

Determination of the ethnobotanical and socio-economic potential of *Cola nitida* nuts through a survey conducted in five cola producing locations in Côte d'Ivoire

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Abstract

Background: Among the agricultural crops of many West African countries such as Côte d'Ivoire, kola nut has reached a certain level of development that requires greater attention, economically, socially and ethnically. The objective of this work was to collect from the entire population (consumers and/or traders or not) what *Cola nitida* represents for them as well as its daily impact on their lives.

Materials and Methods: To do this, a survey was conducted for two months according to the formula of WHO (1991), which involved interviewing 150 people in 5 different localities (Séguéla (30), Bouaké (30), Abobo (30), Anyama (30) and Adjamé (30)). The respondents were composed of 50 sellers and 100 consumers of cola nuts, and the snowball technique, which is a non-probabilistic sampling method, was mainly used in this study.

Results: The survey revealed that *Cola nitida* nuts are known and used by more than 84% of the population for reasons mainly ceremonial (28%) or food (23%), even if other non-common reasons exist. Moreover, even if the cultivation and wholesale trade were carried out at 95% by men, the involvement of women was observed in the harvesting and retail trade of cola nuts, at 55% and 53%, respectively. On the other hand, commercialization provided during periods of abundance, an average daily income of between 2,500 and 5,000 AFCE for Itinerant retail trade at 78%, while the daily income of more than 10,000 AFCE was obtained exclusively by wholesale traders. Furthermore, 89% of cola nut traders kept their products in more or less adequate warehouses, where the storage containers used were of three kinds: plant leaves (*Thaumatococcus daniellii*) + baskets + (jute or polypropylene) bags (56%); plant leaves + bags (38%) and leaves only (6%). Also, 34% of the nuts contained in bags were transported by vans even though they were often simply transported in bags (17%) and baskets (16%). The consumption of cola nuts was noted in their raw and natural form at 85%, but this was not related to their 74% color. The use of cola nuts for health needs has been observed only almost exclusively in human pathologies, at 92%.

Conclusion: All this collected information during this investigation on cola nuts from the population shows the interest that should from now on be given to the cola sector in Côte d'Ivoire in order to help boost its agricultural economy.

Key Words: Survey, *Cola nitida*, Socio-economic, Consumption, Trading, Côte d'Ivoire.

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I. Introduction

The economy of most sub-Saharan African countries is based mainly on agriculture, which employs about 66% of the working population and accounts for 34% of GDP^{1,2}. In Côte d'Ivoire, this agriculture is mainly based on perennial cropping systems including cocoa, coffee, rubber and especially palm¹. In addition to these crops, the cola nut is of great economic importance and is used in several cultural and traditional ceremonies^{3,4}.

In Côte d'Ivoire, several varieties of cola are produced and are appreciated for their many virtues. Among these varieties, *Cola nitida* and *Cola acuminata* are used and play an important role in several fields, mainly in the pharmaceutical industry (manufacture of medicines), in traditional medicine, in the agri-food industry^{5,6} and in the chemical industry (dyeing, cosmetology)^{7,8}.

In Côte d'Ivoire, cola nuts plays a central role in Ivorian traditions and is used by most Ivorian ethnic groups⁹. In addition, with an average annual production of 260,000 tons since 2016, Côte d'Ivoire is the world's second largest producer of cola nuts after Nigeria and the main exporter¹⁰. Furthermore, it took a major step forward by launching the Agricultural Raw Materials Exchange (BMPA) in Abidjan on May 28, 2025¹¹. Among the three agricultural products disseminated, there are also cashew nuts, corn, and cola nuts¹¹. The incorporation of the cola nut into the BMPA aims to bring transparency and revitalization to a sector that had previously been dominated by the informal sector and, above all, in decline over the past two decades¹¹.

Indeed, during the first quotation session, the cola nut was exchanged at 1,000 FCFA per kilogram, compared to 440 FCFA for the cashew nut and 220 FCFA for corn¹¹. With more than 2,000 Ivorian producers, the cola sector is very popular and is growing on plantations of up to 10 ha, supporting several families in Côte d'Ivoire¹².

Therefore, cola nuts could be a viable alternative to promote economic development in low-income countries like Côte d'Ivoire¹³. Despite the structure of the sector and the socio-economic role as well as the nutritional value of the cola nut, production, marketing and consumption are subject to enormous constraints.

