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NUTRIENT AND BIOACTIVE PROPERTIES OF TOSS JUTE (Corchurus olitorius) AND YELLOW TASSEL (Emilia coccinea) VEGETABLES

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The study examined the nutrient and bioactive properties of toss jute (Corchurus olitorius) and yellow tassel (Emilia coccinea) vegetables. The two leafy vegetables were obtained from cultivated farmlands in Mbamo ward, Katsina-ala in Benue state, Nigeria. They were sorted, rinsed with tap water and shade dried for five days at room temperature. The vegetables were then separately pulverized into powder and packaged for chemical analysis. Proximate, some minerals, vitamins (antioxidants), dietary fibre and phytochemicals were determined in triplicates using standard methods. The protein content for Corchorus olitorius (14.67%) and Emilia coccinea (15.04%) varied significantly ($p<0.05$). Corchorus olitorius had higher values for fat, ash, crude fibre and carbohydrate. The low values for Cu, Zn, Mn and Se shows that, these vegetables are poor sources of these nutrients. The values for Ca, Mg, P, K, Na and Fe were in close proximity with other works. Pro-vitamin A and vitamin C in these vegetables were low. Vitamin E was not traceable in all samples. Corchorus olitorius and Emilia coccinea had comparable values (7.43 and 7.20%) for dietary fibre ($p<0.05$). Saponins, alkaloids and tannins were low in both vegetables while flavonoids (3.25-3.26 mg), glycosides (23.26-25.57 mg) and polyphenols (3.25-3.36 mg) were appreciably high. Toss jute and yellow tassel have high nutrient and bioactive potentials to justify their cultivation, processing, consumption and diversification.

Keywords: Bioactive, Phytochemicals, Pulverized, Vegetables

INTRODUCTION

There are hundreds of common vegetables eaten in different parts of the world. In developing countries, the consumption of vegetables for health reasons is all the more important (Khan and Hamid, 1986). The use of leafy vegetables is part of Africa's cultural heritage and vegetables play important roles in the food culture of African households (Ene-Obong, 2008).

Different ethnic groups consume various types of vegetable for different reasons. Vegetables are the cheapest and most available source of important proteins, amino acids, vitamins and minerals (Okaka *et al.*, 2000). Rumeza *et al.* (2006) also noted that, vegetables are important food and highly beneficial for the maintenance of health and prevention of diseases. They contain valuable food ingredients which can be successfully utilized to build up and repair the body. They are valued mainly for their high carbohydrate, vitamin and mineral contents (Rumeza *et al.*, 2006). Fruits and vegetables also contain other components with phytochemicals and antioxidants in the correct combination that helps to keep the blood sugar in balance, create better energy in the body and also build up the immune system (Jane, 2005). Some components of fruits and vegetables (phytochemicals) are strong antioxidants and modify the metabolic activation and detoxification/ disposition of carcinogens and may even influence processes that may change the course of tumor cell (Oguntibeju *et al.*, 2013).

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Rumeza *et al.* (2006) noted that, vegetables are valuable in maintaining alkaline reserve of the body. They are valuable mainly for their high carbohydrate, vitamin and mineral contents. These nutrients make vegetables important food and highly beneficial for the maintenance of health and prevention of disease. Adel (2001) noted that, other important nutrients supplied by fruits and vegetables include folacin, riboflavin, zinc, calcium, potassium and phosphorus.

According to Tutare (2002), there are over 200 varieties of green leafy vegetables which majority of Nigerians are not familiar with. The major reason for the less exploitation and utilisation of fruits and vegetables in Nigeria is due to ignorance of their contribution to adequate nutrition. Lack of information on the specific nutrients in a larger number of locally consumed vegetables species in which Nigeria is richly endowed is partly responsible for their under exploitation especially in areas beyond the traditional localities where they are found and consumed. This study was planned to explore the nutrient and bioactive properties of the vegetables

Toss Jute

Toss jute (*Corchurus olitorius*) is a native plant of tropical Africa and Asia. Its leafy vegetable is popularly used in soup preparation and folk medicine for the treatment of fever, chronic cystitis, cold and tumours (Oboh *et al.*, 2009).

