

Determination of Some Vitamins in Three Selected African Green Leafy Vegetables

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Abstract: Increased alertness of the usefulness of vegetable additions in human nutrition has enhanced their consumption as part of the daily diet. The remedial potential of the vegetables is usually ascribed to the high content of crucial vitamins contents. The aim of this study is to determine the presence of vitamins A, E, K, B1, B2, B6, B12 and C in *Telfairia occidentalis*, *Amaranthus cruentus* and *Mucuna pruriens* leaves. The vitamins were determined using a standard method and these findings show that all the assayed vitamins were present in the selected vegetables in different amounts. The results show that among the green leafy vegetables studied, the amount of vitamin C (57.450±2.150 mg/100g) was higher compared to other vitamins in *T. occidentalis* than the other leafy vegetables while vitamin C (38.250±4.900mg/100g), B12 (37.340±1.780mg/100g) and B6 (25.020±2.667) were higher in *A. cruentus* leaves. Also, *M. pruriens* had the highest amount of vitamin B6, B2, B1 and E which are 15.493±0.733, 14.990±0.035, 12.530±0.975 and 11.652±0.018 (mg/100g) respectively. Based on the widely reported health benefits of the selected vitamins and the amount found in this study, these vegetables might thwart the incidence of the diverse ailments. Thus, the amounts of variety of vitamins in these vegetables are of great importance on nutritional value of human diet.

Key words: Vegetables • Nutritive Value • Human Diet • Malnutrition • Diseases

INTRODUCTION

In developing countries of the world, the populace depend on starch-based food as the main staple food for the supply of both energy and protein [1]. This foods account in a bit for protein-energy malnutrition which prevails among the populace as acknowledged by Food and Agricultural Organization [2]. In Nigeria, as in most other tropical countries of Africa, the daily diets of people are subjugated by starchy staple foods [3]. Green leafy vegetables are cheap and occupy chief place among the food crops as they provide sufficient amounts of vitamins, proteins, minerals and amino acids for humans [4]. These vegetables constitute an indispensable constituent of human diet in Africa generally and West African in particular [5]. Despite, the diversity like taste, flavor and aroma which vegetables add to the menu [6 and 7] they are helpful sources of nutrients especially in rural areas where they contribute substantially to protein, minerals, vitamins, fibers and other nutrients which are usually scarce in daily diets [8].

Vegetables are the fresh and edible portions of herbaceous plants, which can be eaten wholly or in parts, raw or cooked as part of main dish or salad [9]. They contain precious food ingredients which can be used as sources of energy, body building, regulatory and defensive material. Vegetables are helpful in maintaining alkaline reserve of the body. They are valued mainly for their high carbohydrate, vitamin and mineral contents. Vegetables includes; edible leaves, stems, roots, flowers, seed, fruits, bulb and tubers and each group contributes to diet in its own way [10]. Vegetables also act as buffering agents for acidic substances produced during the digestion process [11]. Vegetables contain both vital and noxious substances over a wide range of amounts and the level of these substances is dependent on the levels in the soil in which the vegetable was grown [12 and 13]. Leafy vegetables are regular ingredient in the diet of the average Nigerian with their level of consumption; they can provide substantial amounts of nutritive minerals [14]. Vegetables contain low calories and negligible quantities of utilizable energy hence they are ideal for

obese and diabetic people who can satisfy their desire for food without consuming much carbohydrate [15].

Among the wide range of vegetables cultivated in South-East Nigeria include; *T. occidentalis*, *A. cruentus* and *M. pruriens*. Although, the first two leaves are perhaps the most popular.

T. occidentalis commonly known as Fluted pumpkin, belongs to the family Cucurbitaceae, which is a tropical vine grown in West Africa as a leafy vegetable and for its edible seeds [16]. It is a leafy vegetable that has been widely accepted as a dietary constituent among peasants in Nigeria [17]. The plant produces luxuriant edible green leaves, which are rich in iron and water soluble vitamins such as vitamin C, riboflavin and thiamine [18]. The tender leaves are consumed by man as vegetables as well as by livestock as forage, while the young seeds are eaten as human food [19].