Indeed, despite some work and the performance achieved in both production and research in Côte d'Ivoire, data are scarce or even non-existent regarding the level of knowledge and use of cola nuts in Côte d'Ivoire. The general objective of this study was to contribute to the development of the cola sector by determining the ethnobotanical and socio-economic potential of *Cola nitida* nuts through a survey carried out in localities counted among the largest cola producers in Côte d'Ivoire.

II. Material and methods

1- Material

1-1 Plant material

The plant material consisted of red and white cola nuts sold, marketed and consumed in Côte d'Ivoire (**Figures 1 and 2**).



A



B



C

Figure 2: Storage of cola nuts in leaves (A), in leaves and bagged (B) and (C) under a warehouse

1-2 Non-biological material

The non-biological material consisted of an investigation sheet and a camera. The survey included a questionnaire on the level of knowledge of *Cola nitida* nuts sold and consumed in Côte d'Ivoire, their use and the socio-demographic status of the respondents. As for the camera, it served as a shot.

2. Methods

2-1 Criteria for choosing cola nuts

Cola nitida nuts were chosen for their ethnobotanical importance, availability and lower cost. But also, these types of cola are the most cultivated, consumed and sold in Côte d'Ivoire.

2-2 Identification of cola nuts

Before the survey on the level of knowledge, uses, cultural and economic dimension, scientific identification and confirmation of identity of targeted cola nuts were made at the National Floristic Center (NFC) of the University of Félix Houphouët Boigny, in Côte d'Ivoire.

2-3 Criteria for the choice of survey and sampling areas

The choice of sampling areas is justified on the one hand by the high productivity and abundance of cola nuts in these areas, and on the other hand by the willingness of sellers and consumers to participate in the study.

2-4 Survey method

This survey aimed to assess the level of knowledge, the different uses, the cultural dimensions and the social dimensions of cola nuts sold and consumed in Côte d'Ivoire. The survey period was from February 2026 to March 2026. The size of the respondents was determined according to the **WHO** formula¹⁴. Thus, 150 people in 5 different localities (Séguéla (30), Bouaké (30), Abobo (30), Anyama (30) and Adjamé (30)) were investigated. The respondents were composed of 50 sellers and 100 consumers of *Cola nitida* nuts. The snowball technique, which is a non-probabilistic sampling method, was mainly used in this study. It consisted of distributing the survey questionnaire to people with the desired characteristics and then asking them to distribute it to other people with a similar profile¹⁵.

2-5 Statistical analyses

All results were analyzed by ANOVA variance. The multiple comparison Turkey-Kramer test for which a variation above 10% ($p > 0.01$) was considered not significant and below 10% ($p < 0.01$) will be significant ($P < 0.01$)

III. Results

1- Level of use and knowledge of cola nuts

The survey showed different levels of knowledge and use of red cola nuts (94% and 98%) and white cola nuts (84-97%), respectively (Figure 3).

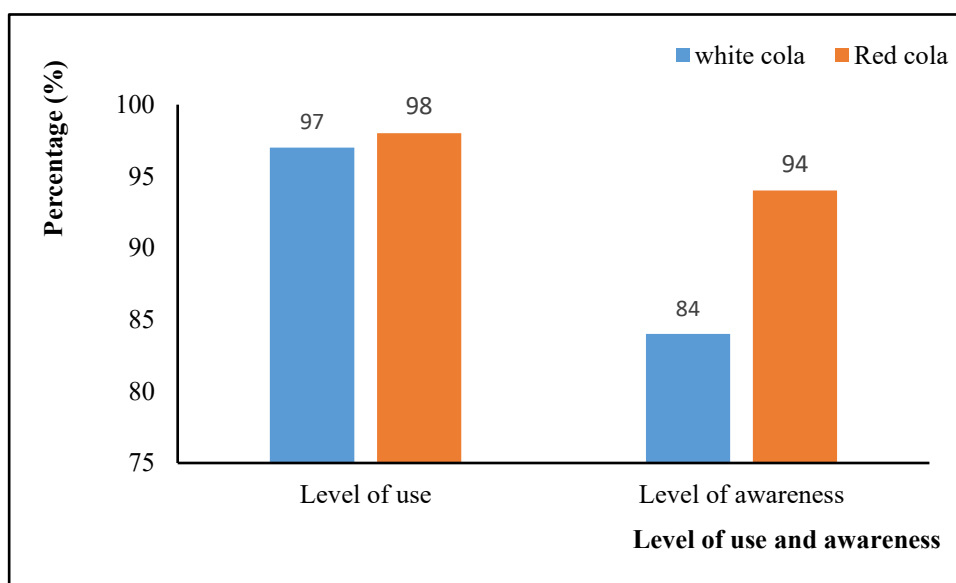


Figure 3: Level of use and knowledge of cola nuts

2- Reasons for the use of cola nuts

The main reasons for using cola nuts were mainly ceremonial (28%) and dietary (23%). The nuts are then used for rituals, for aphrodisiac reasons and to stimulate appetite with 9% and 8%, respectively, or for therapeutic reasons with 7%. Cola nuts are nevertheless used in cases of nausea, vomiting, social cohesion or for aesthetic reasons, in small proportions. (**Figure 4**).

