

Chemical Constituents of *Cochlospermum tinctorium* A.Rich Flowers.

*Yisa, J; Jimoh,T; and Dada, A

Department of Chemistry, Federal University of Technology, Minna, Niger State, Nigeria

*Corresponding author email:joeyisa@yahoo.com

Abstract

The flowers of *Cochlospermum tinctorium* A Rich that is widely consumed among the Gwaris in Nigeria were investigated for the presence of certain phytochemicals, proximate and mineral composition using recommended method of analysis. The result of the analyses showed that the percentage moisture content, crude protein, crude fat, crude fibre, ash content and carbohydrate of this flowers were 10%, 18.13%, 2.0%, 0.71%, 10% and 51.16% respectively. Mineral composition was found to be 14.40 mg/g, 32.5 mg/g, 28.0 mg/g, 6.0 mg/g, 28.6 mg/g, 0.72 mg/g and 1.17mg/g for sodium, potassium, calcium, magnesium, iron, zinc and manganese respectively. The phytochemical screening revealed the presence of alkaloids, cardiac glycosides carbohydrates, steroids and tannins. Based on the results obtained, it was found that flower of *Cochlospermum tinctorium* A Rich are rich in proximate as well as elemental composition when compare with other edible vegetables.

Key words: Chemical composition, *Cochlospermum tinctorium* A Rich flower

Introduction

Cochlospermum tinctorium A. Rich (Rose imperial) is a well known plant of the family *Cochlospermaceae* and found mostly in the savannah area of west and central Africa [1]. *Cochlospermum* comprises of fifteen species, five of these occurring mostly in Africa. Among the Africa species is *Cochlospermum tinctorium* A. Rich (Rose imperial) which is a perennial plant shrub that can grow up to a height of about 10m. The leaves are alternate, basally connate for up to ¼ of their length [2]. The flowers are large, yellow bright which are regular and borne in racemes or panicles produced at the ground level from the rootstock [1]. Flowering period is during the dry season after the savanna burns, and the fruits starts coming out about one month after flowering. But in Southern Sudan and Uganda, the flowers are often borne on top of the leafy shoots [3]. *Cochlospermum tinctorium* A. Rich (Rose imperial) flowers are widely consumed among the Gwaris in the Northern part of Nigeria, precisely Nasarawa, Kaduna, and Niger state including Federal Capital Territory, Abuja. Much research lately has focused on the health benefits of the leaves, roots and seeds [4]. For instance, the leaves are used medicinally for healing wound in Dogon land of Mali [5]. Additionally, [6] reported that leaves of this plant were used for the treatment of malaria and jaundice. In Cote D ivoire, the leaves and the roots are used in wet dressing to maturate abscesses and furuncles, apart from this, decoction of the twigs or rootstock is drunk to alleviate urino-genital disorders, kidney pain or pain between the ribs [7,1]. The oil in the rootstock as observed by Dakuyo and Bastide, (2005)

[8] is also extensively used in veterinary medicine to treat leprosy. Very recently, Etuk *et al.*, (2009) [9] observed that the aqueous root extract on experimentally induced hepatic damage in rats was a potential curative agent for liver disorders. The floss of the fruits is used to stuff cushions or, as is done in Togo, sometimes spun into necklace cords [10]. In Nigeria, a concoction of the fruits with flowers is drink to cure snakebites, while in Cote d ivoire and Burkina-Faso powdered rootstock is applied topically to cure typhoid fever [11]. The flowers were equally being used in the treatment of constipation as reported by [12]. The flowers often serve as decorative purposes and as such make the plant a potential ornamental.

Despite these numerous uses of this plant and its cosmopolitan nature, there is little or no information available on the chemical composition of the flowers of *Cochlospermum tinctorium* A. Rich

The present study therefore examined the chemical composition of the *Cochlospermum tinctorium* A. Rich (Rose imperial) flowers for public and dietary awareness of its nutritional status.