A. Cruentus is a highly popular green vegetable belonging to the family of Amaranthaceae. It ranked among the best leaf vegetable in terms of its chemical composition and nutritional status [20]. Moreover, it contributes much in ameliorating nutrient imbalance in human diet [21]. The market drive on *A. cruentus* is highly appealing and its cultivation is not labour intensive, this makes it to be one of the most important annual leaf vegetables and it develops and matures much more rapidly than any other vegetable. *A. Cruentus* grows for a short period, this serves as a source of encouragement to farmers, especially the peri-urban and urban dwellers where it serves as a source of employment. *Amaranthus cruentus* species are extensively cultivated due to their early maturity and ability to survive in mixture with other arable crops, they remain the most preferred crop by many farmers for early revenue generation and survival while the farmers are still awaiting other crops to mature in the traditional subsistence mixed cropping systems. *Amaranthus cruentus* is produced under different cropping systems in home gardens, farms, inland valleys (*fadamas*) and peri-urban gardens. About 40 % of total *A. cruentus* production by individual farmers is used for family consumption, while the rest is marketed [22]. Leaves and fruits are rich in proteins and micronutrients such as iron, calcium, zinc, vitamin C and vitamin A. All parts of the plant are used as medicine to heal many diseases in African communities [23].

M. pruriens is of a family fabaceae and is a slender climber [24]. It is distributed in the tropics and is used for various purposes. Traditionally, it is used as a stimulant, purgative, diuretic, febrifuge and tonic. Also, it is used to treat snake-bite, sexual debility, cough, tuberculosis and

impotence etc. the toxicity of this plant cannot be over emphasized [25]. The hairs on fresh/dry pods can cause severe itching on contact with the skin. The leaves have been reported to contain a lot of chemical compounds [26].

Although, several researches have been done on compositional evaluation and functional properties of various types of edible wild plants used in developing countries [27] and [28]. However, much still needs to be done on the chemical composition of edible leafy vegetables grown in Nigeria. This study was designed to determine the vitamin contents of *T. occidentalis*, *A. cruentus* as well as *M. pruriens* and to compare their vitamin compositions. This study also tends to find out if these vegetables could be used as supplement to other scarce or non available source of nutrients. The present study therefore aimed at assisting in closing gap in knowledge on green leafy vegetables especially from the South-East Nigeria [29].

MATERIALS AND METHODS

The leaves of *Telfairia occidentalis* and *Amaranthus cruentus* were obtained from Abakpa market, Abakaliki while leaves of *Mucuna pruriens* were obtained from bush at CAS campus. All in Abakaliki Local Government Area, Ebonyi State, Nigeria and identified by a taxonomist in the Department of biological science, Applied Biology Option of Ebonyi State University, Abakaliki. The leaves were cleaned destalked, weighed and shade dried for 14 days. After drying, the leaves were ground separately into a fine powder using manual grinder, sieved and stored in an air-tight container, kept in desiccators until analyzed. Vitamins; A, D, E, K, B1, B2, B3, B6, B12 and C were determined by the method of AOAC, (2000) [21].

RESULTS AND DISCUSSIONS

Vitamin contents of *Telfairia occidentalis*, *Amaranthus cruentus* and *Mucuna pruriens* leaves is as presented in Table 1. The results showed that all the selected green leafy vegetables were found to contain similar vitamins but the major difference appears to be in their compositions. Some of the differences in the composition might be linked to factors like climate, species and nature of soil, growing conditions, application of natural or artificial manure and the period of analysis [2]. Thus, the analyzed vegetables contained numerous vitamins in variable amounts in the order of C>B12>B6>E>B1>B2>K>A in *T. occidentalis*,

Table 1: Vitamin contents (mg/100g) of the three selected leaf vegetables

Vitamins	<i>Telfairia occidentalis</i> (Mg/100g)	<i>Amaranthus cruentus</i> (Mg/100g)	<i>Mucuna pruriens</i> (Mg/100g)
A	0.002+0.000	0.054+0.001	0.026+0.000
E	0.354+0.150	10.530+0.636	11.652+0.018
K	0.870+0.024	0.654+0.222	6.114+0.582
B1	1.725+0.225	9.731+3.250	12.530+0.975
B2	0.521+0.174	7.161+0.521	14.990+0.035
B6	4.187+1.393	25.020+2.667	15.493+0.733
B12	1.330+0.170	37.340+1.78	6.820+2.570
C	57.450+2.150	38.250+4.900	6.750+2.200

Values are expressed as mean±SD of triplicate results.

