



Evaluation of nutrients composition of fresh and shade dried black-eyed bean (*Vigna unguiculata*) leaves for food

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Abstract

Black-eyed bean is a leguminous plant whose grains are widely consumed as rich sources of protein and other nutrients in some parts of Nigeria and the world at large. This research aims to evaluate the nutrient (proximate, some mineral elements and vitamins) compositions of fresh and shade dried Black-eyed bean leaves. The Black-eyed bean plant was grown in Ibaji local government area of Kogi State for about eight weeks. At 8 weeks after planting, tender leaves of the crop were harvested and used for nutrients analysis. Chemical and nutrient analyses were done using HPLC and standard spectrophotometric methods. The proximate composition of fresh and shade dried tender leaves of Black-eyed bean includes moisture (80.08% and 3.18%), ash (5.35% and 12.470%), fibre (2.45% and 24.68%), carbohydrate (6.34% and 39.70%), fat (0.92% and 3.69%), crude protein (4.85% and 16.290%) respectively ($p < 0.05$). The mineral analysis showed that the leaves contains reasonable amount (mg/100g) of minerals nutrient (Ca, Na, K, Fe, Mg, Zn, Mn). The study presents high levels of vitamins (Vitamin A, D, E, K, C and B complex) in both fresh and shade dried leaves, with the fresh sample having higher values of vitamin B 1, 5, 6, 9 and vitamin C. There is no significant difference between vitamin K content of fresh and shade dried leaves ($p > 0.05$). Shade dried sample is a better source of nutrient. Hence, findings from this study support the adoption, utilization and consumption of Black-eyed bean leaves as leafy vegetable.

Keywords: black-eyed bean leaf, nutrients

Introduction

Vegetables include those leafy outgrowths of plants or parts of plants that are used in making soup or eaten with the principal part of the meal (Onimawo & Egbekun, 1998) [21]. Green leafy vegetables and fruits occupy an important place among the food crops as these provide adequate amount of many vitamins and minerals for humans. They are rich source of carotene, ascorbic acid, riboflavin, folic acid and minerals like calcium, iron, potassium, sodium and phosphorous (Nnam, Onyechi & Madukwe, 2012) [16]. They are important protective foods and highly beneficial for the maintenance of good health and prevention of diseases (Kubmarawa, Andenyang & Magomya, 2009) [9].

Over the past 25 years epidemiological studies have shown a diminished risk of chronic diseases in populations consuming diets high in fruits and vegetables (Kearo, Popkin & Frison, 2010). Countries like South Korea, a high income country that have undergone rapid social change and economic development since the 1970s, still have lower rate of obesity and other non-communicable diseases than the countries with comparable average income. This is because South Korea has protected its traditional food systems. These foods are relatively high in vegetables and fruits (Lee, Popkin & Kim, 2002) [12]. Equally numerous empirical and investigative reports have indicated that current non communicable diseases (NCDS) trend in Africa can be attributed to rapid shift from traditional foods which contain mostly vegetables to western food products resulting in elevated intake of saturated fats and food preservatives with reduced intake of dietary fiber, vital nutrients and phytochemicals when compared to basic dietary guidelines

(Nahurung, 1997; Gupta, 2011). The shift from traditional foods to western food products has been dubbed the nutrition transition and is directly implicated in the rise of type 2 diabetes, cardiovascular and other NCDs (Uguru, 2005). Past generations whose diets consisted mainly of herbs, fruits, vegetables, nuts and starchy tubers lived longer than the present generation (Sathanaraynan, Thomas, Fashik & Sekher, 2009) [22]. They were not victims of the many health problems faced by the present population (Uguru, 2005). Life expectancy was better in the past because vegetables were a major component of the diet (Sathanaraynan, *et al.*, 2009) [22]. Vegetables should be adequately included in the diet to help fight against the deadly scourge diseases. According to Socrates, a Greek philosopher, Fruits and vegetables are the earliest source of food to mankind (Largen, 1984). Equally Tutare (2000) [24] reported that there are over 200 varieties of vegetables to which majority of Nigerians are not accustomed to. The major reason for less exploitation and utilization of fruits and vegetables in Nigeria is due to ignorance of their contribution to adequate nutrition (Kubmarawa, *et al.*, 2009; Nnam, 2011) [9].

