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Mineral Composition of Some Under-Utilized Leafy Vegetables Consumed In Ebonyi State, Nigeria

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Abstract

Three different underutilized vegetables- *Pennisetum purpureum* (Elephant grass), *Colocasia esculenta* (Cocoyam leave), and *Ipomea aquatic* (water morning glory) were collected from Afikpo, Abakaliki, and Ohaozara locations of Ebonyi State and were analyzed for the presence of Mg, K, Na, Fe, Cu, Zn, and Co using Atomic Absorption Spectrophotometery. The result revealed that on the average, K content of *Pennisetum purpureum* from Abakaliki has the highest (9764.80±135.80 mg/100g), while Cu content of *Ipomoea aquatic* from Afikpo location was the least (1.47±0.52 mg/100g). Co was not detected. The vegetables are exceptionally rich in the minerals when compared with the recommended dietary allowance (**RDAs**) values. Therefore, the rural dwellers located within these areas most especially can depend on the three vegetables for these essential minerals mentioned above.

Keywords: Analyzed, Leafy, Mineral, Sample, Underutilized, Vegetable

Introduction

The earth generally has been endowed with a number of vegetables which are of great economic importance. Among alternatives available to meet the food demands cultivable and wild vegetables are regarded as cheep source of food for the marginal communities [1].. According to the Food and Agricultural Organization (FAO), there are about 840 million undernourished people in 1998–2000, of whom 799 million are in developing countries like Nigeria, 30 million in the countries in transition and 11 million in the industrialized countries [2, 3, 4].

To apprehend the situation, interests have been centralized on the exploitation, quantification and utilization of food plants, especially vegetables [2]. Vegetables, being the rich source of vitamins and minerals that form the major portion of the human diet, are the cheaper source of nutrients. The importance of these biochemicals has been recorded by various scientists [3,4,5,1].

Some diseases such as diabetes, obesity, cancer, and cardiovascular diseases are manifesting in developing countries more than ever before and could be traced to inadequate consumption of fruits and vegetables. If this trend continues, the world Health organization (WHO) projected that the percentage of people living with diabetes alone in developing countries will rise by 170% by the year 2025 [6].

Amongst the vegetables of interest, *Ipomoeae aquatica Forsk* is a semi aquatic, tropical plant grown as a leafy vegetable. It is found throughout the tropical and subtropical regions of the world. It belongs to the family of *Convolvulaceae* and is also known as water spinach or water morning glory [7]. *Ipomoea aquatica* grows in water or on moist soil. The stems are 2-3 meters (7-10 cm) or more long, rooting at the nodes and they are hollow and can float. In several parts of the East, this vegetable is used to make soup, pottage yam. It popularly referred to as *Otele-piriri* in Afikpo in Ebonyi State.

Pennisetum purpureum (Schumach), commonly known as elephant grass or Napier grass belongs to the *Poaceae* (alt. *Gramineae*) family. It is called achara by the Ibo speaking people of South Eastern Nigeria. It is generally used as animal food, an ornamental and for erosion control [8]. The dried matured shoots are used to make fences in Northern Nigeria. The matrixes of the matured shoots are used for preparing the special soup called 'ofe achara" by the people of Ebonyi State, Abia State, in South Eastern Nigeria. As noted by [9] that although measures are being taken to boost food production by conventional agriculture, a lot of interest is currently being focused on the possibilities of exploiting the vast number of less familiar food plant resources.

Colocasia esculenta is widely cultivated across the world especially in the tropics. It is commonly known as Cocoyam, Elephant ear, Taro, etc. In Ebonyi state, Nigeria, both the corm and the leaf of cocoyam are consumable. The corm can be prepared in various ways and the leave as vegetable for soup majorly in the rural areas .Although a few works have been done on the corm, there is still a very scanty work that has been done on the leave.

This work aims to determine the level of Mg, K, Na, Cu, Zn, Fe, and Co in leaves of *Pennisetum purpureum*, *Ipomoea aquatica*, and *Colocasia esculenta* consumed by inhabitants of Ebonyi State, Nigeria.

Materials And Methods

Sample collection and preparation

Three samples each of the young leaves of *Colocasia esculenta*, *Ipomoeae aquatica and Pennsetum purpureum* were collected from three different zones in the State. These are Afikpo, Abakaliki and Ohaozara areas of Ebonyi State.

