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Anti-nutrient and phytochemical compositions of *Psychotriasp,Cnidoscolusaconitifolius and Telfariaoccidentalis* from South Eastern Nigeria.

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***Abstract**: The study examines anti-nutrient and phytochemical compositions of some leafy vegetables in the south east zone of Nigeria. Chemical and phytochemical analyses were carried out using standard AOAC methods. Phytochemical screening of these vegetables showed that they contain bioactive chemical substances such as akaloids, anthocyanin, carotenoid, flavonoid, oxalate, saponin and tannins. Glycoside was present only in the Psychotriaspsamples. Pro-vitamin A and vitamin E concentrations were highest in Psychotria (5.31 and 3.69mg/100g, respectively) while Cnidoscolus contained the highest vitamin C, 437.7 mg/100g.Similarly Psychotriasp had oxalate value of 5.43g/100g, C. aconitifolius had 0.35g/100g and T. occidentalis had 0.06g/100g. Saponin concentration in the raw samples of T. occidentalis was 0.89g/100g,C. aconitifoliussamples 0.04g/100g. Tannins concentration in C. aconitifolius was 0.18g/100g while T. occidentalis had 0.14g/100g and Psychotriasp had 0.13g/100g. The phytochemical values for solar-dried samples indicated that C. aconitifolius had alkaloid content of 1.32g/100g and T. occidentalis had 0.95g/100g. Anthocyanin concentration in Psychotriasp was 0.20g/100g, C. aconitifolius 0.17g/100g and T. occidentalis 0.13g/100g. C. aconitifolius had carotenoid level of 0.15g/100g while Psychotriasp had 0.03g/100g. Flavonoid content in C. aconitifolius was 0.35g/100g and T.occidentalis 0.15g/100g. Similarly Psychotriasp had oxalate value of 27.7g/100g, C. aconitifolius had 0.96g/100g and T. occidentalis had 0.17g/100g. Saponin concentration in the solar-dried samples was 1.21g/100g in T. occidentalis and 0.79g/100g in Psychotriasample. Tannins concentration was 0.35, 0.26 and 0.23g/100g in Psychotriasp,Cnidoscolius and T. occidentalis respectively.*

I. Introduction

The increased awareness of the health protecting properties of non-nutrient bio-active compounds found in fruits and vegetables has directed immense attention to vegetables as vital components of daily diets. For populations in sub-Saharan Africa, this attention (on vegetables as vital dietary components) reinforces the significant roles that leafy vegetables have long held as important components of African diets. They are indispensable ingredients of soups or sauces that accompany carbohydrate staples (Ene-Obong, 2001; Smith and Eyzaguirre, 2007; Chweya and Eyzaguirre, 1999). African indigenous and traditional leafy vegetables thus have a pivotal role in the success of the World Health Organization's (WHO) global initiative on fruits and vegetables consumption in the sub-continent (Smith and Eyzaguirre, 2007).

Vegetables are those herbaceous plants whose part or parts are eaten as supporting food or main dishes and they may be aromatic, bitter or tasteless (Mensah, et al., 2008; Edema, 1987). The utilization of leafy vegetable is part of Africa's cultural heritage and it plays important roles in the customs, traditions and food culture of the African household. Nigeria is endowed with a variety of traditional vegetables and different types are consumed by the various ethnicgroups for different purposes. The poor state of the economy in developing countries has made consumption of nutritious foods out of the reach of more than 65-70% of the people (Nworgu, 2004). One of the ways of solving this problem is through the use of unconventional sources of protein and micronutrients to supplement the diets of man and farm animals.

According to Mensah*et al.*(2008), vegetables are the cheapest and most available sources of important proteins, vitamins, minerals and essential amino acids. Vegetables are included in meals mainly for their nutritional value. However, some are reserved for the sick and convalescence because of their medicinal properties. The lack of nutritional information and inadequate development of nutritionally improved products from local raw materials have direct bearing on nutrition. Leafy vegetables are ideal for weight management as they are typically low in calories. They are useful in reducing the risk of cancer and heart disease since they are low in fat, high in dietary fiber, and rich in folic acid, vitamin C, potassium and magnesium, as well as containing a host of phytochemicals, such as lutein, beta-cryptoxanthin, zeaxanthin, and beta-carotene.