There is dearth of information on the nutrients and efficacy of Black-eyed bean leaves as remedy in the management of diseases and nutritional deficiencies. Hence, in a bid to create and step up awareness that could contribute to offsetting protein-calorie deficiency as well as mineral imbalances in the nation through use of lesser known vegetables; this research sought to evaluate the nutrients composition of Black-eyed bean leaves grown in Kogi State in Nigeria and to relate same to its potential health benefits.

Materials and Methods

Materials

Chemical and reagents

All chemicals and reagents were of analytical grade obtained in Food Science and Biochemistry laboratory, Kogi State University, Anyigba.

Plants materials

The vegetable used for the study was Black-eyed bean leaves. The tender leaves of Black-eyed bean were obtained fresh from farm in Ibaji, Kogi State in September 2020. The vegetable was identified in the Department of Biological sciences, Kogi State University Anyigba, Nigeria.

Methodology

Preparation of Sample

About 3kg of Black-eyed bean leaves was separately sorted by removing extraneous materials, washed with distilled water, and then, dried under shade for about 10 days at room temperature in Food Science laboratory, Kogi State University. The dried leaves and fresh parts were separately pulverized using Gallenkamp mixer Kenwood-MPR 201. About half of the pulverized leaves were used for chemical analysis.

Chemical analysis

Chemical analysis was carried out in duplicate for the pulverized vegetables. Proximate, some minerals and vitamins, were determined in duplicate using standard methods of AOAC. (AOAC, 2000) [3].

Proximate composition

The moisture, crude protein, fat, ash and carbohydrate of fresh and shade dried Black-eyed bean leaves were determined using standard methods of AOAC (2005) while crude fibre was done by AOAC, (2000) [3].

Mineral nutrients determination

Phosphorus (P), Iron (Fe), Calcium (Ca), Magnesium (Mg), and Manganese (Mn) were determined by Atomic Absorption Spectrometry (SP 700); while Sodium (Na) and Potassium were determined by flame photometry according to the method of AOAC, (2003).

Vitamins determination

Vitamin A, B1, B2, B3, B5, B6, B9, B12, C, D, E and K were determined by High performance liquid chromatography (HPLC, model C030) according to AOAC (2005).

Determination of food Energy Value of black-eyed bean leaves Samples

The energy value of the samples were determined by multiplying the protein content by 4, carbohydrate content by 4 and fat content by 9 and fibre content by 2.

$$\text{Energy Value (Kcal)} = (\text{Crude protein} \times 4) + (\text{Total carbohydrate} \times 4) + (\text{Crude fat} \times 9) + (\text{crude fibre} \times 2).$$

Statistical analysis

Data were collected and the statistical analysis was run using Graphpad stat software. The result of the duplicate was pooled and analyzed using descriptive statistics (mean and standard deviation) and the difference between fresh

leafy vegetable and the shade dried leafy vegetable were analyzed using T-test. The means were considered significant ($p < 0.05$).

Table 1: proximate compositions of fresh and shade dried black-eyed bean (*Vigna unguiculata*) leaves.

Nutrients %	FBBL1	SBBL2
Moisture	80.080a +0.110	3.1806 +0.028
Ash	5.350a ±0.071	12.475b +0.35
Fibre	2.450a ±0.042	24.680b ±0.028
Fat	0.920a +0.028	3.690b +0.014
Protein	4.855a +0.064	16.2956 ±0.092
Carbohydrate	6.345a ±0.035	39.780b +0.028
Energy value [kcal/100g]	57.98kcal/100g	306.87kcal/100g

Mean ± SD, n = 3. NOTE: FBBL₁ = Fresh black-eyed bean leaf, SBBL₂ = Shade dried black-eyed bean leaf. Values in the same row with different superscripts were significantly different ($p < 0.05$).

Table 2: Mineral nutrient contents of fresh and shade dried Black-eyed bean leaves.

Mineral nutrients mg/100g	EBBL1	SBBL2
Calcium	7.300b ±0.014	8.030c +0.028
Sodium	2.820b ±0.014	2.950c 10.014
Potassium	3.960b ±0.003	4.325c ±0.021
Iron	0A73b ±0.003	0.610c ±0.014
Magnesium	3.825b ±0.021	4.315c ±0.007
Zinc	0.124b ±0.001	0.131c ±0.001
Copper	0.031b ±0.002	0.0280c ±0.001
Manganese	0.106b ±0.001	0.113c ±0.001
Phosphorus	0.004b ±0.001	0.003c ±0.003

Mean ± SD, n = 3. Values in the same row with different superscripts were significantly different ($p < 0.05$).