Corchorus olitorius L., also known as wild okra belongs to the family Tiliaceae. It is widely consumed as a vegetable among rural communities in most parts of Africa (Velempini *et al.*, 2003). In West Africa, it is commonly cultivated and very popular among people of all classes especially in Nigeria (Oyedele *et al.*, 2006). It is commonly known as bush okra, Jews mellow, or toss Jute. Locally, it is called "*Ewedu or Oyoyo*" in Yourba, "*Laa lo*" in Hausa, *'Alihara'* in Igbo and *Atyever* in Tiv languages in Nigeria. It is a herb or small shrub characterized by yellow flowers and many seeded elongated capsules with tailed prominently nerved leaves, there are two varieties of this common vegetable. It is commonly found as weed on farmlands or cultivated in the savannah and tropics (Agishi, 2010).

Corchurus olitorius is a very popular vegetable especially in South-Western Nigeria with some medicinal properties reported in literature (Pall *et al.*, 2006).

The leaves are rich in beta carotene, iron, calcium and vitamin C. The plant has an antioxidant activity with a significant tocopherol equivalent Vitamin E (Ayodele, 2005). The young shoot tips can be eaten raw or cooked and it contains high levels of protein and vitamins C. (Shittu and Ogunmoyela, 2001). *Corchurus olitorius* is usually recommended for pregnant women and nursing mothers because it is believed to be rich in iron (Oyedele *et al.*, 2005).

According to Adeniyi *et al.* (2012), *Corchurus olitorius* had moisture content of 79.98%, Ash 0.64%, Crude fibre 0.33%, protein 6.21%, lipid 5.07%, carbohydrate 6.25%. The vitamin composition of the leaves in mg/100g dry weight was found to be 316.80 Ascorbic acid, 0.61 Niacin, 0.06 Riboflavin and 0.04 vitamin (Adeniyi *et al.*, 2012).

Idris *et al.* (2009) carried out the proximate and mineral composition of *Corchurus olitorius* leaves from a farm site in Minna, Nigeria. The results of proximate composition showed that the leaves contained 18.38% ash, 12.54% crude protein, 11.99% crude lipid and 19.56% available carbohydrate. The leaves also had high energy value of 200.78 kcal/100 g. Mineral analysis revealed that potassium (2814.15 mg/100 g) and Magnesium (76.69 mg/100 g) were the dominant elements. The leaves also contained appreciable concentrations of Na (54.56 mg/100 g), Ca (30.55 mg/100 g), P (6.68 mg/100 g), Cu (2.52 mg/100 g), Fe (19.53 mg/100 g), Mn (5.95 mg/100 g) and Zn (4.71 mg/100 g). The above result confirmed that *Corchurus olitorius* leaves are rich source of Potassium, iron, copper, manganese and zinc as well as high energy values essential in human and animal nutrition (Idris *et al.*, 2009).

It is therefore revealing that, mineral bioavailibity was relatively high in *Corchurus olitorius* when compared to the two conventional vegetables (cabbage and spinach), a situation reflecting that this vegetable can be used to alleviate micronutrient deficiency if cultivated, popularized and improved (Ndloru and Afolayan, 2008).

Yellow Tassel

Yellow tassel *(Emilia coccinea)* belongs to the family Asteraceae from Africa, tropical Asia and Oceanica. The specie *E. coccinea* is an herbaceous plant annual, weak-stemmed, to 1m high, flowers solitary, terminal, dispersed from Guinea to Nigeria, Cameroon and occurring through eastern African and into tropical Asia. It is an attractive plant of easy culture, bearing small scarlet or sometimes golden-yellow heads.

E coccinea known as yellow tassel flower or shaving bush is locally known as *Ntiele* (Igbo), *Aninge* (Tiv),

Odundunodo (Yoruba) in Nigeria. The leaves are consumed either raw or prepared as soups mostly among the Tiv and other tribes in the North Central, Nigeria (Agishi, 2010).

Anaka *et al.* (2013), noted that, it has similar uses as *Emilia praetermissa* whose leaves are eaten in West Africa and DR Congo as vegetable either fresh in Salads or cooked. In Nigeria, the leaves are used to treat eye disorders, and also filiasis.

Anaka *et al.* (2013) reported that, the aqueous leaf extract showed the presence of tannins, flavonoids, steroids, cardiac glycosides, carbohydrate, reducing sugar and terpenoids and absence of alkaloids and saponins. Similarly, Edeoga *et al.* (2005) reported 0.92% alkaloids, 0.81% phenols, 11.85% Tannin, 0.96% flavonoid and 2.3% saponin. *Emilia coccinea* therefore, has medicinal and physiological properties worth examining.

The study examined the nutrient and bioactive properties of toss jute (*Corchurus olitorius*) and yellow tassel (*Emilia coccinea*) vegetables. The two green leafy vegetables *Corchurus olitorius* and *Emilia coccinea* had good nutrient profile.