The role of green leafy vegetables in nutrition and human health is inevitable. Several studies have proven its efficacious abilities in promoting good health (Alada, 2000; Oyeyemi, et al., 2008; Modi, et al.,

2006). Green leaf vegetable play crucial roles in alleviating hunger and food security by contributing bulk of the nutrient content needed daily in our diets (Uusikua, et al., 2010). Hence the need to explore more sources of these natural reservoir of vitality and health.

Phytochemicals and anti-nutrients are chemical substances found in leafy vegetables and plant generally. Some of these chemical substances could be deleterious to human health and that of livestock when consumed. These substances are alkaloids, glycoside compounds, oxalates, tannins, phytate, and methyl-cysteine–sulfoxide (Nworgu et al., 2007).

From reviewed literatures on *Psychotriaspp*, not much work have been done on them in Africa especially Nigeria. Most species of *Psychotria* are common in the understory of tropical and subtropical forest. Majority of them are found in west tropical Africa, but few are indigenous to Nigeria. Some are found in the Northern, middle and North east of Nigeria while some are located in the south, south east and middle belt of Nigeria (Lachenaud& Harris, 2010). However, there are about five different species of *Psychotria* in Nigeria. These are *Psychotrianevosa* found in southern Nigeria, *Psychotriaarticulata* in southern Nigeria, *Psychotriasucculenta* in northeast Nigeria *Psychotriafernandopoesis* in south-East and lastly *Psychotrialeptophylla* in the middle belt of Nigeria had shown that, despite the large number of *Psychotriaspp* very few studies have been carried out on them.

The major problem of GLV's utilization in nutrition is the presence of toxic substances such as lecitins, alkaloids, tannins, saponins, protease inhibitors, phytate, among others (D'Mello, 1995). In order to reduce the toxicity of these substances, adequate processing techniques is essential. Mendoza and del Rosario (1988) recommended soaking the leaves in water at 70°C for 10 minutes, while Abeke, et al.,(2003) recommended 20 minutes for cooking beans of *Lablab purpureus*before consumption. Oduguwaet al., (1999) reported that autoclaving whole pods of *Samaneasaman*(JacqMerill) at a temperature of 100°C for 15 minutes resulted to better feed intake and weight gain compared to the rabbits fed 100g/kg raw S*amaneasaman*diet. Cooking improves nutritive values of legume seeds and brings the values close to that of meat and milk products by destroying some of the anti-nutritional factors (Amaefule, &Obioha, 2001). Processing improves the utilization of protein and energy from legumes and vegetables (Kaankuta et al., 2000). Knowing the phytonutrient compositions is important because it will help to elucidate the possible mechanisms by which these medicinal plants performed their nutritional and or therapeutic functions.

II. Material And Methods

Materials

Sample collection and processing

Samples of Psychotriasp "Aya-azu" was collected from Ubulu-Uku, Delta State Nigeria, while *Cnidoscolusaconitifolius* **"**iyanapaja" and *Telfairiaoccidentalis* "ugu" were harvested from the vegetable gardens at Sir Louis Mbanefo Street, University of Nigeria, Nsukka (UNN). Two (2) kg each of *Psychotriasp*, *Cnidoscolusaconitifolius*and*Telfairiaoccidentalis* leaves were plucked and rinsed with deionized water. The samples were dried using solar drier facility at Energy Research Center, UNN. The dried samples were pulverized and packaged in air-tight-polyethene bags for chemical analysis.

Phytochemical analysis

Qualitative and quantitative screenings were carried out to ascertain the presence of different phytochemical (saponin, tannins, phythate, alkaloids, glycoside, anthocyaninsetc) in the GLV samples before quantitative analysis was carried out. The methods as described by Trease and Evans (1989) were used.

Statistical analysis

The data are expressed as mean± SEM. Statistical analysis was carried out by one-way analysis of variance (ANOVA). Difference were considered to be statistically significant when $p<0.05$.