Table 3: Vitamin contents of fresh and shade dried black-eyed bean leaves

Vitamins	FBBL1	SBBL2
B- Carotene (mg/100g)	0.435c ±0.001	0.724d ±0.001
Vitamin A mcg/100g	6.92c ±0.012	11.514d ±0.014
Vitamin Bi mcg/100g	0.65c ±0.212	0.300d ±0.141
Vitamin B2 mcg/100g	22.300c ±0.283	83.450d ±0.071
Vitamin B3 mcg/100g	18.050c ±0.071	31.10040.141
Vitamin Bs mcg/100g	1.989c ±0.001	1.981d ±0.001
Vitamin B6 (mg/100g)	28.100c ±-0.141	28.050c ±0.071
Vitamin B9 (mcg/100g)	0.305c ±0.01	0.225d ±0.001
Vitamin B12 (mg/100)	2.100c ±0.141	4.700d ±0.141
Vitamin C (mg/100g)	22.7950 ±0.167	19.843d ±-0.111
Vitamin D mcg/100	0.338c ±0.003	1.590d ±0.003
Vitamin E (mg/100g)	0.400c ±0.141	6.500d ±0.141
Vitamin K (iU/100g)	4.040c ±0.084	4.250c ±0.071

Mean ± SD, n = 3. Values in the same row with different superscripts were significantly different ($p < 0.05$).

Conclusion

Black-eyed bean (*Vigna unguiculata*) leaves is a rich sources of nutrients. This research shows that significant level of moisture was observed in fresh sample compared to the shade dried sample of Black-eyed bean leaves. The lower moisture content of the shade dried sample was due to dehydration effect ($p < 0.05$). The values were similar to that reported by Olaiya and Adebisi, (2010) [19] on fresh and shade dried ten leafy vegetables. Oloyede, Obuotor and Ibronke, (2011) [20] also reported similar moisture values in a study of underutilized fresh green leafy vegetables in Southwest Nigeria. The values were comparable to the

previously reported findings by Oguche, (2011) on fresh and shade dried leafy vegetables consumed in Ibaji, Kogi state. Moisture is the most abundant constituent of fresh green leafy vegetables, the high moisture content provide for greater activity of water soluble enzymes and co-enzymes needed for metabolic activities of leafy vegetables (Iheanacho and Udebuani, 2009). The high moisture content of vegetables makes it aid digestion, however, the shelf-life is very short because the high moisture facilitates bacterial action resulting to spoilage. Similarly, the low moisture content of the shade dried sample suggests that the growth of microorganism is hindered and the shelf-life is increased. The shade dried sample contains substantial value of protein than the fresh sample, ($p < 0.05$). The higher protein content of the shade dried sample could be due to concentration effect; this implies that dehydration makes the leafy sample a concentrated source of protein. Previous findings by Ahenkora, *et al.*, (1998) [2] reported 4.10% -21.7% for cowpea grown in Ghana. Oguche, (2011) also observed similar values in fresh and shade dried *Amaranthus aquaticus* leaves. The protein values of the fresh sample were similar to the literature report of Sheela, *et al.*, (2004) on protein content of fresh vegetables. The low levels of protein in the fresh sample of the Black-eyed bean leaves were in line with the literature report which classified vegetables as poor source of protein.

The fat content of 0.920% and 3.69% were observed in the fresh and the shade dried vegetable, with the shade dried sample having higher fat content ($P < 0.05$). The high fat content of the shade dried sample could be due to loss of moisture, since high moisture content of food lowers the fat content Nnam, *et al.*, (2012) [16]. The fat content of the fresh leaves were similar to the values reported by Sheela, *et al.*, (2004) on some leafy vegetables and the report of Olaiya and Adebisi, *et al.*, (2010) [19] on ten leafy vegetables. The fat levels is always the least in the proximate composition, it represents the least in vegetable. Oguntona, (1998) [18] opined that fat values for green leafy vegetables scarcely exceed 1.0%. The fat content of the shade dried sample was higher than the fresh counterpart but could not be considered as a good source of fat, which is in agreement with the fact that green leafy vegetables are heart friendly foods.