Materials and Methods

Sampling and Sample Preparations

The flowers of *Cochlospermum tinctorium* A rich were collected in April, 2009 in Keffi, Nasarawa State, Birni-Gwari, Kaduna State, and Bosso town, Niger State and were rinsed with clean water and air dried for 72hours. The dried flower were grounded to a fine powder using mutter and pestle and then sieved, stored in a well labelled air tight container at 4°C for analysis.

Laboratory Analysis**Proximate analysis**

The proximate composition: Crude fiber, moisture content, ash content, fat content, crude protein, and carbohydrate were determined by the method described by A.O.A.C. (2000)[26]

Phytochemical analysis

Phytochemical screening for major constituents was undertaken using standard qualitative methods as

described by Sofowora, 1994, Oyewale *et al.*, 2001 and Oyeleke *et al.*, 2009. [13,14,15]

Determination of Mineral Composition

The mineral composition such as sodium, potassium, calcium, zinc, iron, magnesium and manganese were determined using Atomic Absorption spectrometer (Pye unican Sp9 cambridge, UK) after acid digestion of the samples.

Results

The results of the determination of the proximate, phytochemical and chemical composition of *Cochlospermum tinctorium A rich* are presented in Table 1, 2 and 3 respectively

Table 1. Proximate composition of *Cochlospermum tinctorium A rich* flower sepal

Parameters	Percentage
Moisture	10.00±0.01
Ash content	10.00±0.02
Crude fat	2.00±0.02
Crude fibre	0.71±0.03
Crude protein	18.13±0.07
Carbohydrate	51.16±0.07

Table 2: Phytochemical composition of *Cochlospermum tinctorium A rich* flower sepal

Chemical constituents	n-hexane extract	Ethanol extract
Alkaloids	+	+
Saponins	-	-
Tanins	-	+
Antraquinone	-	-
Cardiac glycosides	+	+
Terpenes	+	-
Steroids	+	-
Carbohydrates	-	+

Table 3. Chemical composition of *Cochlospermum tinctorium A rich* flower sepal

Parameters	Concentration
Sodium	14.4 ±0.03
Potassium	32.5±0.01
Calcium	283±0.03
Magnesium	60.0±0.03
Iron	28.6±0.01
Manganese	1.17±0.01
Zinc	0.72±0.02

Table 4: Summary of the results for comparative studies with Some other vegetables done by Antia et al., 2006 ; Ekop,2007 and Effiong et al., 2009 [16,17,18]

Parameters (%)	Cochlospermum Tintorium Flower	Flute pumpkin(Telferian occidentalis)*	Okra fruit (Abelmoshus esculentus)**	Sweet potatoes Leaves***	Gnetum africanum(Afang)**** seeds
Ash content	10	9.68	9.00	11.1	1.20
Crude protein	18.13	19.4	21.85	24.85	17.5
Carbohydrate	51.16	46.52	51.95	51.95	87.62
Calcium ppm	283.0	240.00	0.49	28.44	7.01
Magnesium ppm	60.0	67.92	52.20	340.0	5.48
Iron (Fe) ppm	28.6	91.09	76.20	16.00	1.50

Discussion

The proximate composition of the flower of *Cochlospermum tinctorium A Rich* is shown in Table 1. The moisture contents of $10.00 \pm 0.01\%$ promises high storage capacity for the plant flower. The observed value is greater than that of Flute pumpkin, okra fruit, Afang seeds and Joy weed leaf [16,17,18,19]. The ash content of $10 \pm 0.02\%$ implies that these flowers are good source of mineral nutrition. The value compared favourably with other vegetables as indicated in Table 4. The crude protein content of 18.13% for the flower is the same range with what is obtainable in most vegetables [16, 17,18,20]. Ekop, (2007) [17] had earlier deduced that plant protein still remains a veritable source of food nutrient for the less-privileged population in developing countries, including Nigeria where the cost of animal protein is beyond their income per capita. Crude fat is lower than what is obtained in most vegetables. The result obtained further support [21] claims that consumption of vegetables flowers containing low level of crude fat in large quantity is a good dietary habit and may be recommended to individuals suffering from overweight or obesity. The carbohydrate content of the flower of *Cochlospermum tinctorium A Rich* observed was $51.16 \pm 0.07\%$. This result agrees with the findings of Ekop, (2007) and Ejoh et al., (2007) [20] who had independently worked on Afang seeds and Leafy vegetables respectively. This value suggests that the flower is a good source of carbohydrate which promotes energy for growth and development of the body.