III. Results

The anti-nutrient composition for the three vegetables is presented in Table 1. Phytate and tannins content in *Psychotriasp*ranged from 0.29-0.72mg/100g and 0.13-0.35 mg/100g respectively. *C. aconitifolius*phytate and tannins content ranged from 0.66-2.72mg/100g and 0.18-0.25 mg/100g while that of *T. occidentalis*ranged from 0.27-1.50 mg/100g and 0.14-0.23 mg/100g respectively. The oxalate content for raw *Psychotriasp* was 5.42 mg/100g, *C. aconitifolius* (0.34 mg/100g) and *T. occidentalis* (0.06 mg/100g).

The phytochemical screening of *Psychotriasp, Cnidoscolusaconitifolius and Telfariaoccidentalis* is presented in Table 2. Alkaloids, anthocyanin, carotenoid, flavonoid, oxalate, saponin and tannins were present in these three vegetables. Glycoside was identified only in the *Psychotriasp*and was absent in *Cnidoscolusaconitifolius and Telfariaoccidentalis*samples. The solar-dried samples of *Psychotriasp*had higher levels of alkaloids and tannins than the fresh samples, while the fresh sample had higher flavonoid content than

all the samples studied. The solar dried *T. occidentalis* had the highest saponin content. *C. aconitifolius* (solar dried) had appreciable quantities of alkaloids.

Quantitative phytochemical values for *Psychotriasp, C. aconitifolius and T. occidentalis* are presented in Table 3. Alkaloid content for the raw samples showed that *C. aconitifolius*had 1.14g/100g, *T. occidentalis*0.85g/100g and *Psychotriasp* had 0.82 g/100g. The concentration of anthocyanin in *C. aconitifolius*was0.05 g/100g, and 0.02g/100g in *T. occidentalis*. Carotenoid value was 0.06g/100g in *Cnidoscolusaconitifolius*but*Psychotriasp* had 0.02g/100g. Flavonoid content in *C. aconitifolius* was 0.19g/100g while *T.occidentalis* sample had 0.04g/100g. Glycoside was present in raw *Psychotriasp*at 0.01g/100g. Similarly *Psychotriasp* had oxalate value of 5.43g/100g, *C. aconitifolius* had 0.35g/100g and *T. occidentalis* had 0.06g/100g. Saponin concentration in the raw samples of *T. occidentalis* was 0.89g/100g,*C. aconitifolius*samples 0.04g/100g. Tannins concentration in *C. aconitifolius* was 0.18g/100g while *T. occidentalis* had 0.14g/100g and *Psychotriasp* had 0.13g/100g. The phytochemical values for solar-dried samples indicated that *C. aconitifolius* had alkaloid content of 1.32g/100g and *T. occidentalis* had 0.95g/100g. Anthocyanin concentration in *Psychotriasp* was 0.20g/100g, *C. aconitifolius* 0.17g/100g and *T. occidentalis* 0.13g/100g. *C. aconitifolius* had carotenoid level of 0.15g/100g while *Psychotriasp* had 0.03g/100g. Flavonoid content in *C. aconitifolius* was 0.35g/100g and *T.occidentalis* 0.15g/100g. Similarly *Psychotriasp* had oxalate value of 27.7g/100g, *C. aconitifolius* had 0.96g/100g and *T. occidentalis* had 0.17g/100g. Saponin concentration in the solar-dried samples was 1.21g/100g in *T. occidentalis* and 0.79g/100g in *Psychotria*sample. Tannins concentration was 0.35, 0.26 and 0.23g/100g in *Psychotriasp,Cnidoscolius and T. occidentalis* respectively.

Table 1: Anti-nutrient compositions of *Psychotriasp, Cnidoscolusaconitifolius and Telfariaoccidentalis samples* (mg/100g).