C>B6>B1>B12>K>B2>E>A in *A. cruentus* and that of *M. pruriens* is in the order of B6>B2>B1>E>B12>C>K>A. The results of *T. occidentalis* and *A. cruentus* leaves are in agreement with the work of Uraku and Nwankwo (2015) [22] where they reported that the laeves of *Murranya koenigii* contained highest amounts of vitamin C and low amount of vitamin A. The findings disagree with report of [12] who reported that *T. occidentalis* had higher amount of vitamin A and E than vitamin C. Similarly, the results of *M. pruriens* disagree with the work of Achikanu et al. (2013) [where they reported that the level of vitamin C content is lower than vitamin A and E.

The comparative study indicated that *T. occidentalis*, *A. cruentus* and *M. pruriens* contain low amounts of vitamin A compared to other vitamins and that vitamin C contents in *T. occidentalis* is in the highest amounts compared to other vitamins. *M. pruriens* had lowest amounts of vitamin C compared to other leaves. Vitamin B6 and B12 contents are higher in *T. occidentalis* leaves and were followed by *M. pruriens*. The study also indicated that vitamin B1, B2 and E contents are higher in *M. pruriens* and were followed by *T. occidentalis*.

The presence of the vitamins in the selected vegetables had credit to their widely use as food supplements and medicine. Interestingly, these leaf vegetables have been used for years as a remedy for various ailments. This is probably due to the presence of these vitamins in the vegetable as confirmed by this study and previously by resarchers.

The substantial amount of vitamin C in *T. occidentalis* and *A. cruentus* shows that they can help in normal formation of intercellular substances throughout the body, including collagen, bone matrix and tooth dentine. A striking pathological result from this defect is the weakening of the endothelial wall of the capillaries due to a reduction in the amount of intercellular substances (Uraku et al., 2015) [23]. Therefore, the clinical

manifestations of scurvy hemorrhage from mucous membrane of the mouth and gastrointestinal tract, anemia, pains in the joints can be related to the association of ascorbic acid and normal connective tissue metabolism. This function of vitamin C also account for the requirement for normal wound healing [7]. In South - East Nigerian, rural dwellers used *A. cruentus* leaves and friuts for the treatment of inflamed or ulcerated tissue [25] and for the treatment of intestinal bleeding and menstruation [5, 6, 8 and 9]. The choice of this leaf for these treatments might be due to the presence of Vitamins especially vitamin C due to its role as scavengers of free radicals and making the them effective as a protector of the integrity of lipids and phospholipids membranes [11]. Vitamin B12 was found to be high in *A. cruentus*, this elevated amount could help in red blood cell formation. It could also regulate nerve cell development thereby preventing abnormalities in the brain. Vitamins B6, B2, B1 and E were found to high in *M. pruriens*. Some of these vitamins are beneficial in growth, digestion and simulation of appetite while vitamin E acts as an antioxidant. The results on the composition and medical uses of these vitamins could be helpful to create nutritional awareness among various Nigerians on the importance of these green leafy vegetables and thus increase the consumption of these vegetables.

CONCLUSION

This study showed that *Telfairia occidentalis*, *Amaranthus cruentus* and *Mucuna pruriens* contain appreciable amounts of vitamins; A, E, K, B1, B2, B6, B12 and C. The study further revealed that *the leaves* are good source of vitamin C, B12, B6, B2, B1 and E. In general therefore, these vegetables have high nutritional value and are recommended as a cheap source of vitamins.

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