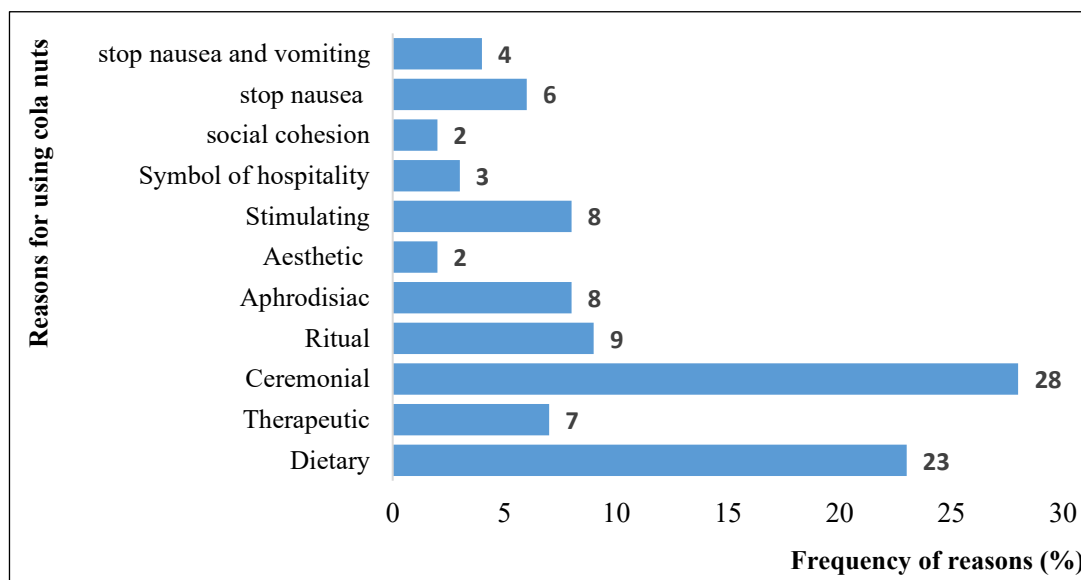


Figure 4: Reasons for the use of cola nuts

3- Economic aspects in cola nuts production

The results of the survey indicated (**Table 1**) that daily average income below 2,500 (AFCF) is mainly obtained by street retailers, with 78%. As for average daily income between 2,501 and 5,000 AFCF, it is obtained by street retailers (12%), and traders in fixed details (10%). The average daily income of between 10,001 and 20,000 AFCF and that of over 20,001 was mainly dominated by wholesalers, with 23% and 47%, respectively.

Table 1: Economic aspects in cola nuts production

Daily income ranges (AFC franc)	Frequency of incomes by trade type (%)		
	Itinerant retail trade	Fixed-site retail	Wholesale trade
[0-2500]	78	22	0
[2501-5000]	12	10	0
[5001-10000]	2	2	4
[10001-20000]	0	0	23
[> 20000]	0	0	47

4- Level of involvement in the cola production based on gender

Men and women participate in all levels of cola production and marketing. Nevertheless, men are significantly more involved than women in growing (95%), selling wholesale (85%) and packaging and storing nuts (85%) (Figure 5).

