côte d'Ivoire benefit. In fact, it employs more than 350,000 producers for an estimated cultivated area 1,350,000 ha [6].

Despite all these very appreciable results from the sector, producers are faced with a nut quality problem. Cashew nuts are often harvested immature, poorly dried or poorly stored, which would affect their marketability and

health quality. These poor agricultural practices are detrimental to the value of cashew nuts on national and international markets, with repercussions on the purchase price [7]. Current challenge of the cashew sector is essentially linked to the quality of raw nuts, the delivery time of products, commercial and financial networks and the traceability of products which condition the dynamics of purchase prices at the global level [8]. Controlling the quality of cashew nuts is essential for obtaining good quality nuts which would depend on post-harvest treatments including drying, storage and packaging before export or processing [9,10]. This involves assessing the impact of producers' post-harvest practices on the deterioration in the quality of cashew nuts produced, and determining the KOR of cashew nuts, which to date remains the only barometer of the quality of the nuts produced. in Côte d'Ivoire, thus conditioning their purchase price. Knowledge of post-harvest operations carried out by producers could effectively contribute to improving the quality of this product. It is in this context that this survey was carried out, the general objective of which is to contribute to improving the quality of cashew nuts produced in the Poro region.

2. Material and Methods

2.1. Material

Biological material used in this survey consisted of cashew nuts collected from February to May 2023, from producers in four localities in the PORO region: Foundo, Lataha, Ziemogokaha and Gbambalanubokaha. The target population was producers in 4 localities

2.2. Methods

2.2.1. Sampling of Cashew Nut Producers

Survey was carried out in 4 localities in the PORO region. These localities were selected on the basis of stakeholder availability and local accessibility, in accordance with the guidelines of the NGO Chigata, *Woman and Development*).

In these different localities, 32 producers (8 producers/locality) with plantations in production were met randomly, taking into account their willingness to be interviewed.

2.2.2. Survey

Survey consisted in submitting to the selected producers a questionnaire consisting of closed and open questions. Closed questions allow for concise and precise answers. As for open questions, they were used to gather broader opinions. The questionnaire focused on the sociological profile of producers and post-harvest practices of cashew nuts.

2.2.3. Cashew Nut Sampling

Sampling consisted in taking 1.5 kg of cashew nuts from three different batches of bags from each producer. The cashew nuts collected from producers in the same locality were mixed to make up the local sample. Thus, analyzes were carried out on 4 samples, that is, one sample per locality.

2.2.4. Nut quality Analysis

2.2.4.1. Determination of Moisture Content

Moisture content of cashew nuts was determined using the humimeter FSG. It consisted in filling the humidity meter with a volume of 2 L of cashew nuts and the humidity value displayed was read.

2.2.4.2. Determination of Graining and Foreign Matter Content

Graining and the level of foreign matter in the cashew nuts were determined following the method described by [11]. 1 Kg of sample (P) was weighed and the cashew nuts were placed in small piles of ten. The number of lots of ten and the extra nuts were counted. Foreign matter present (PME) in the weighed sample was removed and then weighed.

To restore the initial weight (1 Kg) of the sample, the weight of foreign matter was compensated by other nuts before the final count. Graining and the rate of foreign matter were calculated using the following formulas:

Graining = N/P; Foreign Matter Rate (%) = (PME / P) × 100

N: number of cashew nuts counted; PME: weight of foreign matter; P: sample weight

2.2.4.3. Determination of Defect Rate, Fine Yield and Kernel Output Ratio

Defect rate, kernel yield and Kernel Output Ratio (KOR) of cashew nuts were determined gravimetrically according to the method described by [11]. 1 Kg of sample cashew nuts (P1) were delicately cut into two halves lengthwise using a hornbill beak. Good-quality nuts (white, healthy kernels with no visible defects) that can be used in full (100%) are placed on a green plate. Then, the partially usable (50%) immature nuts (crumpled kernels) and pitted nuts (black spot on the kernel) are grouped together in a blue plate. Finally, the buttered, moth-eaten, stunted, moldy and empty nuts rejected (100%) are placed on a red plate.

Healthy kernels of the nuts contained in the green plate were separated from their shells using a needle or point. Kernels obtained were weighed (P2). Nuts contained in the blue plate were weighed (P3) then the kernels were removed from the shells and weighed (P4). Finally the nuts contained in the red plate were weighed (P5). The defect rate was calculated using the following formula:

Defect rate (%) = (P3 + P5)/P1 × 100

P1: the total weight of the sample; P3: the weight of nuts rejected at 50%; P5: the weight of nuts rejected at 100%.