The Black-eyed bean leaves contains high amount of carbohydrate, with the shade dried sample having higher content compared to the fresh sample ($P < 0.05$). The significant high value of carbohydrate could be possibly be due to dehydration, green leafy vegetables are not considered as a good source of carbohydrate but, after dehydration the carbohydrate content of the leaves was comparable with many of the carbohydrate rich vegetables. The lower carbohydrate value of the fresh sample were compared to the values reported for some underutilized leafy vegetables (*Celosia trigyna* and *Solanum nigrum*) by Oloyede, *et al.*, (2011) [20]. Similarly, the carbohydrate content of the fresh Black-eyed bean leaves (7.345%) were lower than the values reported by Kanchan, *et al.*, (2011) on indigenous vegetables in India. The study suggests that shade dried Black-eyed bean leaves is of better carbohydrate content. Therefore, in order to offset negative energy imbalance, the carbohydrate content of shade dried Black-eyed bean leaves could supply better part of the daily requirement for carbohydrates (30.6% respectively to daily carbohydrate intake) for individuals. Shade dried Black-

eyed bean leaves contains substantial amount of fibre which is statistically significant ($p < 0.05$) when compared to fresh sample. The fibre content of the fresh sample is similar to the findings of Olaiya and Adebisi, (2010) [19] who reported fibre content of 0.8- 9.5% for fresh ten green leafy vegetables in South Western Nigeria. The values of the fresh sample were lower than fibre content reported by Nnam, *et al.*, (2012) [16] on four leafy vegetables. The fibre content of the shade dried sample was higher than the value reported by Oguche, (2011) on shade dried *Amaranthus aquaticus* leaves in Ibaji. Fibre provides bulk and increases intestinal peristalsis by surface tension of food in the intestinal tract (Mathenge, 1997) [13]. Black-eyed bean leaves could help in preventing constipation, bowel disorder and pile when consumed in large quantity. This vegetable could be useful in the management of diseases such as obesity, diabetes mellitus, cancer and cardiovascular disorders etc.

Ash content of vegetables is a reflection of the mineral deposits in it. The ash content of the shade dried sample (12.475% and the fresh sample (1.350%) were significantly different ($p < 0.05$) with the shade dried sample having higher ash content. The ash content of the fresh sample was comparable to the value reported by Nwankwo, (2014) on *Hibiscus canibinnus* leaves. Also the values of the ash were lower than the value observed by Oloyede, *et al* (2012) on fresh underutilized vegetables in South Western Part of Nigeria. The ash content of the shade dried sample was higher than the value reported by Oguche, (2011) [20] on shade dried *Amaranthus aquaticus* leaves. The substantial amount of ash in shade dried Black-eyed bean leaves implies that the shade dried sample has higher mineral deposits than the fresh sample and as such could be of benefit in the management of mineral element deficiencies.

The result of the study shows that fresh and shade dried Black-eyed bean leaves are good sources of minerals as shown in table 2. All the mineral nutrients shows higher value in shade dried sample due concentration effect, The values are in agreement with the study done by Lakshmi and Vimla, (2000) which shows that leaves retained a good amount of mineral elements after drying The value is statistically significant ($p < 0.05$). The calcium levels of the fresh leaves were lower than the value reported by Nnam, *et al.*, (2012) [16] in their study of four leafy vegetables. The values of fresh and shade dried samples were comparable to the values reported by Olaiya and Adebisi, (2010) [19]. Similarly, Oguche, (2011) reported a lower values in fresh and shade dried *Amaranthus aquaticus* leaves. The high calcium levels found in the fresh and the shade dried samples relative to other vegetables suggest that consumption of Black-eyed bean leaves would be effective in bone formation and proper functioning of the nervous system.

The potassium values (3.960mg/100g and 4.305mg/100g) of the fresh and shade dried vegetables were higher than the values observed by Nwankwo, (2014) on fresh *Hibiscus cannabinus* leaves, but comparable to values reported by Akindahusi, *et al.*, (2006) on some Nigerian green leafy vegetables. Potassium is needed for muscle and nerves functions. Potassium and sodium are important intracellular and extracellular cations. Consumption of this vegetable would be of importance in maintenance of proper heart function.

The Black-eyed bean leaves is a rich source of magnesium,

the good amount was noticed in shade dried sample which is statistically significant ($p < 0.05$). The values obtained from this research were higher than the values observed by Nwankwo, (2014) on *Hibiscus cannabinus* leaves. However, the values were comparable to the values reported by Olaiya and Adebisi, (2010) ^[19] on ten leafy vegetables but not comparable to the lower values reported by Okudu, (2007) on some Nigerian green leafy vegetables. Magnesium is an obligate co-factor for DNA synthesis and important minerals in energy metabolism. It is important in the reduction of blood pressure. Therefore, the vegetable could be used as supplement in low magnesium staple food such as cassava (Olaiya and Adebisi, 2010) ^[19]. Literature report shows that green leafy vegetables are high in magnesium and have low glycemic index. Thus, they prove to be potent in reducing the risk of diabetes type-2 (www.health.com/mineral).