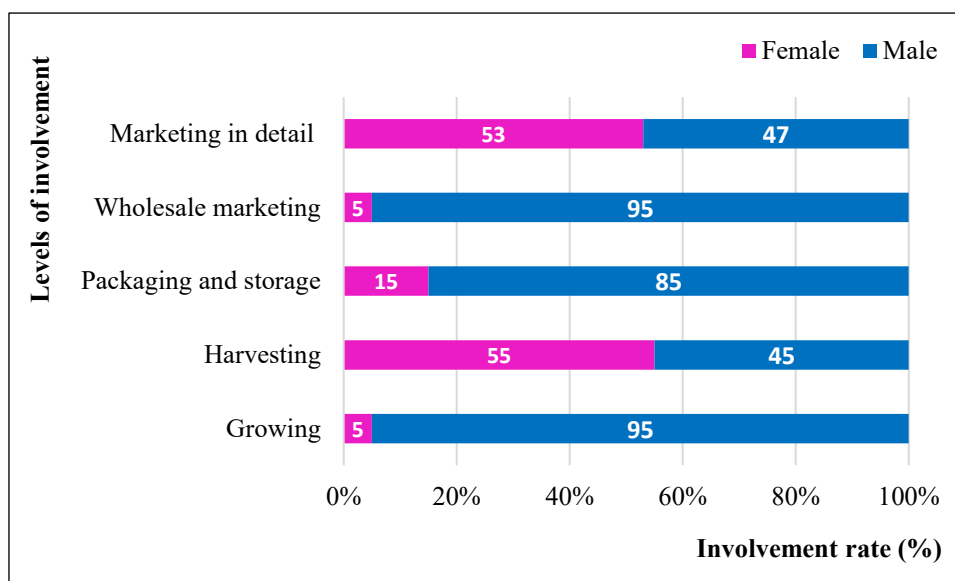


Figure 5: Level of involvement in the cola production based on gender

5-Storage method of *Cola nitida*

The survey results revealed that 89% of traders of *Cola nitida* walnuts kept their products in storage, compared to 11% who kept them in ambient air (Figure 6). In addition, the storage media found in warehouses were plant leaves (*Thaumatococcus daniellii*) + baskets + bags (in joute or polypropylene) (56%), plant leaves + bags (38%) and single leaves only (6%) (Figure 7).

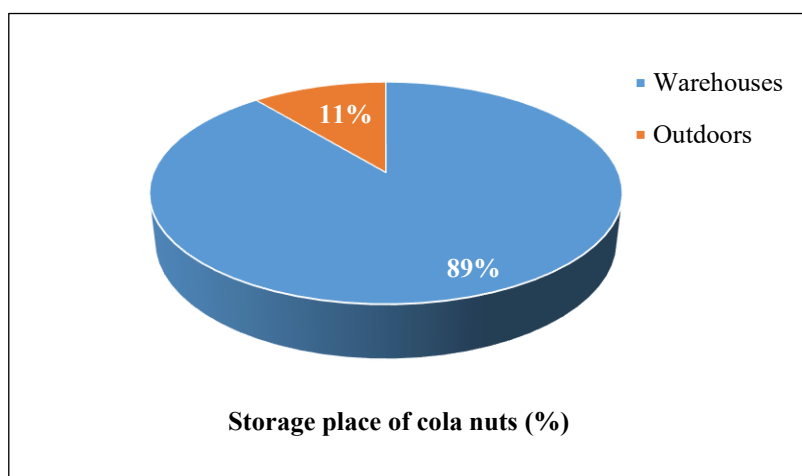


Figure 6: Storage places of cola nuts

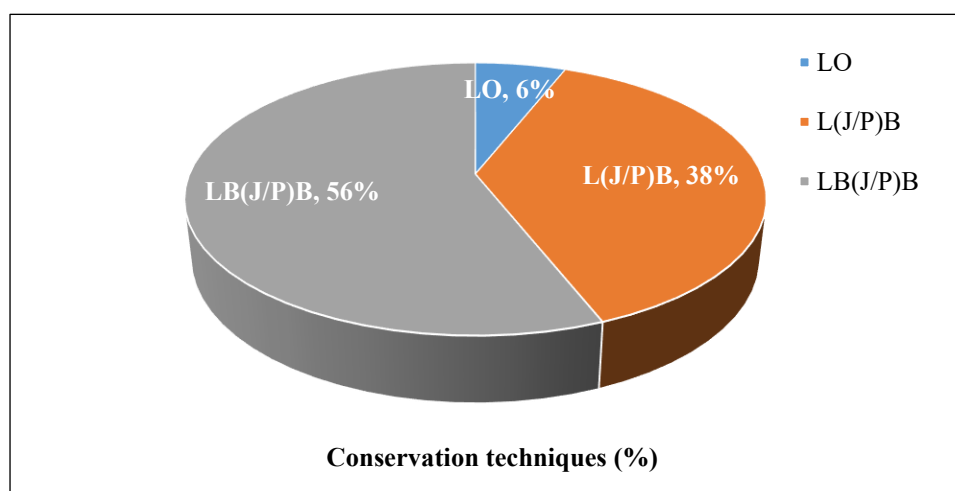


Figure 7: Preservation techniques of cola nuts

NB: L = Leaves of *Thaumatococcus daniellii*; LO = Leaves Only; L(J/P)B = Leaves + (Jute/Polypropylene) Bags; LB(J/P)B = Leaves + Basket + (Jute/Polypropylene) Bags

6- Reasons for cola nuts consumption

Figure 8 shows the reasons for consumption of cola nuts by the population. Among these reasons, those related to the stimulation of appetite and taste are the most important with 41% and 30%, respectively. Nuts are also consumed to cut off sleep (9%) or for simple pleasure (9%).