Kernel yield (%) was calculated by the formula below:

Ra (kernel yield) = ((P2 +P4/2)/ P1) ×100

KOR (in lbs) was calculated using the following formula:

KOR (lb) = (Ra/100) × 80 × (1/0.45359)

P2: weight of healthy kernels; P4: weight of 50% rejected kernels; 1/0.45359: coefficient for converting Kg to lb.

2.2.4.4. Cashew Nut Grade Classification

Grade classification of cashew nuts was made according to the Ivorian standard [12,13]. Classification criteria are recorded in Table 1.

Table 1. Cashew nut marketability criteria

Quality parameters	Grade I	Grade II	Grade III
Moisture (%)	≤ 10	≤ 10	≤ 10
Graining (nuts/kg)	≤ 200	] 200-215]	] 215-240]
Foreign matter content (%)	≤ 0.5	≤ 0.5	≤ 0.5
Defect rate or TD (%)	≤ 10	] 10-15]	] 15-20]
Kernel yield or Ra (%)	≥ 27.24	[23.83-27.23]	[19.86-23.82]
KOR (lb/80 Kg)	≥ 48	] 42-48[	[35-42]

2.2.5. Statistical Analysis

Quality parameters are expressed as mean ± standard deviation. Analysis of variations were carried out to verify the existence of significant differences between the means. This was followed by Tukey's HSD test to classify the means. The chi-square test ($\chi 2$) was then applied to assess the significance of the difference between the calculated proportions. All statistical tests were carried out using XLSTAT 2014 software, and statistical significance was set at $p < 0.05$.

3. Results and Discussion

Figure 1 shows the distribution of producers by gender, age and literacy level. Concerning gender, the majority of cashew producers are men with percentages varying from 83.33% to 100% in the 4 localities. In the localities of Foundo, Lataha and Gbambalanubokaha, producers were exclusively men. In the locality of Ziemogokaha, women were in the minority with a percentage of 16.67% compared to men (83.33%). Indeed, the rush of men towards cashew farmnig is due to the cotton crisis characterized by the fall in seed cotton prices unlike cashew nuts which have seen an increase in recent years. These results are in line with those of [14] who stated that most cashew producers are men. Some women own plantations acquired through inheritance from their husbands or fathers. This same observation was made by [15] who reported that women rarely inherit valuable land definitively with exclusive rights and that the areas of their farms are generally a third of those of men. Regarding the distribution of producers according to age, the majority of producers met were between 21 and 50 years old with a percentage oscillating between 75% and 100%. The producers of Foundo and Ziemogokaha were exclusively from 21 to 50. As for the producers of Lataha and Gbambalanubokaha, the rate for the 21 to 50 year old group is between 75% and 77.78% unlike the over 50 year old group (22.22 to 25%). This presence of young people in cashew farming could be explained by the arduousness of the work during plantation maintenance [16]. Regarding literacy, the producers of Foundo and Ziemogokaha were all illiterate (100%). In Lataha and Gbambalanubokaha, the literacy rate was 12.5% and 11.11% respectively. This high rate of illiteracy is justified by the refusal of parents to send their children to school in the past because they would constitute a workforce. This situation would have had a negative impact on the application of farming techniques. These results were similarto those of [16] showing that cashew producers in the Korhogo department were mainly illiterate.

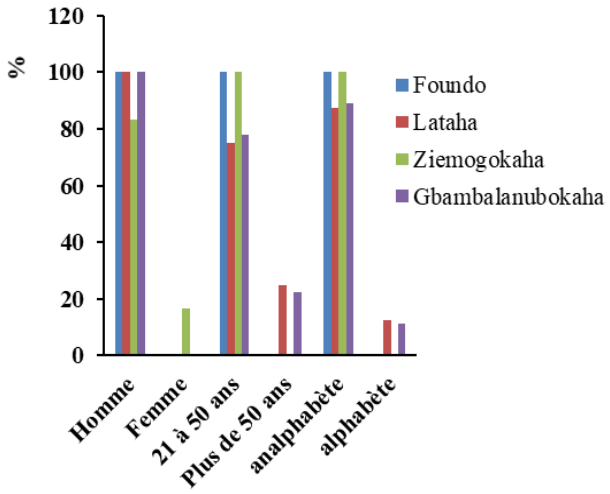

Figure 1. Distribution of farmers by gender, age and literacy level in the different localities