The outer covering of *Colocasia esculenta* and *Pennisetum purpureum* was removed to obtain the innermost tender part of the vegetables. It was cut into smaller pieces to enhance drying. Each of the 27 samples was spread out on a laboratory bench for drying. After drying, the samples were ground into powder using a ball mill (MBY710 made in China).

Determination of the mineral content

The mineral contents of each of the samples were determined by atomic absorption spectrometry, flame photometry and spectrophotometry according to the methods of [10]. Exactly 0.5 g of the powdered sample was taken in a digesting glass tube. 12 cm^3 of HNO_3 was added to the food samples and the mixture was kept overnight at room temperature. Then 4.0 cm^3 perchloric acid ($HClO_4$) i.e. 3:1 of trioxonitrate and perchlorate acid respectively, was added to this mixture and was kept in the fumes block for digestion to take place. The temperature was increased gradually, starting from 50^oC and increasing up to 250-300^oC. The digestion is completed in about 70- 85 min, as indicated by the appearance of white fumes. The mixture was left to cool down, and the contents of the tubes were transferred to 100 cm^3 volumetric flasks and the volumes of the contents were made to 100 cm^3 with distilled water. The wet digested solution was transferred to plastic bottles labeled accurately and stored before analysis.

Statistical Analysis

From the results presented below, apart from Cobalt which was not detected in all locations and the vegetable analysed, other minerals (Potassium, Sodium, Iron, Magnesiun, etc) showed appreciable significant difference in level at $p < 0.05$.

Results and Discussion

The experimental results were expressed as the mean, standard error of the mean of different replicates. Significance differences between values are determined using the student's T-test and compared among the groups using the analysis of variance (ANOVA). Differences existed at $P < 0.05$ (Steel and Torie, 1986). The results are arranged in Tables. Table (a) shows the results of the vegetable samples, while Table (b) shows the mean of the results. The discussion of the results was done by comparing the results obtained for each of the vegetables in the three different locations and also placing them side by side with those obtained from previous works.

Magnessium

The three vegetables analysed were high in magnesium. *Colocasia esculenta* was moderately high, with a range of 572.71 – 892.42 mg/100g. *Ipomoea aquatica*, on the other, was low except for those sampled from the Abakaliki location, which was as high as 931.58 mg/100g. *Pennisetum purpureum* showed the highest amount of magnesium (483.36 – 999.83 mg/100g). In terms of location, Abakaliki samples were the highest (572.71 – 999.83 mg/100g), but Afikpo samples showed a lower level (308.74 – 604.62 mg/100g) and Ohaozara was a little higher (630.15 – 892.42 mg/100g) except for *Ipomoea aquatica* which is much lower than others. A significant level of magnesium is expected since it is a component of leaves chlorophyll [11,12]. These values are higher than that in *Ipomoea batatas* (79 – 107 mg/100g) [13]. [14] reported that 310.64 mg/100g concentration of Ipomoea aquatica was consumed in Kebbi State, Nigeria. The values are within the RDA, especially for adults.

Potassium

The vegetables analysed contain a high amount of potassium. Among the vegetables, *Pennisetum purpureum* had the highest (3,974.00 – 9,764.80 mg/100g), followed by *Ipomoea aquatica* (3,324.90 – 7,307.40 mg/100g), while *Colocasia esculenta* was the least (4,775.60 – 5,910.00 mg/100g).

In terms of the sampling location, Abakaliki samples showed the highest amount of potassium (4,449.60 – 9,764.80 mg/100g), Afikpo samples showed 5,121.30 – 7,307.00 mg/100g, but Ohaozara samples were the least in potassium concentration (3,324.70 – 5,910.00 mg/100g). These values are higher than that reported by [14] (5,458.33 – 954.70 mg/100g) for *Ipomoea aquatica* grown in Kebbi State, Nigeria and much higher than *Ipomoea batata* leaves (750.00 – 4,953.49 mg/100g DW) grown in Ghana [15,13]; [16] but are within the range of that reported in some Nigerian leafy vegetables such as *Talinum trianglare* (8,000 mg/100g), *Crassocephalum biafrae* (6,500 mg/100g) and *Solanium nigrum* (6,700 mg/100g), *Celosia argentea* (5,200 mg/100g) and *Solanium aethiopicum* (5,000 mg/100g) as reported by [17].

