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PROXIMATE ANALYSIS OF THREE VARIETIES OF KOLA NUT SELECTED FROM ALAMISI MARKET IKIRUN, OSUN STATE NIGERIA

OLAOYE ADEKUNLE JELILI *

Department of Pure and Applied Chemistry, Ladoke Akintola University of Technology Ogbomoso, Oyo State Nigeria

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Abstract: Three (3) varieties of Cola, a tropical African crop of the family Sterculiacea, were gotten from Ikirun, State of Osun Nigeria, conventional method was used to cured it by wrapping it in clean leaves of banana to decrease the quantity of moisture lost and after that set aside for fourteen days in the laboratory before used. Association of Official Analytical Chemists (AOAC) 1984 methods was used to carry out proximate analysis of the species. The results obtained showed that Cola nitida had (60.80%), moisture, (2.94%) ash, (7.91%) crude protein, and (2.70%) caffeine. Cola accuminata had (56.30%) moisture, (3.04%) ash, (8.68%), crude protein and (2.75%) caffeine, while Garcinia Kola had (51.30%) moisture, (2.95%) ash, (8.90%) crude protein and (2.96%) caffeine.

Keywords: Garcinia Kola, crude protein , Phamarcological,moisture and ash.

1. Introduction

Cola, a tropical African genus of the family Sterculiacea, was classified into about 125. *Cola species* are evergreen, usually small or fairly sized trees, actually, a few bring into being to twenty five metres tall. In tropical countries, especially in Africa many varieties are extensively cultivated. The frequently used are: *Cola acuminata* and *Cola nitida* with the latter are having the maximum economic significance (Lovejoy, 1980).

The subsequent report of the genus is given by Opeke (1992) that, its trees or shrubs are with vary leaves, stipules present even though sooner or later falling. Male and female, hermaphrodite flower classified into a panicle of Cymes, or in fascicles on the branches or on the trunks. Five sepal; male flower; the another loculi are positioned tangentially at the peak of the androecium's in one or two superimposed rings; hermaphrodite flower, short style, fleshy gynoecium's fruit; five to ten follicles, placed perpendicularly on the peduncle, radicals directed towards the helium. The leaves of *Cola species* are simple, entire and narrowed or rounded in the direction of the base. The pact of the leaves on the stem is vary in some species and reticulate, in whorls of 3 or 4, in others. Both *Cola nitida and Cola acuminata* have a white or coloured perianth flowers. Naturally, trees bear two types of flower; male, with anthers fused into a single column or a hermaphrodite with one or two rings of anthers at the base of the better ovary. The ovary splits by forming different fruiting carpels or follicles, generally five to ten in number, after fertilization. Fruits are sessile, placed at the end of a short peduncle, from which they give out in star shaped fashion. As the fruit increase in weight, the

* Corresponding Author: aberin4u@gmail.com

stem hangs perpendicularly and the follicles are borne horizontally or ascending in recurred fashion, containing one to ten seeds. The nuts of a small number of *Cola species* , together with *Cola natida* and *Cola acuminata*, are excellent to consume however, nearly all species generate seed that is tough indigestible. Some *Cola variety* is ovoid or ellipsoid, or sharp, by firmness varying in size up to 5cm long and 3cm in wideness. Nearly all of the seeds contains cotyledons and the seeds readily divide into two equal part in *Cola nitida* but in *Cola acuminata*, the cotyledon rarely divided into six equal part

(Irvine, 1956; Keay, 1958; Russell, 1955). Kola nut (*Cola spp*) and the Bitter kola (*Garcinia spp*) are traditional plants which are frequently eaten as snacks mainly among the aged in Nigeria (Arogba, 1999).

Kola nut (*Cola* spp) belongs to the family Sterculiacea having about 125 species of trees, native to the tropical rainforest of Africa. Two species are particularly very common among the Yorubas of south Western Nigeria; these are *Cola nitida* and *Cola acuminata*. Kola nut is chewed in many West African cultures, either individually or in group settings and it is often used ceremonially (Arogba, 1999). Kola nut contain large amounts of caffeine and Theobromine and are therefore used as a stimulant. They produce a strong state of euphoria and well being, enhance alertness and physical energy, elevate mood and increase tactile sensitivity, suppress appetite and hunger and are used as an aphrodisiac (Arobga, 1999). The caffeine in the nuts also act as a bronchodilator, increasing the air passage hence, kola nuts can be used to take care of whooping, cough and asthma (Arogba 1999).