Distribution of farmers according to marital status, ethnicity and method of land acquisition is shown in Figure 2. In the localities of Foundo, Lataha and Gbambalanubokaha, the majority of farmers were polygamous with proportions between 55.56% and 75%, while in Ziemogokaha, they were mainly monogamous with a proportion estimated at 66.67%. This high proportion of polygamists could be explained by the use of women as labor for rural work. In the localities of Foundo, Lataha and Ziemogokaha, all producers (100%) were Senufos compared to the locality of Gbambalanubokaha where Malinkés represent 33.33%. This is corroborated with the method of land acquisition where in the localities of Foundo, Lataha and Ziemogokaha, it is done exclusively by inheritance (100%). In that of Gbambalanubokaha, the ceded lands represent only 22.22%. This would be justified by the fact that the Sénoufos are the indigenous people and therefore land owners.

In the four localities, the majority of the plantations were between 10 and 20 years old. Which represents a proportion oscillating between 62.50 and 83.33% while the minority of plantations were between 20 and 30 years old (11.11 to 12.50%) and these plantations are located in Foundo, Lataha and Gbambalanubokaha. Plantations less than 10 years old have rates varying from 12.50 to 25%. Low proportion of plantations whose age is between 20 and 30 years is due to the renewal of plantations In terms of cashew nut drying facilities, the most widely used is tarpaulin in the 4 localities, with proportions ranging from 71.43 to 100%. The use of tarpaulins is 100% in Foundo and Gbambalanubokaha. In

Foundo and Gbambalanubokaha.

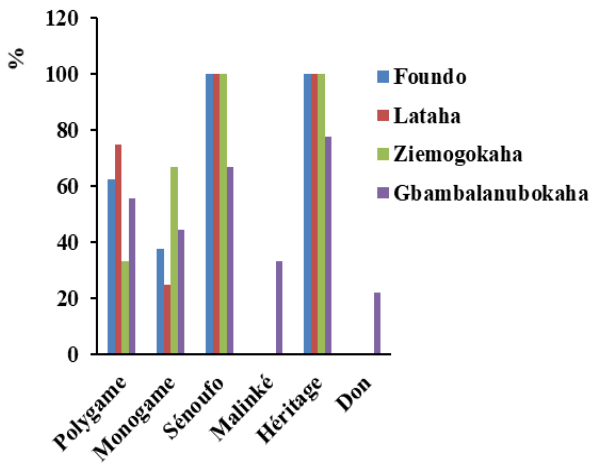

Figure 2. Distribution of farmers by marital status, ethnicity and land acquisition method in the different localities

Age of the plantations, the drying method and the drying time are illustrated in Figure 3.

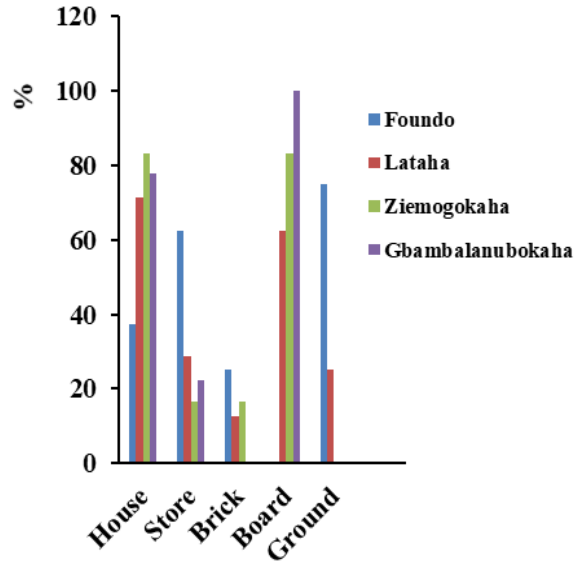

Figure 3. Distribution of farmers according to plantation age, drying method and drying time in different localities

Drying on the ground is only carried out in Lataha and ziemogokaha with respective percentages of 28.57 and 16.67%. Our results are confirmed by those of [17] who allegedly stated that producers dry their nuts before storage on the ground or on tarpaulins. No-use of the racks would be justified by the fact that the racks would be difficult to install.

As for the drying time, the majority of producers in the localities of Foundo, Lataha and Ziemogokaha dry the nuts in less than 3 days, percentages oscillating between 50 and 71%, unlike drying between 5 and 7 days which only practiced in the localities of Foundo (12.50%) and Ziemogokaha (16.67%). Gbambalanubokaha farmers mainly dry the nuts between 3 and 5 days with a proportion of 88.88%.