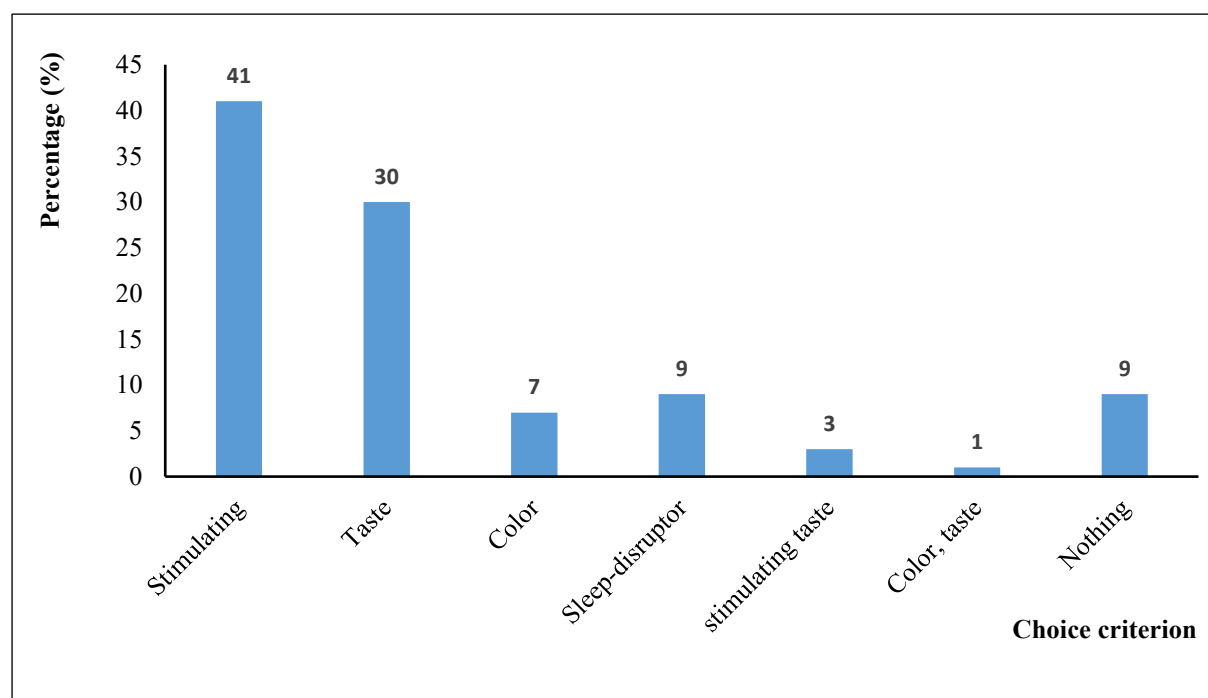


Figure 8: Reasons for cola nuts consumption

7- Level of preference for cola nuts varieties

The survey revealed that nut preference is not based on color because 74% of consumers of these nuts do not use them due to the attraction of their color, but certainly for other reasons. Nevertheless, 13% of consumers prefer white nuts to red ones (5%) (**Figure 9**).