White Kola, *Cola nitida* is a average sized (25cm) always green forest tree. The cola *nitida* is typically, umbranched reaching from 8 to 20cm in height and sometimes attain 24cm. The trunk may grow up to 50 cm in diameter (FAO, 1995). The dark green leathery leaves are easy, up to 33cm long and 13cm width with apex abstructly and soon acuminate with extended petiole and often engorged at the top. Capacity of two hundred leaves from various sources gave the following mean size; Lamina length 16.3cm, Width 5.6cm, Petiole length 4.1cm (Russel, 1995). Red Kola, *Cola acuminata* is a slender tree that can develop up to height of 30cm, but usually 10 to 20 cm with diameter of about 30cm. The truck usually branches close to the base with the leave approximately getting to the ground. There are a lot of branches; normally divided, slim, and curved, noticeably ascending. The barks of the old tree are relatively coarse and corky, grey in colour and frequently divide into squares. The leave is not flat but often curled, keeled at the mid-rib and twisted at the tip. Russel (1995), discussed the mean dimension of a bigger number of leaves from different source: Lamina length 16.3cm, maximum width 5.6cm, petiole length 4.1cm. Bitter Kola, *Garcinia Kola* also recognized as African wonder. It originates from *Garcinia* tree which belongs to the family Chisiaceae and developed in coastal rain forest in South-Western and South-Eastern parts of Nigeria. Conventionally, the flow of saliva is stimulated by chewed these nuts as masticator substances, but are now commonly obsessive as snacks in West and Central Africa. The kernels of the nuts are generally traded and eaten as a stimulant. Bitter kola is also rich in caffeine and theobromine and also supposed to be an aphrodisiac. Unique from other kola-nuts, however, bitter kola is said to clean digestive system without side effect such as abdominal difficulty, even when a lot of nut are eaten. In African medicine, bitter Kola is dehydrated, grounded and traditional cough syrup can be made by mixed it with honey (Eleyinmi *et al.*, 2006).

Kola nuts are generally cultivated in West Africa because they consist of two alkaloids: (Caffeine and Theobromine, which are influential stimulant that offset fatigue, restrain thirst and hunger and are supposed to enhanced intellectual activity (Nickalls 1986).

Kola nuts are used as a basis of alkaloids in pharmaceutical industries (Opeke, 1992). Cola drinks such as coca-kola are prepared from Kola nuts, which are refreshing or stimulating substitutes for Tea or coffee (Irvine, 1956). Kola nut when in use internally, the large concentration of caffeine in some species, can enlarge air passage in human. This makes Kola nuts efficient for treating breathing mayhem like asthma. Kola nut was applied to treat different maladies and medical condition, preceding to the beginning of stronger drugs but not limited to the following, aphrodisiac, digestion, headache treatment, increase appetite, increase energy, relieve diarrhea (Ogutuga 1975). Tonic as a remedy for dysentery, cough, diarrhea, vomiting were usually prepared from the leaves, stick flowers, fruits and the bark of Kola nuts (Ayensu, 1978), and chest complaints can also be treated with it (Irvin, 1961) . Extract from bark of Kola nuts have been experienced on various pathogenic bacteria such as: *Staphylococcus aureus, Proteus mirabilis, Escherichia coli* (Ebana *et al.,* 1991). All the extract showed inhibitory commotion against these organisms. Kola nuts are used chiefly for their stimulant and euphoriant character. They have consequence comparable to other Xanthene consisting of herbs like cocoa, tea, coffee and yerba mate . On the other hand, the effects are specifically different, Producing a stronger condition of euphoria and well being. Autonomic Changes includes: rise body temperature, increased blood pressure after injection (James, 2001).

2. METHODOLOGY

2.1. Samples Collection

The fresh kola nuts were gottened from Ikirun market in Ikirun Osun, Osun State, and using traditional method to cure it by wrapping it in clean banana leaves to diminish the amount of moisture and subsequently kept for fourteen days in the laboratory before used. Three (3) varieties of kola nut which include *Kola acuminata, Kola nitida* and *Garcinia Kola* were investigated.