Plant Materials	Phytates	Tannins	Oxalates
Psycotriasp(raw)	0.29±0.01	0.13±0.00	5.42±1.22
Psycotriasp(dried)	0.72±0.21	0.35±0.01	27.70±3.21
Cnidoscolousaconitifolius(raw)	0.66±0.03	0.18±0.01	0.34±0.01
Cnidoscolousaconitifolius(dried)	2.72±0.12	0.25±0.03	0.97±0.05
Telfairiaoccidentalis(raw)	0.27±0.01	0.14±0.02	0.06±0.02
Telfairia occidentalis (dried)	1.50±0.23	0.23±0.01	0.17±0.00

Mean ± SD (n=3)

Table 2: Phytochemical screening of *psychotriasp, Cnidoscolusaconitifolius and Telfariaoccidentalis*

	Phytochemicals							
Green leafy vegetables	**Alkaloid**	**Anthocyanin**	**Carotenoid**	**Flavonoid**	**Glycoside**	**Oxalate**	**Saponin**	**Tannin**
***Psychotria sp. (*raw)**	+	+	+	++	+	+	+	+
***Psychotriasp. (*Dried)**	++	+	+	+	+	+	+	++
C. aconitifolius (raw)	+	+	+	+	-	+	+	+
C. aconitifolius (dried)	++	+	+	+	-	+	+	+
T. occidentalis (raw)	+	+	+	+	-	+	+	+
T. occidentalis (dried)	+	+	+	+	-	+	++	+

+ indicates the presence of constituents.
++ indicates that the constituents are highly present.
-Indicates the absence of constituents

Table 3: Phytochemical contents of *Psychotriasp, Cnidoscolusaconitifolius and Telfariaoccidentalis*.

Green leafy Vegetables	**Phytochemicals in g/100g**							
	Alkaloid	**Anthocyanin**	**Carotenoid**	**Flavonoid**	**Glycoside**	**Oxalate**	**Saponin**	**Tannins**
Psychotriasp (raw)	0.82±0.21	0.04±0.01	0.02±0.00	0.18±0.03	0.01±0.00	5.43±1.53	0.26±0.02	0.13±0.01
Psychotriasp (dried)	1.12±0.05	0.20±0.00	0.03±0.00	0.35±0.01	0.05±0.01	27.7±3.21	0.79±0.02	0.35±0.01
***C. aconitifolius* (raw)**	1.14±0.02	0.05±0.01	0.06±0.02	0.19±0.01	-	0.35±0.02	0.04±0.01	0.18±0.00
***C. aconitifolius(* dried)**	1.32±0.05	0.17±0.03	0.15±0.01	0.30±0.00	-	0.96±0.02	0.99±0.02	0.26±0.02
T. occidentalis(raw)	0.85±0.03	0.02±0.00	0.03±0.00	0.04±0.01	-	0.06±0.01	0.89±0.02	0.14±0.01
T. occidentalis(dried)	0.95±0.03	0.13±0.00	0.07±0.01	0.15±0.00	-	0.17±0.02	1.21±0.01	0.23±0.01

Mean ± SD (n=3)

IV. Discussion

Phytochemicals and antinutrients are chemical substances found in leafy vegetables. Some of these chemical substances could be deleterious to human health and that of live stocks. These substances are alkaloids, glycoside compounds, oxalates, tannins, phytate, and methyl-cysteine–sulfoxide (SMCO)

(Nworgu*etal*, 2007).Qualitative and quantitative analyses of the phytochemical components in*Psychotria sp, C. aconitifolius and T. occidentalis*vegetables showed the presence of phytochemicals such as alkaloids, anthocyanin, carotenoids, flavonoids, and glycosides. The medicinal properties of these components have been documented by a number of researchers (Mensah *et al.,* 2012; Oyagbemi *et al*., 2008; Okigbo*et al*., 2009). The importance of alkaloids, saponins, tannins and carotenoids in various antibiotics used in treating common pathogenic strains has been reported by Kubmarawa *et al.,* (2007). It is noteworthy that, alkaloids were recorded in all the three leafy vegetables studied and that they all have nutritive and medicinal values. Further efforts at searching for more literature indicates that *Psychotria spp* has a lot of varieties but very few are found in Africa. Latest of these findings was by Martin and Diane (2002) who identified two new spp of *Psychotria* (*Psychotria bimbiensis and Psychotria moliurensis*) in the Western Cameroon. The specie of *Psychotria* found in Ubuluku Nigeria may be a new specie as efforts at identifying the specific specie is still ongoing because of wide variations observed in this specie from the existing known species.