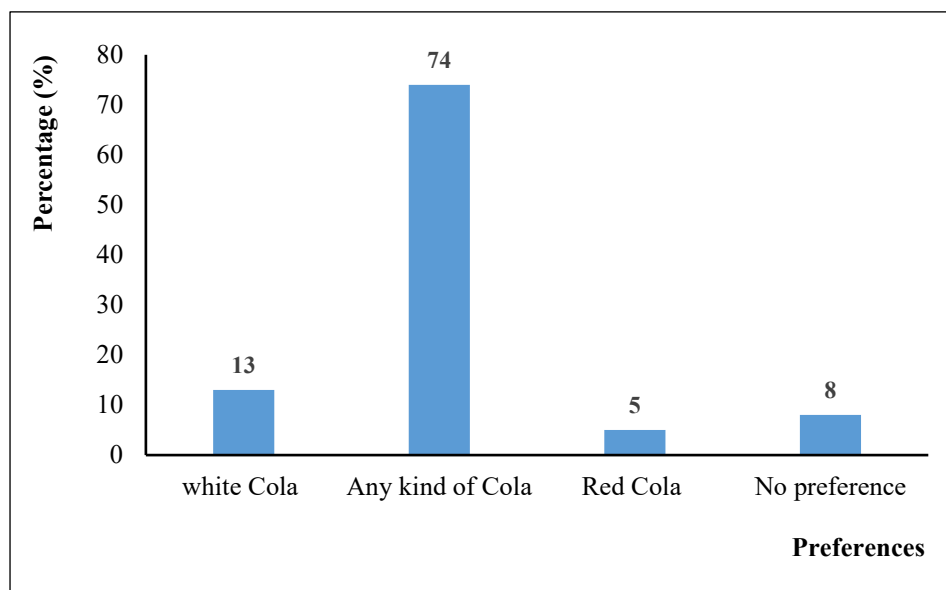


Figure 9: Preference for cola nuts based on color

8- Consumption form of cola nuts

The form in which cola nuts are consumed (**Figure 10**) is essentially the raw and natural form under which they are harvested, with 85%. They are also sometimes consumed as a food additive (8%) or in other forms (7%).

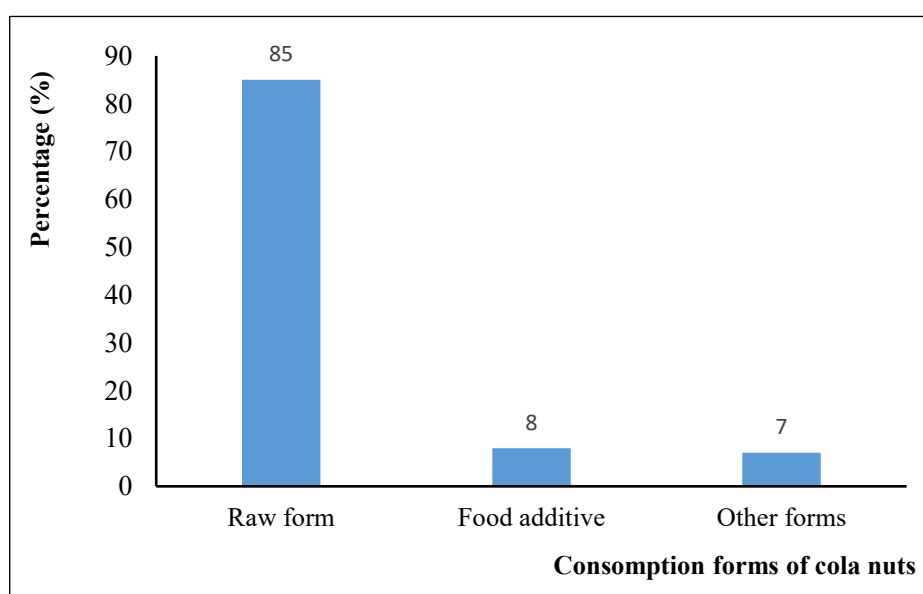


Figure 10: Consumption form of cola nuts

9- Types of pathologies for which cola nuts are used

The use of cola nuts in care related to human and animal pathologies was mentioned in the survey, which revealed that for most users (92%), the nuts are often used in human pathologies and very rarely in animal pathologies (5%) (**Figure 11**).