2.2. Treatment of Sample

The samples i.e *Cola acuminata, Cola nitida* and *Garcinia Cola* were, washed using distilled water, separately splitted-open and afterward capped container was used to keep it in anticipation of analysis.

2.3. Samples Digestion

At a temperature of 550^{o} C, a muffle furnace has been used to heated 2 g of the sample for about 8 hours, 1 g ashed sample was measure and digested with 20 ml of Perchloric acid, Nitric acid, Sulphuric acid and Hydrochloric acid respectively. Then, 100 ml volumetric flask was used to stored the samples that have been digested prior to analysis. The similar process was used for the other kola nut species.

2.4. Determination of Percentage Moisture

The method of AOAC (1984) was used to determine moisture content of the samples. The moisture content was calculated as the loss in weight of the dried sample in an oven until a constant weight was obtained and was cooled in desiccators.

The percentage (%) moisture content of the samples by weight was calculated using formula;

$$\%\ Moisture\ Content = \frac{W_2 - W_3}{W_2 - W_1} \times 100\% \qquad (1)$$

Where;

W_1 = weight of Petri dish,

W_2 = weight of Petri dish + sample before drying,

W_3 = weight of Petri dish + sample after drying.

2.5. Determination of Percentage Crude Protein

Micro Kjeldahl apparatus using the method of AOAC (1984) was use to determined percentage crude proteins of the samples. The formula below was used to estimated the total nitrogen by the Kjedahl method in a volumetric method :

$$\%\ Nitrogen = \frac{(Titter\ Value\ blank) \times 0.0014 \times vol.of\ digested\ sample}{Aliquo\ taken \times weight\ of\ substances\ of\ dry\ matter} \times \frac{100}{1} \qquad (2)$$

Therefore, $\%\ Crude\ Protein = \%\ Nitrogen \times 6.25$ (3)

2.6. Extraction of Caffeine from Kola Nut

Method projected by (Allen *et al.* 2000) was applied for the extraction of caffeine with little modification. About 20 g of each pre-treated samples was weighed into a filter paper and stapled pined, placed into a 125 ml Erlenmeyer flask. To the flask, 20 ml of distilled water and 4 g sodium carbonate were added and stirred. Washed glass was placed on the top of the flask; heated using sand and bath boiled gently for 20 minutes. Add 4 ml aliquot of methyl chloride to the aqueous layer in the centrifuge tube shake the tube, venting frequently, and allowed the layer to separate. Transfer the organic layer (bottom layer) to the Erlenmeyer flask containing the first extract using a clean, dry Pasteur pipette. Add small amount of anhydrous Sodium Sulphate (about tip of the spatula) until no more champing is observed. Allow to stand for about 10 minutes. Use a filter paper to transfer the dried Erlenmeyer flask and add boiling chip. In the hood, drive off the methylene chloride; a layer of white crystal will remain. Place a boiling chip into the tube, add warm acetone and heat the solution until the crystal dissolved. Hold the tube at an angle to avoid bumping of the liquid. Continue to evaporate the solvent until the solution is highly concentrated and the first appearance of white crystal is evident. Cool the tube in an ice bath until crystallization is complete. Stir the Crystals with glass rode to break them up.

The calculation of the percentage caffeine is given by:

$$\%\ Caffeine = \frac{Weight\ of\ Erienmeyer\ flask + crystal - weight\ of\ flask}{Weight\ of\ sample} \times 100 \ldots\ldots\ldots (4)$$

3. RESULT AND DISCUSSION

Table 1. PERCENTAGE MOISTURE CONTENT IN THREE COMMON NIGERIA KOLA NUT

S/N	*Cola nitida* (%)	*Cola acuminata* (%)	*Garcina kola* (%)
1	60.80	56.30	51.30
2	60.60	56.50	50.90
3	61.00	56.10	51.70
Mean Value	**60.80**	**56.30**	**51.30**