Results

Table 1a. Mineral analysis of *Colocasia esculenta*

Location	Sample	Magnesium (mg/100g)	Potassium (mg/100g)	Sodium (mg/100g)	Iron (mg/100g)	Copper (mg/100g)	Zinc (mg/100g)	Cobalt (mg/100g)
Afikpo	Zone A	644.93±0.12^{d}	5260.30±0.12^{b}	164.80±0.20^{a}	72.80±0.02^{b}	2.00±0.20^{bcd}	36.07±0.12^{e}	ND
	Zone B	614.53±0.23^{cd}	5260.20±0.00^{b}	170.53±0.46^{a}	73.13±0.12^{b}	2.20±0.20^{cd}	39.87±0.23^{f}	ND
	Zone C	554.40±0.84^{ab}	4843.50±0.49^{a}	625.80±0.20^{b}	75.47±0.03^{b}	2.47±0.12d^{e}	33.40±0.64^{de}	ND
Abakaliki	Zone A	529.60±0.95^{a}	4728.40±0.73^{a}	854.87±0.31^{c}	98.27±0.65^{c}	2.80±0.20^{e}	29.07±0.85^{bc}	ND
	Zone B	581.60±0.65^{bc}	4796.50±0.57^{a}	890.47±0.23^{c}	106.40±0.40^{c}	2.13±0.76^{bcd}	31.80±0.95^{cd}	ND
	Zone C	606.93±0.12^{f}	4801.90±0.12^{a}	908.20±0.35^{c}	106.13±0.23^{c}	1.87±0.23^{ab}	33.60±0.00^{de}	ND
Ohaozara	Zone A	910.53±0.12^{g}	6010.90±0.12^{d}	402.40±0.20^{ab}	40.20±0.20^{a}	1.60±0.00^{ab}	20.33±0.31^{a}	ND
	Zone B	951.40±0.20^{g}	6011.30±0.12^{d}	453.33±0.31^{b}	46.40±0.40^{a}	1.40±0.20^{a}	27.47±0.31^{b}	ND
	Zone C	815.33±0.12^{e}	5707.70±0.23^{c}	438.07±0.12^{b}	47.80±0.20^{cd}	2.20±0.20^{cd}	29.60±0.00^{bc}	ND

Table 1b: Mean of Mineral analysis of *Colocasia esculenta*

Location	Magnesium (mg/100g)	Potassium (mg/100g)	Sodium (mg/100g)	Iron (mg/100g)	Copper (mg/100g)	Zinc (mg/100g)
Afikpo	604.62±46.07^{a}	5121.30±240.61^{a}	320.38±264.52^{a}	73.80±1.46^{b}	2.22±0.24^{a}	36.45±3.25^{b}
Abakaliki	572.71±39.42^{a}	4775.60±40.97^{a}	884.51±27.16^{b}	103.60±4.62^{c}	2.27±0.48^{a}	31.49±2.28^{ab}

Ohaozara	892.42±69.82^{b}	5910.00±175.12^{b}	431.22±26.14^{a}	44.80±4.04^{a}	1.73±0.42^{a}	25.80±4.86^{a}

Table 2a: Mineral analysis of *Ipomoea aquatic*

Location	Sample	Magnesium (mg/100g)	Potassium (mg/100g)	Sodium (mg/100g)	Iron (mg/100g)	Copper (mg/100g)	Zinc (mg/100g)	Cobalt
Afikpo	Zone A	304.33±0.31^{d}	7310.90±0.31^{f}	102.07±0.12^{a}	40.20±0.20^{a}	1.20±0.20^{ab}	26.13±0.23^{c}	ND
	Zone B	311.28±0.10^{f}	7304.80±0.72^{d}	102.53±0.31^{b}	56.33±0.31^{c}	2.07±0.42^{cd}	26.80±1.06^{c}	ND
	Zone C	310.60±0.60^{e}	7306.40±0.40^{e}	102.00±0.20^{a}	50.20±0.20^{b}	1.13±0.31^{a}	26.47±0.50^{c}	ND
Abakaliki	Zone A	930.20±0.20^{g}	4542.50±0.12^{c}	185.20±0.20^{g}	264.40±0.40^{g}	2.13±0.23^{cde}	18.40±0.20^{b}	ND
	Zone B	930.27±0.31^{g}	4402.30±0.31^{b}	200.07±0.12^{h}	264.27±0.31^{g}	2.27±0.31^{de}	18.40±0.40^{b}	ND
	Zone C	934.27±0.42^{h}	4403.00±0.40^{b}	160.93±0.31^{f}	305.00±0.20^{h}	2.60±0.20^{e}	16.47±0.31^{a}	ND
Ohaozara	Zone A	251.40±0.20^{b}	3325.10±0.31^{a}	124.87±0.31^{e}	76.33±0.31^{d}	2.27±0.23^{de}	29.27±0.12^{d}	ND
	Zone B	250.40±0.40^{a}	3324.70±0.61^{a}	120.47±0.42^{d}	88.60±0.20^{f}	1.67±0.23^{bc}	31.40±0.20^{e}	ND
	Zone C	272.40±0.20^{c}	3324.90±0.31^{a}	119.67±0.12^{c}	84.80±0.20^{e}	2.27±0.31^{de}	29.00±0.20^{d}	ND