The presence of tannins at a moderate concentration may confer on the vegetables more therapeutic and nutritional benefits than reported by other vegetables with high levels of these anti-nutrients. Tannins are of wide occurrence in plants and are usually found in greatest quantity in dead and dying cells. They exert an inhibitory effect on many enzymes due to their ability to denature protein (Trease and Evans, 2009). These authors also stated that tannin containing drugs will precipitate protein and have been used traditionally as stypics and internally for the protection of inflamed surfaces of mouth and throat. Studies on the antitumor activity of tannins have also been reported by Ken-ichi*et al.,* (1993).

Flavonoids are naturally occurring plant compounds with established *in vitro* antioxidant properties and potential cardioprotective effects (Shand*et al.,* 2002). This work showed that *Psychotria sp*and *C. Aconitifolius*had the highest flavonoid contents and may function as possible cardioprotective agents. Flavonoids and other poly-phenolics from a number of plants have also been reported to possess nutritional and medicinal properties (Pourmorad*et al.,* 2006; James *et al.,* 2008; Arbonnier, 2004) which support the claims of the rural consumers on the use of these lesser known vegetables. Despite the multiple medicinal uses of *Cnidoscolius* one possible disadvantage is that the fresh leaves of this plant contain high levels of cyanogenic glycosides. This result is in agreement with earlier work by Adeniran et al., (2013); Ross-Ibarra and Molina-Cruz (2002) who reported that *Cnidoscolius* contain glycosides which, upon hydrolysis, liberate hydrogen cyanide and cyanide molecules, potent toxic anti-nutritional compounds. Therefore the cyanogenic content of *Cnidoscolius* leaves makes it potentially deleterious to health (Kuti and Konoru, 2006). This may be the reason why we observed some itching effect on the skin during sample collection. Thus it is imperative that the use of medicinal plants be supported by scientific studies that evaluate their safety and efficacy. In this respect, Torrico et al. (2010) indicated that *Cnidoscolius* can be used for therapeutic purposes due to the low value of the median toxic dose (TD_{50}) and considering that the toxic effects possibly attributed to cyanogens contained in *Cnidoscolius* are lights and reversible. In addition, cooking, as well as other heat treatments hydrolyze the cyanogenic glycosides, minimizing the risk of toxicity (Martin and Ruberté, 1978; Kuti and Konoru, 2006). *Cnidoscolius*leaves are now being commercialized as tea product in dried form, because the dried leaves conserve high polyphenol contents (Loarca-Piña et al., 2010).

In conclusion, the phytochemical properties of these lesser known plants seem to make them a good source of nutritional and therapeutic agents.

References

[1]. Abeke, P.O., Ogundipe, S.O., Oladele, S.B. &Sekoni, A.A. (2003).Effects of cooking duration of lablab (*Lablab purpureus*) on organ weights and blood parameters of pullet chicks.Proc. of 28th Ann. Conf. of the Nigerian Society of Ani. Prod. Held on 16 – 20th March, 2003 at IAR&T Ibadan – Nigeria.Taiwo AA, Raji AM, Ogbanna JU and Adebowale EA (eds) pp. 240 – 242.

[2]. Adeniran, O.I., Olajide, O.O., Igwemmar, N. C. &Orishadipe, A.T. (2013).Phytochemical constituents, antimicrobial and antioxidant potentials of tree spinach [Cnidoscolusaconitifolius (Miller) I. M. Johnston].Journal of Medicinal Plants Research. 7(19): 1317-1322.

[3]. Alada, A.R.A. (2000). The haematological effect of *Telferiaoccidentals* diet preparation. African Journal of Biomedical Research. 3(3): 185-186.

[4]. Amaefule, F.G. &Obioha, F.C. (2001).Performance of broiler starters fed raw and boiled pigon pea seed meal. *Nigerian Journal of Animal production.* 28: 34-40.

[5]. Arbonier, M.A. (2004). Trees, Shrubs and Lianas of West African Dry Zones.2nd edition, Margraf publishers, Netherlands, pp. 412.

[6]. Chweya, J.A. &Eyzaguirre, P.B. (1999).The biodiversity of Traditional leafy vegetables IPGRI publishers.*International plant genetic Resources institute Rome*, Italy, p. 181.