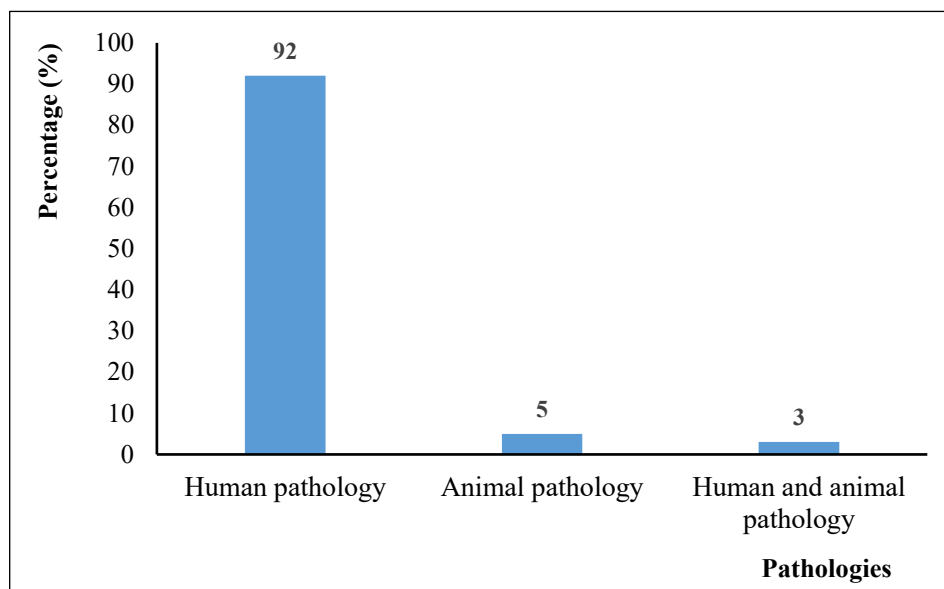


Figure 11: Pathologies in which cola is used

10- Mode of delivery for cola nuts

Since the method of delivering cola nuts to wholesale traders (**Figure 12**) is related to nut quality, it was revealed that 34% of actors delivered the nuts in bags transported by vans. The delivery of nuts is also carried out simply in bags (17%), in baskets (16%) or in vans (21%), but rarely in boxes.

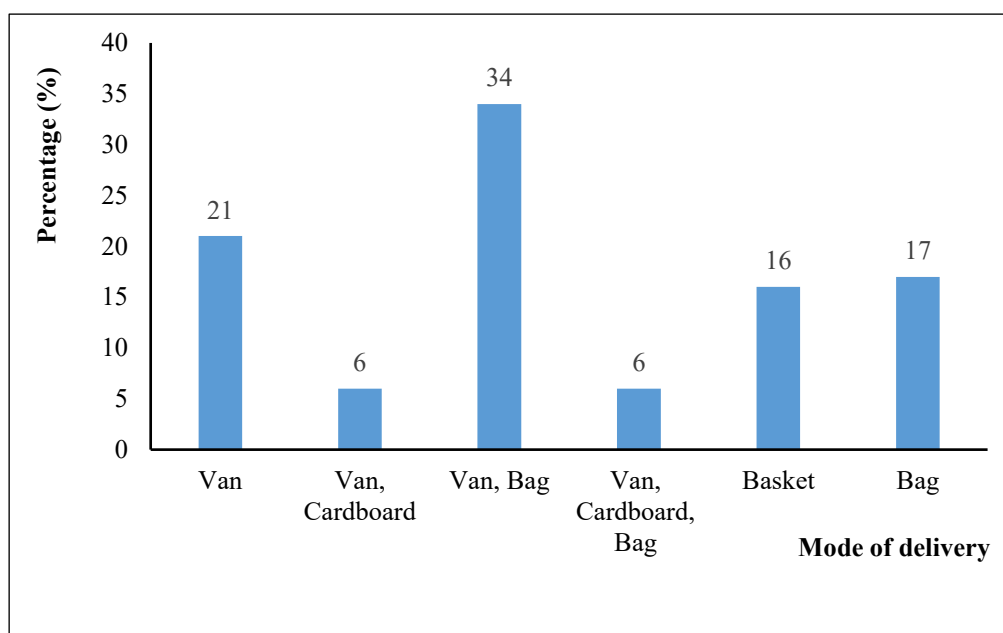


Figure 12: Mode of delivery of marketed cola nuts

IV. Discussion

In this study, the results of the survey on the level of knowledge and use of *Cola nitida* nuts indicated rates above 84% (98 and 94% for red nuts and 97 and 84% for white nuts). These values are consistent with those reported by **Garuba et al.**, which highlight that the cola nut is one of the best-known plants in West Africa, where it enjoys multigenerational cultural recognition¹⁶.

Similarly, **Tokannou et al.** recall that cola nuts are deeply rooted in the social, religious, and economic practices of the West African sub-region¹⁷. social and a mark of hospitality. These observations are also consistent with the work conducted by **Ekalu and Habila**, who also indicated that cola nuts play an important role in traditional African ceremonies such as weddings, baptisms, enthronements, and funerals⁸.

The high use of cola nuts could also be explained by their strong presence in markets, relative to their importance in socio-cultural traditions and ceremonies, or for dietary reasons, which represent the two main reasons for their use, respectively at 28% and 23%. These high utilization rates are consistent with the observations of **Adou et al.** and **Kouamé et al.**, which showed the intensive use of cola nuts in Côte d'Ivoire as a common food, a symbol of cohesion^{18,19}. *Cola nitida* is recognized according to **Dewole et al.** as having great importance at the traditional, social and medicinal level as well as in other cultures of the world²⁰.