Storage location and storage facilities for the bags are shown in Figure 4. In the localities of Lataha, Ziemogokaha and Gbambalanubokaha, the majority of farmrs store bags of nuts in their houses and on boards with percentages varying respectively from 71.42 to 83.33% and from 62.50 to 100%. On the other hand, in Foundo, the majority store bags of nuts in stores (62.5%) and on the ground (75%). These results confirm those of [17] who revealed that placing bags directly on the ground is an inappropriate practice that could have a negative impact on the quality of cashew nuts.

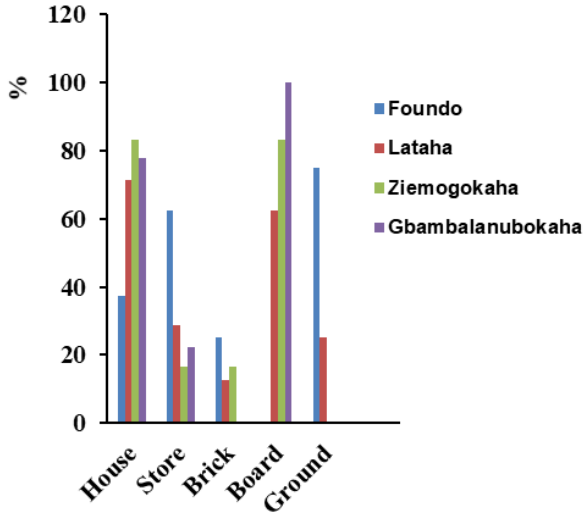

Figure 4. Distribution of farmers according to storage location and storage facilities for cashew nut bags in different localities

Results of the nut quality parameters are presented in Table 2. These parameters are statistically identical ($p < 0.05$). The moisture of the cashew nuts studied varied from 8.42 ± 0.10 to 9.2 ± 0.23% with the lowest value for the Gbambalanubokaha locality and the highest for Foundo. Lataha (9.02±1.15%) and Ziemogokaha (8.55±0.46%) recorded intermediate values. These contents were lower than those of [18] who recorded a moisture of 11.91± 0.15 in the Kent variety mangoes but higher than those of [16] who recorded contents between 5.60 ± 1.40 and 5.80 ± 1.80% in cashew nuts from Korhogo department. Our results comply with the standards of Côte d'Ivoire which are between 7 and 10% [12,19]. These low moisture contents of cashew nuts testify to well-managed drying by producers in the different localities. Under proper storage conditions, cashews may not be exposed to mold which could extend shelf life [3]. Regarding graining, the average of cashew nuts from different localities oscillated between 180.60 ± 5.26 and 191.75 ± 7.40 Nuts/Kg. These values were much lower than those [20] recorded in Senegal (218 to 227 nuts/Kg) and Guinea Bissau (215 to 222 nuts/Kg). Cashew nuts from Foundo (191.75 ± 7.40 Nuts/Kg) could be considered of good quality because the grain value is between 190 and 200 Nuts/Kg unlike other localities where they are of very good quality (180 and 190 Nuts/Kg) according to the assessment criteria defined by [21]. This good graining of our nuts could be due to good agricultural practices carried out by producers [10]. Concerning foreign matters, the percentage varied between 0.23 ± 0.02 and 0.24 ± 0.02%. These percentages are well below 0.50% which is the marketing standard for nuts defined by Côte d'Ivoire [12,19]. These low values of foreign matters could be due to careful sorting carried out

by producers. Defect rate of cashew nuts from different localities was between 11.90 ± 1.79 and 13.45 ± 1.77%. These values are match with those of [16] who recorded values between 11.96 and 13.90% in nuts from the Korhogo department. But different from those of [7] in raw cashew nuts (7.9 and 9%) in Ziguinchor in Senegal. Our values obtained were lower than 15% which is the reference value for quality nuts in Côte d'Ivoire [12] but higher than the WAEMU standard which is 8% [22]. These high defect rates in the different localities could be due to a poor harvest and storage of nuts in inappropriate conditions. Kernels yield and the KOR reflect the quantity of useful kernels contained in an 80 kg bag of cashew nuts. The KOR for the locality of Foundo was 47.77±1.23 Ib. Nuts from this locality could be of an acceptable quality because the KOR is between 46 and 48 Ib according to the assessment criteria defined by [21]. As for cashew nuts from the other localities, they had a KOR of between 48 and 50 Ib so could be of good quality according to these same assessment criteria. This difference would be due to the fact that the majority of Foundo producers store their bags of cashew nuts on bare ground, which would have generated a high default rate (13.45 ± 1.77%).