Consumption of 100g of leafy vegetables could provide sufficient copper to meet the recommended nutrient intake of copper (1.4-3.0mg/day). Copper is involved in the absorption, storage, metabolism of iron and formation of red blood cells. The fresh and the shade dried Black-eyed bean leaves contain reasonable amount of copper with the fresh sample having higher value ($p < 0.05$). The values obtained were lower than that reported by Nwankwo, (2014) on fresh sample of *Adansonia digitata* leaves. The values obtained contribute about 1.5% and 1.4% respectively to the daily copper intake.

The Black-eyed bean leaves contains substantial amount of iron. The value of iron obtained from the shade dried samples were higher than the fresh sample ($p < 0.05$). The higher value in the shade dried sample could be due to loss of moisture through drying. The iron content of the fresh and the shade dried samples were comparable to that reported by Oguiche on fresh and shade dried *Telfairia occidentalis* in Unale. Similarly, the values were lower compared to the report by Ngwa, (2010) on some underutilized vegetables. The lower iron contents compared to other research work could be due loss during sample preparation as some mineral elements are sensitive to heat and easily get oxidized. Iron plays key role in haemopoiesis, control of infections and cell mediated immunity (Bhaskeran, 2001).

The samples contain reasonable amount of zinc. The levels of zinc in the shade dried sample was higher than the fresh sample ($p < 0.05$). However, the value of fresh sample was lower than that reported by Nwankwo, (2014) on fresh *Hibiscus cannabinus* leaves. The value of the fresh sample was also higher than the values reported by Oguiche, (2011) on *Telfairia occidentalis*. However, the value of zinc in fresh and shade dried samples were comparable to the value reported by Nnam, *et al.*, (2012) ^[16] on *Vernonia amagdalina*. Zinc plays an important role in the body as an antioxidant defense in type 2 diabetes by notably acting as a co-factor of superoxide dismutase enzymes, modulating glutathione metabolism, competing with iron and copper in the cell membrane and by inhibiting nicotinamide adenine dinucleotide phosphate-oxidase enzymes. It also improve oxidative stress in diabetes patient by reducing chronic hyperglycemia, it promote phosphorylation of insulin receptors by enhancing transport of glucose into the cell (Kyria, *et al.*, 2015).

The Black-eyed bean leaves contain moderate level of sodium. The shade dried sample has higher value than fresh

sample ($p < 0.05$). The values were comparable to the values reported by Shovon, *et al.*, (2013) ^[23] on Indian onion.. Similarly, Nwankwo, (2014) observed similar values in *Sesamum indicum*. The level of sodium in Black-eyed bean leaves could be useful in the regulation of plasma volume, acid-base balance, nerve and muscle contraction (Akpanyung, 2005). The fresh and shade dried sample contains reasonable amount of manganese. The manganese content of the Black-eyed bean leaves were comparable to the value reported by Shovon, *et al.*, (2013) ^[23] on Indian onion. The amount of manganese found in the vegetable contributes 5.65% to the daily intake of manganese. The intake of the vegetable could help in activating several enzymes involved in energy metabolism.

The phosphorus content of the fresh and shade dried vegetable were relatively low ($p > 0.05$). Comparing to the value by Nwankwo, (2014) on *Adansonia digitata*, Black-eyed bean leaves was extremely low. The low levels could be due to its loss during sample preparation or probably due to low content of phosphorus in the soil where the plant was planted. The low level is in line with the literature that, minerals from plant sources vary from place to place because the mineral contents of the soil vary according to the location in which the plant is grown (Onimawo and Egbekun, 1998) ^[21].

The fresh and the shade dried sample contain substantial amount of vitamin A, with the shade dried sample having higher value ($p < 0.05$). The values were similar with report of Oguiche, (2011) on fresh and shade dried *Amaranthus aquaticus* leaves with the shade dried sample having higher value. Vitamin A deficiency remains a major problem in Nigeria, affecting mostly the people in the North (UNICEF, 2001). Its role in growth regulation and vision has made the public health officials to look for rapid methods of combating problems associated with it, this research suggests that the shade dried Black-eyed bean leaves could be of more benefit in supplementing vitamin A.