MATERIALS AND METHODS

The leafy vegetables of toss jute (*Corchurus olitorius*) and yellow tassel flower (*Emilia coccinea)* were used for this study. These two vegetables were obtained from cultivated farmlands in Mbamo ward, Katsina-Ala in Benue State, Nigeria.

Fresh tender leaves of the two vegetables were harvested from cultivated farmlands (5-10 kg each), sorted by removing extraneous materials, rinsed with tap water and shade dried(for five days at room temperature). The vegetables were then be separately pulverised into powder using Warburg laboratory blender and packaged in labelled polyethylene bags for further use.

Chemical analysis of the two shade dried samples were conducted in triplicates. Proximate, some minerals, vitamins (antioxidants), dietary fibre and phytochemicals were determined in triplicate using standard methods.

Proximate Analysis: Proximate analysis of the samples was done using AOAC (2000) methods. The total carbohydrate content was determined by difference.

Determination of Minerals

The calcium, magnesium, iron, cupper, phosphorus, zinc, potassium, manganese, sodium and selenium contents were determined using the method described by AOAC (2000).

Vitamins (antioxidants) Determination

Pro-Vitamin A (-carotene) (Retinol Equivalent) (RE)

Pro-vitamin A (β-carotene) was determined using spectrophotometric method based on UV inactivation adopted from International Vitamin A Consultative Group (IVACG, 1992). Vitamin C (ascorbic acid) was determined using the procedure described by AOAC (2000). Vitamin E (tocopherol) was determined using AOAC (2000) method. The total dietary fibre (insoluble dietary fibre and soluble dietary fibre) was determined using the enzymatic-gravimetric methods (AOAC, 1995).

Determination of Phytochemicals

Saponin content was determined using the method as described by Obadori and Ochuko (2001). Alkaloids determination was carried out as described by Harborne (1973) while flavonoids determination was done using the method described by Bonh and Kocipoi-Abyazan (1994). Polyphenols were determined as outlined by (Trease and Evans, 1989), glycosides by Onwuka (2005) while the tannins were determined by the method of Padmaja (1989).

STATISTICAL ANALYSIS

The data were presented as means ± Standard Deviation (SD). Statistical differences were evaluated by analysis of variance (ANOVA) followed by Duncan's new multiple range and Student's ttests using Statistical Product and Service Solutions (SPSS) version 21.0 computer software package (SPSS Inc., Chicago, USA). A probability level of less than 0.05 ($p<0.05$) was considered as significant (SAS, 2002).

RESULTS AND DISCUSSION

Table 1 shows the proximate composition of the two green leafy vegetables on dry matter basis. The protein content of the samples ranged from 14.67 to 15.04% ($p<0.05$). The high protein content in these vegetables (14.67 – 15.04%) on dry matter basis could be attributed to the processing method used. Aletor and Adegun (1995) reported that, when green leafy vegetables are dried, their crude protein ranged from 15.0 - 30.0% and the mean is usually around 20%.The values in this study are in close proximity with those reported by Idris *et al*. (2009) for *Corchurus Olitorius* (12.54%). *Corchurus olitorius* recorded the highest fat and ash content 3.90% and 13.43% among the vegetables. The

Table 1: Proximate Compositions (%) of Vegetables of *Corchurus olitorius* and *Emilia coccinea* (Dry Matter)

Sample	Protein	Fat	Ash	Crude Fibre	Carbohydrate
Co	14.67± 0.01^{b}	3.90±0.01^{b}	13.43±0.01^{b}	15.68±0.01^{c}	52.12±5.21^{b}
Ec	15.04± 0.01^{c}	3.67±0.01^{b}	13.40±0.01^{b}	15.03±0.01^{b}	50.62±5.19^{a}

Note: Mean ± SD of three determinations. Means with different superscripts in the column are significant at P<0.05; Co = *Corchurus olitorius*; Ec = *Emilia coccinea*.