The presence of biologically active constituents like alkaloids, cardiac glycosides, tannins, carbohydrates and steroids in *Cochlospermum tinctorium A Rich* flowers, as indicated in Table 2 shows that the flowers could also be exploited in many areas of medicine e.g. in physiotherapy and pharmacy. For

vegetables. The need for supplementary diets rich in mineral content is necessary for a singular ration.

instance, cardiac glycosides are known to be used in the treatment of congestive heart failure [22](Schneider and Wolfling, 2004). The presence of cardiac glycosides in *Cochlospermum tinctorium A Rich* flowers will therefore help victims of strokes, heart diseases and as well aids the production of new drug for chronic pain controls. The presence of steroids justified the flowers to have anti-inflammatory and immunosuppressive effects which makes them useful for disease conditions such as lupus erythematosus, arthritis, ulcerative colitis, hepatitis and nephritic syndrome [23]. Tannins were found to be present [24] had earlier reported that tannins are anti-nutritional factors capable of lowering available protein by antagonistic competition and can therefore elicit protein deficiency syndrome, 'kwashiorkor'. The presence of this anti-nutritional factors in *Cochlospermum tinctorium A Rich* flowers studied in this work need not pose any threat of toxicity, because it can be easily be detoxified by soaking, boiling or frying as rightly reported by Ekop et al., (2004),[17]. Ekop and Eddy, (2005) [25] among other researchers that most plant toxicants are drastically reduced to tolerable limits by proper processing.

The result of the elemental composition of *Cochlospermum tinctorium A Rich* revealed that the flower is rich in some mineral elements such as calcium (283.0 mg/g), magnesium (60.0 mg/g) and iron (28.6 mg/g). The values obtained compare favourably with what observed in most vegetables. For instance, Calcium content in the fluted pumpkin was 240.0 mg/g although magnesium value was low. While in okra fruits both calcium and magnesium content were low. In potatoes leaves, magnesium value observed was 340.0 mg/g, low value was obtained for calcium content. The elemental analysis investigation carried out on Afang seeds revealed that magnesium and calcium are low which is shown in Table 4. The potassium, sodium and iron are relatively low compare to other. Therefore, the flower of *Cochlospermum tinctorium* is good for metal deficiency syndrome like

ricket and calcification of bones. The presence of calcium, magnesium and iron justify its consumption locally among the Gwaris in the following northern state of Nigeria; Nasarawa, Kaduna, Niger state including Federal Capital Territory, Abuja. This flower also contained sodium, potassium, magnesium and zinc which may help in correcting the distorted enzymatic activity and poor electrolyte balance of the blood fluid as they are the most required elements of living cells. [17].

Comparing the chemical composition of the flower of *Cochlospermum tinctorium A Rich* with other edible vegetables as presented in (Table 4) shows that the flower is rich in carbohydrates, crude protein but low ash and lipid content of 0.71 ± 0.03 , 10 ± 0.02 and $2.0 \pm$

0.03 respectively. For instance, a fluted pumpkin leaf has an average of 19.4% and okra is 21.81% it is cherished by most people as being affordable source.

Conclusion

These research findings revealed that *Cochlospermum tinctorium A Rich* flowers consumed by the Gwaris people contained some minerals and secondary plant products which are of biological importance. This research also uncovered *Cochlospermum tinctorium A Rich* flowers to be a promising alternative source of food nutrient which hitherto had been ignored.

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