[7]. D'Mello, J.P.F. (1995). Leguminous leaf meals in non-ruminant nutrition.In *Tropical legumes in animal nutrition.*1st ed. AB International, Wallingfort, Oxon, UK: 247-280.

[8]. Edema, A.O. (1987).Production of some common vegetables, *Horticultural Research Institute Ibadan* Nigeria. pp. 1-5.

[9]. Ene-Obong, H.N., 2001.Eating right (A Nutrition Guide).The University Press, Calabar.

[10]. James, D.B..Owolabi, A.O., Ibiyeye, H., Magaji, J. &Ikugiyi, Y.A. (2008). Assessment of the hepatic effects, heamatological effect and some phytochemical constituents of Ximeniaamericana (Leaves, stem and root) extracts. *African Journal of Biotechnology* 7(23): 4274-4278.

[11]. Kaankuta, F.G., Balogun, T.F. &Yaakugh, I.D.I. (2000).Effect of duration of cooking raw full fat soybeans on dug matter digestibility and energy utilization by young pigs. Proc. Ann. Conf. NSAP held at Michael Okpara University of Agriculture Umudike, Nigeria. pp. 191-193.

[12]. Ken-ichi M., ,Tsugiya M., , Takashi Y., Tsutomu H. andTakuo O. (2009).Anticarcinogenic Activities of Polyphenols in Foods and Herbs. *ACS Symposium Series*, Vol. 662: pp 245–259.

[13]. Kubmarawa, D., Ajoku, G.A., Enwerem, N.M. &Okorie, D.A. (2007).Preliminary phytochemical and antimicrobial screening of 50 medicinal plants from Nigeria, Afr. J. Biotechnol. 6(14): 1690-1696.

[14]. Kuti, J.O. &Konuru, H. B. (2004).Anti oxidant capacity and phenolic content in leaf extracts of tree spinach (Cnidoscolus spp.).journal of agricultural and food chemistry, 52 pp. 117.

[15]. Lachenaud, O. & Harris, D.J. (2010). Three new species of chassalia and psychotria (rubiaceae) from central africa. *Edinburgh Journal of Botany*. 67: 219-233.

[16]. Loarca-Piña, G., Mendoza, S., Ramos-Gómez, M., &Reynoso, R. (2010).Antioxidant, antimutagenic, and antidiabetic activities of edible leaves from Cnidoscoluschayamansa Mc. Vaugh.*J. Food Sci.* 75(2): 68-72.

[17]. Martin C. & Diane B. (2002).Two New Species of Psychotria (Rubiaceae) from Western Cameroon.*Kew Bulletin* 57(2): 389-395.

[18]. Martin, F.W. &Ruberté, R. (1978).Vegetables for the hot, humid tropics.Part 3.Chaya, Cnidoscoluschayamansa. USDA, New Orleans.

[19]. Mendoza, E.M.T. &del Rosario, R.R. (1988). Detoxification of ipil – ipil leaves by various heat and soaking treatments. Terminal Report.College of Agriculture, University of the Philippines at Los Banos, Laguna, Philippine. pp. 9–26.

[20]. Mensah, J.K., Ikhajiagbe, B., Edema, N. E. &Emokhor, J. (2012). Phytochemical, nutritional and antibacterial properties of dried leaf powder of *Moringaoleifera* (Lam) from Edo Central Province, Nigeria. *J. Nat. Prod. Plant Res*., 2012, 2 (1):107-112

[21]. Mensah, J.K., Okoli, R.I., Ohaju-Obodo, J.O. &Eifediyi, K. (2008).Phytochemical, nutritional and medical properties of some leafy vegetables consumed by Edo people of Nigeria.*African Journal of Biotechnology*. 7 (14): 2304-2309.

[22]. Modi M., Modi, A.T. &Hendriks.S. (2006).Potential role for wild vegetables in household food Security: a preliminary case study in kwazulu-natal, South Africa. *African Journal of food agriculture nutrition and development.* 6(1): 1-12.

[23]. Nworgu, F.C. (2004). Economic importance and growth rate of broiler chickens served fluted pumpkin (Telfariaoccidentalis) leaves extract. African Journal of Biotechnology. 6(2): 167-174.