ND: Not detected

Table 2b: Mean of Mineral analysis of *Ipomoea aquatic*

Location	Magnesium (mg/100g)	Potassium (mg/100g)	Sodium (mg/100g)	Iron (mg/100g)	Copper (mg/100g)	Zinc (mg/100g)
Afikpo	308.74±3.83^{b}	7307.40±3.16^{c}	102.20±0.29^{a}	48.91±8.14^{a}	1.47±0.52^{a}	26.47±0.34^{b}
Abakaliki	931.58±2.23^{c}	4449.30±80.74^{b}	182.07±19.76^{b}	277.89±23.48^{c}	2.33±0.24^{a}	17.79±1.11^{a}

Ohaozara	268.00±12.42^{a}	3324.90±0.20^{a}	121.67±2.80^{a}	83.24±6.28^{b}	2.04±0.35^{ab}	29.89±1.32^{c}

Table 3a: Mineral analysis of *Pennisetum purpureum*

Location	Sample	Magnesium (mg/100g)	Potassium (mg/100g)	Sodium (mg/100g)	Iron (mg/100g)	Copper (mg/100g)	Zinc (mg/100g)	Cobalt
Afikpo	Zone A	500.80±0.20^{c}	6970.90±0.12^{f}	88.53±0.50^{c}	24.27±0.31^{a}	1.80±0.20^{bc}	23.80±0.20^{b}	ND
	Zone B	460.20±0.20^{a}	6969.80±0.20^{e}	69.07±0.31^{b}	25.20±0.20^{b}	1.20±0.20^{a}	20.47±0.42^{a}	ND
	Zone C	489.07±0.31^{b}	6119.40±0.20^{d}	60.80±0.20^{a}	27.73±0.12^{c}	1.53±0.31^{ab}	25.07±0.31^{c}	ND
Abakaliki	Zone A	944.00±0.20^{g}	9830.60±0.20^{h}	105.07±0.23^{f}	62.87±0.31^{f}	1.80±0.20^{bc}	25.20±0.20^{c}	ND
	Zone B	1010.90±0.12^{h}	9608.60±0.02^{g}	100.20±0.20^{d}	82.27±0.31^{h}	2.13±0.31^{cd}	25.27±0.31^{c}	ND
	Zone C	1044.60±0.20^{i}	9855.10±0.31^{i}	103.20±0.40^{e}	71.80±0.20^{g}	1.60±0.20^{b}	30.80±0.20^{f}	ND
haozara	Zone A	602.20±0.20^{e}	3846.90±0.12^{a}	122.40±0.20^{g}	45.00±0.20^{d}	2.33±0.12^{de}	30.33±0.31^{e}	ND
	Zone B	710.53±0.31^{f}	4039.60±0.20^{c}	131.13±0.31^{h}	45.13±0.23^{d}	2.60±0.20^{e}	26.53±0.12^{d}	ND
	Zone C	577.73±0.12^{d}	4035.60±0.20^{b}	140.07±0.12^{i}	51.20±0.20^{e}	3.07±0.12^{f}	26.80±0.20^{d}	ND

Table 3b: Mean of Mineral analysis of *Pennisetum Purpuerum*

Location	Magnesium (mg/100g)	Potassium (mg/100g)	Sodium (mg/100g)	Iron (mg/100g)	Copper (mg/100g)	Zinc (mg/100g)
Afikpo	483.36±20.89^{a}	6686.70±491.30^{b}	72.80±14.24^{a}	25.73±1.79^{a}	1.51±0.30^{a}	23.11±2.38^{a}
Abakaliki	999.83±51.20^{c}	9764.80±135.80^{c}	102.82±2.46^{b}	72.31±9.71^{c}	1.84±0.27^{a}	27.09±3.21^{a}