Azeez has also attested that for several decades, the medicinal plants including *Cola nitida* have played an important role in traditional health care in Africa, particularly in Côte d'Ivoire, where they are used for the prevention and treatment of many diseases²¹. **Nyadanu et al.** argued that *Cola nitida* is distinguished by its cultural, socio-economic and therapeutic importance, as well as its wide use in traditional pharmacopoeia, pharmaceutical and agri-food industries⁶.

In addition to its role as a stimulator of appetite (41%) and taste (30%), *Cola nitida* is somewhat recognized in small proportions by those interviewed for its role as an appetite-suppressant and nausea-inducer, and for its aphrodisiac, therapeutic, and aesthetic properties. The aphrodisiac effect of *Cola nitida* was observed by²² **Adisa et al.** with antimicrobial and antioxidant properties²³, anti-inflammatory²⁴, to resist fatigue and stay awake²⁵.

The use of cola nuts for health needs has been observed only almost exclusively in human pathologies, at 92%. The administration of cola extracts to animals is generally observed in cases of medicinal or biological tests, as evidenced by **Erukainure et al.**, who have discussed the possibility of treating type 2 diabetes using *Cola nitida* extracts²⁶.

This survey also revealed that the average daily income of between 10,001 and 20,000 CFA francs and that of over 20,001 CFA francs was dominated by wholesale traders, probably because these traders supply directly to semi-wholesalers and retailers²⁷.

But also by their regular sales, thus guaranteeing a high turnover compared to the classic retail trade. These same findings were made by **Okonkwo-Emegah et al.**, which showed that the marketing of cola nuts provides substantial income to those who engage in it²⁸.

With regard to the level of involvement of men and women in the various stages of cola production and marketing, investigations have shown that women play a significant role in the process, particularly at harvest time (55%), and first transformations (15%), but also at the level of detailed marketing (53%). On the other hand, their role is very negligible at the level of cultivation (5%) and wholesale marketing (5%). **Deigna-Mockey et al.** also reported that at the level of cola cultivation, the male gender is predominant with 98.9%, while **Adedokun et al.** stated that nearly 52.5% of women over 45 years old were involved in the marketing of cola^{29,30}. Even if women participate a little in the conditioning (extraction of husks and sanitation), their absence in cultivation and wholesale trade could be explained by the fact that they are rarely land owners for crops. In addition, they are not financially well enough to carry out the wholesale trade profession which requires mobilizing a lot of money.

The results of the survey revealed that 89% of their products were stored in warehouses, compared to 11% in other ambient air locations. The use of warehouses was related to protecting the nuts from rain and sun, which respectively have direct consequences: increased humidity promotes the germination and desiccation of the nuts. Note also that the types of warehouses used were large, high and not airtight which, according to the actors, had been designed in such a way to allow good ventilation of the environment.

Furthermore, the storage media found in warehouses were plant leaves (*Thaumatococcus daniellii*) + baskets + bags (in jute or polypropylene) (56%), plant leaves + bags (38%) and single leaves only (6%). **Adeleye et al.** had also mentioned in their work the use of woven baskets with palm leaves and other materials such as cardboard, paper, clay pots, and semi-evaporative pots³¹.

Regarding the transport and delivery of cola nuts, 34% of deliveries were made in vans even though they were often simply transported in bags (17%) and baskets (16%). Vans are considered by traders to be the most adequate and relatively cheaper means of transporting post-harvest cola nuts quickly, efficiently and in sufficient quantity to warehouses and wholesale traders.

The majority consumption of cola nuts in their raw and natural forms (85%) was, according to consumers, related not only to the preference for its fresh taste and the flavor provided by the fresh cola juice but also to the ease of chewing or processing the cola in its fresh state. However, the reasons for the use of cola have not been linked to its color by 74%, thus showing that whatever its color it will be loved, produced and marketed.

V. Conclusion

The survey carried out among 150 people in 5 localities (Séguéla, Bouaké, Abobo, Anyama and Adjamé) on the use and importance of *Cola nitida* for them showed that in Côte d'Ivoire, the populations of these areas (southern and central) producing the cola nut have traditionally, strongly integrated this foodstuff into their daily lives. It was thus revealed that people use them for various reasons, in different forms with a significant daily profitability, despite precarious storage, transport and marketing conditions. This work has therefore highlighted the need to

now give greater attention to the cola sector in order to help not only those involved in this sector to make a decent living from their activity, but also to boost the Ivorian agricultural economy.

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