low fat content in these vegetables which ranged from 3.67% in *Emilia coccinea* to 3.90% in *Corchurus olitorius* were expected because the little fat for vegetables in general is to maintain the integrity of the cell—a commonly observed fact (Oguntona, 1998). However, the presence of fats in foods increases palatability. Ash content which is an index of mineral contents in biota were comparable (13.40-13.43%). These values were similar with those reported by Oduro *et al.* (2008) who had 8.71-11.60% for *Corchurus olitorius.* Crude fibre content of the samples showed that, *Emilia coccinea* had (15.03%) followed by *Corchurus olitorius* (15.68%). The crude fibre content of the two leafy vegetables ranged from 15.03% to 15.68%. These values are in agreement with most Nigerian vegetables and values obtained from other researchers. Ekumankama (2008) reported the fibre content of Nigerian vegetables such as "Oha" (Pterocarpus soyauxii) 13.1%, "Nturukpa" (*Pterocarpusan talinoides*) 10.55%, "Okazi" (*Gnetum africanum*) 24.6%. Idris *et al*. (2009) reported 11.99% for *Corchurus olitorius.* The values obtained in this research were however higher than those reported by Ogbumedia *et al*. (2013) who had 4.36%. Fibre cleanses the digestive tract by removing potential carcinogens from the body and prevents the absorption of excess cholesterol (Emebu and Anyika, 2011). The carbohydrate content of the two vegetables *Corchurus olitorius* and *Emilia coccinea* were 50.62 and 52.12%, respectively. There was a significant difference ($p<0.05$) in the values for carbohydrates among the vegetables. As far as vegetables are concerned, some of them are rich sources of carbohydrates while others contain traces of the nutrient. Perhaps, one of the most appealing benefits of dark green leafy vegetables is their low caloric and carbohydrate contents and their low glycaemic index. These features make them ideal food to facilitate achieving and maintaining a healthy body weight (USDA, 2013).

Table 2 shows the mineral compositions of *Corchurus olitorius, and Emilia coccinea* samples on dry matter basis.

Table 2: Mineral Composition (mg/100 g) of *Corchurus olitorius,* and *Emilia coccinea* Vegetables (Dry Matter Basis)

Minerals	Co	Ec
Ca	24.16±0.01^{c}	27.26±0.01^{d}
Mg	5.33±0.01^{b}	5.56±0.01^{c}
P	147.59±0.23^{a}	155.36±0.01^{c}
Fe	1.25±0.01^{b}	1.25±0.01^{b}
Cu	0.07±0.01^{b}	0.03±0.01^{a}
Zn	0.20±0.01^{a}	0.22±0.01^{a}
K	435.36±0.01^{b}	450.21±0.01^{c}
Mn	0.24±0.01^{a}	0.23±0.01^{a}
Na	38.69±0.01^{b}	35.56±0.01^{a}
Se (µg/100 g)	0.05±0.01^{b}	0.05±0.01^{b}

Note: Mean ± SD of three determinations. Means with different superscripts in the row are significant at P<0.05; Co = *Corchurus olitorius.*

The amounts of calcium in the vegetables were 27.26 mg in *Emilia coccinea* and 24.16 mg/100 g in *Corchurus olitorius*, respectively. These values were in close proximity with the works of Idris *et al.* (2009) (30.58 mg/100 g) who worked on *Corchurus olitorius* dried leaves. Phosphorus ranged from 147.59-155.36 mg in the two vegetables. Other mineral contents includes; Magnesium (5.33-5.56 mg), iron (1.25 mg), potassium (435.36-450.21 mg) and Sodium (35.56-38.69 mg/100 g). These values were in comparably lower than those obtained from the works of Idris *et al.* (2009) who reported magnesium (76.69 mg), iron (19.53 mg), potassium (2814.14 mg), and sodium (54.56 mg/100 g) for *Corchurus olitorius* on dried matter basis, respectively. The values obtained in this study for copper were (0.03-0.07 mg), zinc (0.20 mg-0.22 mg), manganese (0.23-0.24 mg) and selenium (0.05 µg/100 g). The values in this study were similar with

the works of Idris *et al.* (2009) (Cu-2.52 mg, Zn-4.71 mg, Mn-5.95 mg) who worked on *Corchurus olitorius* dried leaves, respectively. Calcium is a major factor for sustaining strong bones and plays a part in muscle contraction and relaxation, blood clothing, central nervous system functioning when needed, blood pressure regulation, synaptic transmission and absorption of vitamin B 12. Iron has been reported as an essential trace metal and plays numerous biochemical roles in the body, including oxygen binding in haemoglobin and acting as an important catalytic centre in many enzymes. Thus, the use of *Corchurus olitorius* and *Emilia coccinea* vegetables in diet can furnish the diet with iron sufficient enough to meet the daily requirement for the nutrient. Green vegetables also contain iron needed in haemoglobin formation (Ladan *et al.*, 1986). Various minerals such as Zn Mg and Mn are also co-enzymes in certain biochemical reactions in the body which underscore the importance of leafy vegetables in metabolic reactions. Zinc-requiring enzymes participate in a multitude of reactions associated with the hormone insulin involved in making genetic materials and proteins, immune reactions, transport of vitamin A, taste perception, wound healing, the making of sperm and the normal development of the fetus (Igbatim, 2010). The lower values obtained from these vegetables for Cu, Zn, Mn and Se shows that these vegetables are poor sources of these nutrients. They require supplements to meet their dietary adequacy. The high and comparable values of sodium, magnesium, potassium and phosphorus are interesting. They require a little amount of supplementation to meet their various dietary adequacies.