Ohaozara	630.15 ± 70.67^{b}	3974.00 ± 110.12^{a}	131.20 ± 8.83^{c}	47.11 ± 3.54^{b}	2.67 ± 0.38^{b}	27.89 ± 2.12^{a}

Summary of Mineral Results

Location	Mg			K			Na			Fe			Cu			Zn		
	Ce	Ia	Pp	Ce	Ia	Pp	Ce	Ia	Pp	Ce	Ia	Pp	Ce	Ia	Pp	Ce	Ia	Pp
Afikpo	604.62 ± 46.07	308.74 ± 3.83	483.36 ± 20.89	5121.30 ± 240.61	7307.40 ± 3.16	6686.70 ± 491.30	320.38 ± 264.52	102.20 ± 0.29	72.80 ± 14.24	73.80 ± 1.46	48.91 ± 8.14	25.73 ± 1.79	2.22 ± 0.24	1.47 ± 0.52	1.51 ± 0.30	36.45 ± 3.25	26.47 ± 0.34	23.11 ± 2.38
Abakaliki	572.71 ± 39.42	931.58 ± 2.23	999.83 ± 51.20	4775.60 ± 40.97	4449.30 ± 80.74	9764.80 ± 135.80	884.55 ± 27.16	182.07 ± 19.76	102.82 ± 2.46	103.60 ± 4.62	277.89 ± 23.48	72.31 ± 9.71	2.27 ± 0.48	2.33 ± 0.24	1.81 ± 0.27	31.49 ± 2.28	17.79 ± 1.11	27.09 ± 3.21
Ohaozara	892.42 ± 69.82	268.00 ± 12.42	630.15 ± 70.67	5910.00 ± 175.12	3324.90 ± 0.20	3974.00 ± 110.12	431.22 ± 26.14	121.67 ± 2.80	131.20 ± 8.83	44.80 ± 4.04	83.24 ± 6.28	47.11 ± 3.54	1.73 ± 0.42	2.04 ± 0.34	2.67 ± 0.38	25.80 ± 4.86	29.89 ± 1.32	27.89 ± 2.12

Mg = Magnessium, K = Potassium, Na = Sodium, Cu = Copper, Fe = Iron, Zn = Zinc, Ce = *Colocasia esculenta*, Ia = *Ipomoea aquatica*, Pp = *Pennisetum purpureum.* Cobalt was below detection level (BDL)

Sodium

Colocasia esculenta showed the highest sodium concentration (320.35 – 884.5 mg/100g), *Ipomoea aquatica* showed 102.20 – 182.07 mg/100g and *Pennisetum purpureum* showed the least amount of sodium (72.80 – 131.20 mg/100g). On the area of location, Abakaliki samples showed the highest concentration of sodium (102.82 – 884.51 mg/100g), followed by Ohaozara location (121.67 – 431.22 mg/100g) and lastly Afikpo samples (72.80 – 320.38 mg/100g). Sodium is associated with potassium in the body in maintaining proper acid-base balance and nerve transmissions. The concentration of sodium revealed for *Ipomoea aquatica* was within the range of that reported by [14]. The values were higher than those of *Ipomoea batatas* leaves [15,13]; Except for *Pennisetum purpureum* which showed higher sodium concentration, *Ipomoea aquatica* was within the range of the values reported in *Talinium trianglare* (248.8 – 280.00 mg/100g) [18,17], *Telferia occidentalis* (229.10 mg/100g), *Amaranthus caudatus* (427.90 mg/100g) fall within the values reported by Smith, [17]. But *Amaranthus hybridus* (258.90 mg/100g) and *Vernonia amygdalina* (117.40 mg/100g) were also within the range of *Ipomoea aquatica* [17]. From the results, it was obvious that the concentration of potassium was far greater than that of sodium, as also evident from values in the available literature. The high concentration of potassium may be due to environmental factors resulting from the abundance of the mineral in the soil [19].