Table 2. Cashew nut quality parameters by locality

Parameters	Foundo	Lataha	Ziemogokaha	Gbambala nubokaha
Moisture (%)	9.20 ± 0.23a	9.02 ± 1.35a	8.55 ± 0.46a	8.42 ± 0.10a
Graining (nuts/kg)	191.75 ± 7.44a	180.85 ± 6.28a	180.6 ± 5.26a	188.44 ± 5.01a
Foreign matter (%)	0.24 ± 0.01a	0.23 ± 0.02a	0.24 ± 0.02a	0.23 ± 0.04a
Defect rate (%)	13.45 ± 1.77a	12.17 ± 1.72a	12.95 ± 1.11a	11.9 ± 1.79a
Kernel yield (%)	27.09 ± 0.71a	27.75 ± 1.26a	27.3 ± 1.86a	27.79 ± 0.27a
KOR (lb)	47.77 ± 1.23a	48.95 ± 2.27a	48.14 ± 3.41a	49.01 ± 1.11a

Averages in the same colonn bearing the same letter show no material difference at risk p=0.05.

Table 3. Classification of nuts by grade and locality

Parameters	Foundo	Lataha	Ziemogokaha	Gbambala nubokaha
Grade I (%)	25	12.50	25	22.22
Grade II (%)	37.50	50	50	55.56
Grade III (%)	0	25	12.50	11.11
Out of grade (%)	37.50	12.50	12.50	11.11

Table 3 shows the grade classification of cashew nuts according to localities. Grade I percentages of cashew nuts are 25, 12.50, 25 and 22.22% respectively for Foundo, Lataha, Ziemogokaha and Gbambalanubokaha. Compared to Grade I, the percentages of Grade II were higher and varied from 37.5 to 55.56% with the highest percentage for Gbambalanubokaha (55.56%) and the lowest for Foundo. As for the localities of Lataha and Ziemogokaha, they had a percentage of 50%. Regarding grade III, it varies from 0 to 25% with o% for Foundo and 25% for Lataha. Ziemogokaha (12.50%) and Gbambalanubokaha (11.11%) recorded intermediate values. On the other hand, in Foundo, cashew nuts classified as off-grade are higher (37.5%). It follows from these results that post-harvest treatments could have an impact on the quality of cashew nuts. This observation is confirmed by [23] who allegedly stated that poor packaging and storage has a negative impact on the quality of cashew nuts in the sense that the slightest presence of fungus, mold and rot affects the KOR.

4. Conclusion

This survey showed that cashew nut producers in the localities of Foundo, Lataha, Ziemogokaha and Gbambalanubokaha carried out the post-harvest operations recommended by the Cotton and Cashew Board (CCA). However, the storage location and facilities used by the majority of farmers were inappropriate and did not comply with the CCA's requirements. In addition, the minimum drying time was not observed by the majority of producers. Determination of quality parameters revealed that the cashew nuts produced are generally very dry, large in size and free of impurities. However, cashew nuts classified grade II are higher in all localities. On the other hand, Foundo recorded more cashew nuts classified off-grade. Ultimately, non-compliance with post-harvest practices had a negative effect on the quality of the cashew nuts produced. We recommend that the CCA raise awareness among producers in these localities, particularly those of Foundo, about observing post-harvest operations in order to improve the quality of cashew nuts.

ACKNOWLEDGEMENTS

The heading of the Acknowledgment section and the References section must not be numbered.

References

[1] MINADER. Document de stratégie de la réforme des filières coton et anacarde. *Ministère de l'agriculture, Côte d'Ivoire*, 55p. 2013.

[2] Yao, N. R., Oule, A.F. and N'Goran, K.D. Evaluation de la vulnérabilité du secteur agricole face aux changements climatiques en Côte d'Ivoire. *Rapport final*, 105 p. 2013.

[3] ACA. Alliance pour le Cajou Africain, *rapport annuel* 2021.

[4] Ecofin. Noix de cajou: production Africaine devrait depasser 2,1 millions de tonnes en 2021. 2021.