Antioxidants compositions of *Corchurus olitorius, and Emilia coccinea* samples on dry weight basis were presented in Table 3. The pro-vitamin A concentrations for *Corchurus olitorius*, and *Emilia coccinea* ranged from 0.00RE in *Emilia coccinea* to 0.03RE in *Corchurus olitorius* samples. The vitamin C contents in *Emilia coccinea* was lowest 0.43 mg/100 g and *Corchurus olitorius* had the highest value of 0.48 mg/100 g. However, there was no trace in vitamin E concentrations in all samples.

The findings are in agreement with Adeniyi *et al.* (2012) who recorded 0.04 mg/100 g (dry matter) pro-vitamin A in *C.olitorius* leaves. On the contrary, Faleye *et al.* (2012) recorded 31.79 mg/100 g vitamin C in *E. coccinea*. The result of this study showed that, these vegetables are poor sources of pro-vitamin A, vitamin C and vitamin E. Vegetables are the cheapest and most available source of important proteins, amino acids, dietary fibre, vitamins and minerals (Okaka *et al.*, 2000). Pro-vitamin A (beta-carotene) is a vitamin that protects the body cells from the damaging effects of free radicals; they act as good source of vitamin A and enhance the functioning of the immune system (Whitney and Rolfes, 2005). Beta carotene as antioxidant stops singlet oxygen scavengers' free radical and protects cell membrane lipids from the destructive effects of oxidative degradation (Brio *et al.*, 2005). The presence of pro-vitamin A in these vegetables is a good quality of the lesser known vegetables that could be promoted to consumers for its health benefits.

The total dietary fibre and phytochemical composition of the four vegetables are presented in Table 4. Total Dietary Fibre (TDF) for *C.olitorius* (7.43%) was found to be the highest among the vegetables. Saponins content for the samples showed that, *E. coccinea* had the highest value (0.45 mg/100 g). There was no significant difference ($p<0.05$) in the Flavonoids content of *C.olitorius* (3.25 mg/100 g) and *E. coccinea* (3.26 mg/100 g), respectively. Alkaloids content ranged from 1.53-1.64 mg/100 g. Tannins and Glycosides content were highest in *C.olitorius* (1.13 and 25.57 mg/100 g), respectively. Lower values were recorded in *E.coccinea* 1.04 and 23.26 mg, respectively. Polyphenols content in the two samples ranged from 3.25 to 3.36 mg/100 g.

The Total Dietary Fibre (TDF) ranged from 7.20% in *E. coccinea* to 7.43% in *C. olitorius*. Green vegetables are good source of both soluble and insoluble dietary fibre (Egbuna, 2000). While prevention of constipation, improved blood glucose levels, and blood lipid profiles predominate as beneficial outcomes of a diet high in dietary fibre, other benefits are worth noting. For example, because

Table 3: Antioxidants Composition of *Corchurus olitorius* and *Emilia coccinea* Samples (Dry Matter Basis)

Sample	Pro Vitamin A R E	Vitamin C mg/100 g	Vitamin E (α-tocpherol) mg/100 g
Co	0.03 ± 0.00^{a}	0.48 ± 0.01^{c}	NT
Ec	0.00 ± 0.00^{a}	0.43 ± 0.01^{b}	NT

Note: Mean ± SD of three determinations. Means with different superscripts in the row are significant at $P<0.05$; Co = *Corchurus olitorius*; Ec = *Emilia coccinea*.