Table 2. - PERCENTAGE ASH CONTENT IN THREE COMMON NIGERIA KOLA NUT

S/N	Cola nitida (%)	Cola acuminata (%)	Garcina kola (%)
1	3.20	3.00	2.98
2	2.90	3.10	2.90
3	2.72	3.02	2.96
Mean Value	**2.94**	**3.04**	**2.95**

Table 3. - PERCENTAGE CRUDE PROTEIN IN THREE COMMON NIGERIAN KOLA NUT

S/N	Cola nitida (%)	Cola acuminata (%)	Garcina kola (%)
1	8.80	8.68	8.90
2	8.96	8.69	8.70
3	5.97	8.67	9.10
Mean Value	**7.91**	**8.68**	**8.90**

Table 4. PERCENTAGE CAFFEINE CONTENT IN THREE NIGERIAN KOLA NUT

S/N	Cola nitida (%)	Cola acuminata (%)	Garcina kola (%)
1	2.75	2.66	2.900
2	2.65	2.63	2.960
3	2.70	2.76	3.030
Mean Value	**2.70**	**2.750**	**2.960**

4. DISCUSSION OF RESULTS

The moisture content of the three varieties of kola nut for this research work in indicated that *Cola nitida* has the highest moisture content of 60.80% followed by *Cola acuminata* 56.30% and *Garcina kola* having the least moisture content 51.30%. This variation may be attributed to lose of weight by kola nut during storage and transportation or ecological zone of cultivation. The result of this research work for moisture content in (table 1) above fall within the range of moisture content reported earlier by Jayeola (2005) and Odebunmi *eta*l., (2008) that give moisture content 55% and 66.4% respectively but the moisture content for *Garcina kola* falls below the range with moisture

content (51.30%). Total ash of this research work, (table 2) above, show that *Cola Acuminata* having (3.04%) with the highest content of ash followed by *Garcina kola and* Cola nitida 2.95% and 2.94 respectively. The variation in ashing value of these three varieties indicated that the mineral element content relatively differ from one another which may be attributed to the environmental factor, age of harvesting e.t.c the result of this research differs relatively from what was reported by other workers like Odebunmi *etal*., (2008) that reported 2.40% ash in kola nut and another worker Jayeola, (2004) who had earlier r+eported 2.43% ash in common species of kola nut. The percentage crude protein investigated in this research work in (table 3) above indicate that *Cola Acuminata* has (7.91%), *Cola Nitida* has the crude protein of (8.68%) and *Garcina Cola* has the percentage crude protein of (8.90%) and found to fall within the range of percentage crude protein reported by other workers in previous research such as Ekanade in (1989) who reported 8.60% crude protein, Ogutuga, (1975) reported 8.06% crude protein and Jayeola, (2001) who reported 8.90% crude protein in kola nut , but differ relatively from what was reported by Odebunmi et al (2008) as 7.80% crude protein in kola nut species.

The mean value of the percentage caffeine in the 3 varieties of kola nut investigated in (table 4) above showed that *Garcinia Cola* has the highest percentage caffeine of (2.96%) followed by *Cola Acuminata* (2.75%) and then *Cola nitida* (2.70%). The variation in percentage caffeine of the kola nuts may be attributed to the ecological zones of cultivation and other factor such as storage and age since the kola nut were obtained from different markets. The result of the analysis for caffeine as shown in table 4 above was within the range obtained by previous workers according to (http://WWW.all 2c3.com/drugs /varo31.htm) which indicated that the amount of caffeine varies depending on species of kola nut. However, the result differed from the work of Arthfield (1865), who reported 1-2 % caffeine in kola nut and Jayeola (2004) who reported 1.5% caffeine. Both Arthfield and Jayeola reported that drugs abuse can occur if its use is not medically necessary. i.e. it is not prescribed by medical practitioners and if it used excessively as it is a socially acceptable drugs. They stated that concentration of caffeine as high as 10 g needed to be exceeded before toxic level of caffeine can be obtained.

Caffeine is generally regarded as Central Nervous System (CNS) stimulant. Although, its psychological and physiological effect which appear to be medicated primarily by the adenosine receptors are much and varied. Cola, tea and other caffeine containing beverages or stimulants are taken by most human cultures; making caffeine the most widely consumed “psychoactive” substance in the world (IFRI 1993).

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