[24]. Nworgu, F.C., Ekemezie, A.A.O., Ladele, A.O. &Akinrolabu, B.M. (2007).Performance of Broiler Chickens Served Heat Treated Fluted Pumpkin (*Telfariaoccidentalis*) Leaves Extract Supplement.*Journal of Applied Sciences Research.*3 (7): 540-548.

[25]. Oduguwa, O.O., Fanimo, A.O., Onyekwere, E.A., Oyenuga, A.B. &Sobogun, G.O. (1999).Utilization of raw and autoclaved whole pools of *Samaneasaman*(JACQ MERILL) by the domestic rabbit.*Tropical Journal of Animal Science.* 2: 69-77.

[26]. Okigbo, R.N. Anuagasi, C.L. &Amadi, J.E. (2009). Advernces in some selected medicinal and aromatic plants indigenous to Africa. Africa Journal of Medicinal Plants Research, 2000, 3(2), 86.

[27]. Oyagbemi, A. A., Odetola, A. A. &Azeez, O. I. (2008). Ameliorative effects of Cnidoscolusaconitifolius on anaemia and osmotic fragility induced by protein energy malnutrition. *Journal of biotech.*, 7(11):1721-1726.

[28]. Oyeyemi M.O., Leigh, O.O., Ajala, O.O., Badejo, A.O. &Emikpe, B.O. (2008). The effects of the aqueous extract of "ugu" (*Telfairiaooccidentalis*) eaveso n the testis and spermatozoa Characteristics in the male albino rat (wrsrAR STRATN). *Folia Veterinaria*. 52 (2): 102-1052.

[29]. Pourmorad F, Hosseinimehr SJ, Shahabimajd N. (2006). Antioxidant activity of phenol and flavonoid contents of some Iranian medicinal plants.Afr J Biotech. 5:1142-5.

[30]. Ross-Ibarra J. & Molina-Cruz, A. (2002). The ethnobotany of chaya (Cnidoscolusaconitifolius sp. *Aconitifoliusbreckon*): A nutritious Maya vegetable. Economic Botany. 56:350–365.

[31]. Shand, J., Hart, N. S., Thomas, N. and Partridge, J. C.(2002). Developmentalchanges in the cone visual pigments of black bream AcanthopagrusbutcheriJ. Exp.Biol. 205: 3661-3667.

[32]. Smith, F.I. &Eyzaguirre, P. (2007). African leafy vegetables: their role in the world health organization's global fruit and vegetables initiative. African Journal of Food Agriculture Nutrition.and Development. 7(3): 7019

[33]. Torrico, M., Giménez M.J., González, N., Alou, L., Sevillano, D., Cafini, F., Prieto, J., Cleeland, R. & Aguilar, L. (2010).Bactericidal activity of daptomycin versus vancomycin in the presence of human albumin against vancomycin-susceptible but tolerant methicillin-resistant Staphylococcus aureus (MRSA) with daptomycin minimum inhibitory concentrations of 1-2microg/mL.*Int J Antimicrob Agents*. 35(2):131-137.

[34]. Torrico, M., Giménez M.J., González, N., Alou, L., Sevillano, D., Cafini, F., Prieto, J., Cleeland, R. & Aguilar, L. (2010).Bactericidal activity of daptomycin versus vancomycin in the presence of human albumin against vancomycin-susceptible but tolerant methicillin-resistant Staphylococcus aureus (MRSA) with daptomycin minimum inhibitory concentrations of 1-2microg/mL.Int J Antimicrob Agents. 35(2):131-137.

[35]. Trease G. E. and Evans, W. O. (2009).*Trease and Evans Pharmacognosy*.Sixth Edition. New York: Sauders Elsevier Limited, pp. 104-262.

[36]. Trease, A. & Evans, W.C. (1989).*Pharmacognosy* (13thed.). London: BailliereTindall. pp 60-75.

[37]. Uusikua, N.P., Oelofsea, A., Kwaku, G., Duodub, M.J. &Besterc, M.F. (2010). Nutritional value of leafy vegetables of sub-Saharan Africa and their potential contribution to human health: A review. *Journal of Food Composition and Analysis.* 23 (6): 499-509.