The fresh and shade dried samples contains significant amount of vitamin B complex exception of Vitamin B1 in shade dried sample. It was observed that vitamin B1, B5, B6, B9 have higher values in the fresh sample than the shade dried sample, the difference were statistically significant ($p < 0.05$) exception of vitamin B6 ($p > 0.05$). The low levels of some of the vitamins B in shade dried sample could be due oxidation on exposure to heat during sample preparation. On the other hand, Black-eyed bean leaves contains reasonable amount of B2, B3, B12 compared to fresh ($p < 0.05$). These values were lower than the value of thiamin, riboflavin and niacin reported by Olaiya and Adebisi, (2012) on ten leafy vegetables in South Western Nigeria. Similarly, the vitamin B5 observed in fresh and shade dried sample were lower than the RDA (5mg/day). The vitamin B6 were higher than the RDA (1.3mg/day) for adult, B9 is lower than the RDA (400mg/day) for adult but although, (it contributes about 1% to daily intake). Vitamin B12 in both sample were higher than the RDA (2.4mcg/day) with the shade dried sample having higher value of 4.700mg/100g. Vitamin B complexes play roles in nutrient metabolism. Niacin has ability to lower blood lipid and sometimes used in treating hyperlipidemia (Olaiya and Adebisi, 2010). Folate and cobalamin helps in the management of anemia, dementia, dementia and neural tube defect.

Black-eyed bean leaves contains substantial amount of

vitamin C, the level of vitamin C in fresh sample is higher compared to shade dried, this is because is a heat labile vitamin and is destroyed when exposed to heat and air due to oxidation ($p < 0.05$). The values were similar to the report of Nwankwo (2014) on *Hibiscus cannabinus* fresh leaves, but higher than the values reported by Ogbontale, *et al.*, (2016) on unprocessed washed bitter leaf. However, the values were comparable to that reported by Nnam, *et al.*, (2012) [16] on *Gnetum africanum* fresh leaves. Human body cannot synthesis vitamin C, so it must be obtained entirely through diet. Vitamin C is a powerful antioxidant; therefore, this study suggests that consumption of large quantities of the vegetable could provide health benefit. Antioxidants are known to protect the cells by reacting with the oxidizing factors and neutralizing their effects (Nnam, 2011). B-Carotene and vitamin C found in the vegetable will synergistically facilitate the absorption of iron in the leaves. The enhancing effect of vitamin C and β - carotene has been attributed to it reducing and chelating properties during digestion of foods (Hurrell and Egli, 2007). Vitamin C enhance the absorption of iron by reducing iron (iii) to ferrous (Fe^{2+}) state, a form in which iron is absorbed. The inclusion of the vegetable as dietary component would improve the absorption of iron especially non haem iron found in plant that has low rate of absorption.

Vitamin D contents of the vegetable were 0.338mcg/100g and 1.590mcg/100g in fresh and shade dried sample respectively. The difference between the two samples were statistically significant ($p < 0.05$) with shade dried having higher value. The values obtained from fresh and shade dried sample can contribute about 1.5% and 10.6% to daily intake of vitamin D (15mg/day). Vitamin D play key role in the absorption of calcium.

Vitamin E, also known as alpha tocopherol is a fat soluble antioxidant vitamin. It is the collective name for eight compounds, four tocotrienols and four tocopherols. It is present in all cellular membrane and mainly stored with fat in adipose tissue, the liver and muscles (Prior, 2007). Vitamin E is promoted for a range of health purposes from delaying ageing to healing sun burn (Frei, 1994). It is a powerful antioxidant. Vitamin E is the most effective non enzymatic antioxidant for terminating the chain reactions of lipid peroxidation in cell membranes. The levels of vitamin E found in Black-eyed bean leaves was substantial, but the level in the fresh sample was extremely low ($p < 0.05$). The low level in shade dried sample could be due to the loss during sample preparation. Vitamin K helps in blood clotting thereby preventing hemorrhage. Vitamin K content of the fresh and shade dried samples were present in reasonable amount, with the shade dried sample having higher value ($p > 0.05$). The values were comparably lower than the values reported by Ogbontale, (2016) on unprocessed / washed /sundried bitter leaf. This research suggest that the shade dried has higher proportion of vitamin E and K compared to fresh sample and as such could be used in preparing diet for patient bleeding problem, cancer and other nutritionally related disorders.

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