[5] Ruf, F, Kone, S, and Bebo, B. Le boom de l'anacarde en Côte d'Ivoire: transition écologique et sociale des systèmes à base de coton et de cacao. *Cah Agric* 28: 19p. 2019.

[6] FIRCA. La filière anacarde, firca, Cote d'Ivoire, 55p. 2018.

[7] Ndiaye, S, Charahabil, M.M, and Diatta, M. Evaluation de la qualité des noix brutes d'anacarde en Casamance (Sénégal). *European Scientific Journal*, 16 (6): 374-394. 2020.

[8] Ouedraogo, A. and Ricau, P. Bulletin sur le marché d'anacarde, Bulletin N°188, SICN et ACA, 8 p. 2016.

[9] Balogoun I., Saïdou A., Ahoton E.L, Amadji, L.G, Ahohuendo, C.B.I, Adebo, B, Babatounde, S, Chougourou, D, Adoukonou-sagbadja, H, and Ahanchede, A. Caractérisation des systèmes de production à base d'anacardier dans les principales zones de culture au Bénin. *Agronomie Africaine*, 26 (1): 9-22. 2014.

[10] Amanoudo, M.J, Moussa, I, Tokore, J.S.B, Kindemin, O.A, Wauters, P, and Muenkner, C**.** Evaluation des effets des bonnes pratiques d'entretien et de gestion des plantations sur la productivité et la qualité des noix brutes de cajou dans le département du borgou (Benin). Actes du Colloque International d'Échanges Scientifiques sur l'Anacarde (CIESA), Bassam. (Côte d'Ivoire), pp 46-53. 2017.

[11] Rabany, C. Apprécier la Qualité des Noix de Cajou Brutes - Manuel Technique. Initiative Cajou Africain (ICA) – GTZ (Deutsche Gesellschaft für Internationale Zusammenarbeit): 25 p. 2011.
[12] CODINORM. Standards de qualité de noix brutes. 31p. 2009.
[13] NI. Noix brutes de cajou - spécification. Norme Ivoirienne NI4595. 2009a.
[14] Diabaté, Z.A. Étude de la qualité de la noix de cajou dans la sous-préfecture de kiemou. Mémoire de Licence, IGA/Université Peleforo GON COULIBALY (Korhogo, Côte d'Ivoire), 43 p. 2017.
[15] Koné, M. Analyse de la chaine de valeur du secteur anacarde en Côte d'Ivoire. ICA, Côte d'Ivoire, 76 p. 2010.
[16] Coulibaly, A, Doumbouya, M, Dagnogo, K, Coulibaly, A.S, Gboko, O.S, Biego, G.M.H and Diarrassouba, N. Évaluation de la qualité des noix de cajou (Anacardium occidentale L.) produites dans le département de Korhogo en Côte d'Ivoire. *International Journal of Biological and Chemical Sciences*, 15(3): 1030-1049. 2021.
[17] Lebailly, P, Lynn, S, and Seri, H. Etude pour la préparation d'une stratégie pour le développement de la filière anacarde en Côte d''Ivoire ; *Rapport diagnostic. FED*, 92 p. 2012.
[18] Touré, A, Zoro, A.F, Touré, N, Sall, F, Soro, Y.R and Coulibaly, A. Physicochemical and nutritive properties of by-products flours from cashew (Anacardium occidentale) and mango (Mangifera indica) for ruminants feeding in Poro region (Northern Côte d'Ivoire). EAS Journal of Nutrition and Food Sciences, 2(2): 44 – 48. 2020.
[19] NI (Norme Ivoirienne). (2009b). Noix brutes de cajou - spécification. Norme Ivoirienne, NI4595. 2009b.
[20] WCCE (World Cashew Convention & Exhibition). Résumé de conférence. La 5ème édition de la World Cashew Convention & Exhibition s'est tenue à Abu Dhabi du 24 au 26 janvier. 25p. 2019.
[21] Rongead. L'out-turn ou comment mesurer la qualité de l'anacarde ? Projet de professionnalisation de la filière anacarde, mise en œuvre IFCI/Rongead. 36 p. 2015.
[22] Arlène, A, and Broutin, C. Normes de qualité pour les produits agroalimentaires en Afrique de l'Ouest. Agence Française de Développement, du département de recherche. 2009.
[23] Say, A.A.D. Analyse de la qualité bord champ de la noix de cajou dans le département de boundiali et kouto. Mémoire de Licence en Economie et Gestion Agropastorale. Université Peleforo Gon Coulibaly. Côte d'Ivoire 32 p. 2017.