Table 4: Total Dietary Fibre (%) and Phytochemical Compositions (mg/100 g) of *Corchurus olitorius* and *Emilia coccinea* Leaves (Dry Matter Basis)

Sample	TDF	Saponins	Flavonoids	Alkaloids	Tannins	Glycosides	Polyphenols
Co	7.43±0.04^{b}	0.25±0.01^{a}	3.25±0.01^{b}	1.53±0.01^{b}	1.13±0.0^{c}	25.57±0.03^{b}	3.25±0.01^{b}
Ec	7.20±0.00^{c}	0.45±0.01^{c}	3.26±0.01^{b}	1.64±0.01^{d}	1.04±0.0^{b}	23.26±0.01^{a}	3.36±0.01^{c}

Note: Mean ± SD of three determinations. Means with different superscripts in the column are significant at P<0.05; Co = *Corchurus olitorius*; Ec = *Emilia coccinea*; TDF = Total Dietary Fibre.

fibre provides bulk in the diet, without added calories, it can have a satiating effect on appetite; helping in weight management (FAO, 1998). Clinical recommendations for dietary fibre are routinely provided to improve laxation and reduce diverticular disease. In addition, physicians recommend an increase in the consumption of foods containing fibre to reduce obesity, cardiovascular disease, type-2 diabetes and some cancers (Turner and Lupton, 2011).

Quantitative analysis of the phytochemical components of *Corchurus olitorius* and *Emilia coccinea* vegetables showed the presence of phytochemicals such as flavonoids, alkaloids, tannins, glycosides, polyphenols and saponins (Table 4). The values obtained for *E. coccinea* (Table 4) flavonoids (3.26 mg), polyphenols (3.36 mg), tannins (1.04 mg) and saponins (0.45 mg) were relatively higher than those from the work of Faleye *et al.* (2012) who had flavonoids, polyphenols, tannins and saponins to be 1.71 mg, 1.87 mg, 1.55 mg, 0.37 mg and 0.37 mg/100 g, respectively.

The importance of alkaloids, saponins, tannins, flavonoids, glycosides and polyphenols in various antibiotics has been documented in Whitney and Rolfes (2005). Wardlaw and Insel (1996) noted that, phytochemicals influence production of certain enzymes involved in detoxifying carcinogens and removing them from the body. When consumed on a regular basis, some phytochemicals may help in reducing the risk of cancer and heart disease. The merits of the preventive and curative potentials of these phytochemicals would be attained by diversification of diets. This is because various fruits and vegetables contain varied levels of phytochemicals (Nnam *et al*., 2012).

Flavonoids were recorded in the vegetables (3.25-3.26 mg/100 g). Flavonoids are naturally occurring plant compounds with established *in vitro* antioxidant properties and potential cardio protective effects. They acts as antioxidants, scavenge carcinogens, bind to nitrates in the stomach, preventing conversion to nitrosamines and inhibits cell proliferation (Whitney and Rolfes, 2005). They are found in black tea, berries, celery, citrus fruits, green tea, olives, onions, soybeans, vegetables, wine, whole wheat, etc. Flavonoids and other poly-phenolics from a number of plants have also been reported to possess nutritional and medicinal properties (Aldona, 2008) which support the claims of the rural consumers on the use of these four leafy lesser known vegetables. Furthermore, free radicals are formed disproportionately in diabetes by glucose oxidation, non-enzymatic glycation of proteins, and the subsequent oxidative degradation of glycated proteins (Mehta *et al.*, 2006). Flavonoids can exert their antioxidant activity by various mechanisms, e.g., by scavenging or quenching free radicals, by chelating metal ions, or by inhibiting enzymatic systems responsible for free radical generation (Dais *et al.*, 2005).

The presence of tannins and saponins at a moderate concentration may confer on the vegetables more therapeutic and nutritional benefits than reported by other vegetables with high levels of these antinutrients

It is noteworthy that, alkaloids were recorded in the two leafy vegetables (1.53-1.64 mg) studied and that they all have nutritive and medicinal values. An alkaloid is a nitrogenous organic molecule that has a pharmacological effect on humans and animals. Many alkaloids have toxic properties. They can be extremely poisonous if taken in larger doses.

It is now widely accepted that, dietary polyphenolics may play an important role in protecting the body against chronic diseases, such as cancer, cardiovascular diseases and diabetes mellitus (Knekt *et al.*, 2002). The vegetables had high level of glycosides (23.26-25.57 mg/100 g) which may be detrimental to health if consumed in high quantity. Glycosides are compounds containing a carbohydrate and non carbohydrate residues in the same molecule. Glycosides can be referred to as compounds or substances found in combination with sugars.

CONCLUSION

The proximate composition of C*orchurus olitorius* had slightly higher values than *Emilia coccinea* except protein. The values obtained from the nutrient and bioactive properties of the vegetables were comparable with literature. The two leafy vegetables *Corchurus olitorius* and *Emilia coccinea* had good nutrient profile.

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