Iron

Pennisetum purpureum was significantly low in iron concentration (27.72 – 72.31 mg/100g) compared to other vegetables. *Ipomoea aquatica* was the highest in the concentration of iron (48.91 – 277.89 mg/100g). In terms of the sampling location, Abakaliki samples again showed the highest concentration (72.31 – 277.89 mg/100g). Ohaozara location was the second in concentration (44.80 – 83.24 mg/100g), while Afikpo samples showed the lowest amount of iron available in the vegetables analysed. The importance of iron to human health cannot be overemphasized. According to the World Health Organisation (WHO), iron deficiency affects about 3.7 billion people and, out of which 2 billion people are anaemic [20]. The values obtained here were very encouraging, especially for the concentration of iron in *Ipomoea aquatica* and those other vegetables grown in the Abakaliki location. The value falls within that obtained from *Ipomoea aquatica* grown in Kebbi State, Nigeria (210.30 mg/100g) as reported by [14]. The values were higher when compared with similar work done in Vietnam (41.27 mg/100g) reported [21]. *Ipomoea batatas* leaves grown in Ghana showed 36.69 – 147.87 mg/100g DW, as reported by [15,22]. [23] also reported that green leafy vegetables grown in Sokoto state, Nigeria (110 – 325 mg/100g). It is important to state again that this factor is possibly due to the soil composition.

Copper

The concentration of copper was generally low. *Colocasia esculenta* showed the least amount of copper (1.73 – 2.22 mg/100g). *Ipomoea aquatica* showed 1.47 – 2.33 mg/100g, while *Pennisetum purpureum* was the highest (1.51 – 2.67 mg/100g). In terms of location, the vegetables sampled from Ohaozara showed the highest amount of copper (1.73 – 2.67 mg/100g), followed by Abakaliki samples (1.84 – 2.33 mg/100g) and Afikpo samples were the least (1.47 – 2.22 mg/100g). The values obtained were a little higher than that reported by [14] (0.36 mg/100g). However, [15,22] reported a higher range of copper content values in *Ipomea batatas* leaves (3.34 – 3.95 mg/100g). [24] reported very high levels of copper in Trianthema portulacastrum compared to the acceptable range set by WHO, which is 2-5 mg intake per day [25]. The value of copper obtained for the vegetables analyzed is within the acceptable standard [26] reported that the consumption of copper in excess of 3 mg/l of drinking water results in gastrointestinal tract (GIT). Also, excess of copper in plants can lead to oxidative stress, inducing changes in the activity and content of some components of antioxidative pathways.

Zinc

The concentration of zinc in the vegetables analysed was a little higher than that of copper. It was highest in *Colocasia esculenta* (25.80 – 36.45 mg/100g), followed by *Ipomoea aquatica* (17.79 – 29.89 mg/100g) and the least was *Pennisetum purpureum* (23.11 – 27.89 mg/100g). Comparing the sampling locations, Afikpo samples were the highest in zinc content (23.11 – 36.45), while Abakaliki and Ohaozara samples were 17.79 – 31.49 mg/100g and 25.80 – 29.89 mg/100g amount of zinc, respectively. Zinc is important in the human diet. The positive impact of zinc supplementation on the growth of some stunted children and the prevalence of selected childhood diseases such as diarrhea, suggests that zinc deficiency is likely to be a significant public health problem, especially in developing countries like Nigeria [27,1]. It has been reported that according to FAO's food balance data, 20 % of the world population could be at risk of zinc deficiency. The average daily intake is less than 70ug per day [26].

This finding should stimulate the cultivation and consumption of large-scale vegetables, especially *Colocasia esculenta* and *Ipomoea aquatica*, which are grown in the Afikpo and Abakaliki areas. The concentration of zinc in the vegetables analysed was higher than that grown in Kebbi State (2.47 mg/100g) as reported by [14]. [15], also reported lower zinc content in *Ipomea batatas* leaves grown in Ghana (3.95 – 6.86mg/100g).

Conclusion

The results generally show that *Ipomoea aquatica*, *Colocasia esculenta*, and *Pennisetum purpureum* are rich sources of important nutrients. Like some Nigerian green vegetables, the vegetables studied are rich in the macro and micronutrients analyzed. The results show that *Pennisetum purpureum* collected from the Abakaliki location is considered the richest in magnesium and potassium. *Colocasia esculenta,* also grown in Abakaliki, can be considered the richest source of sodium. *Ipomoea aquatica,* also grown in Abakaliki, proved to be the richest source of iron. On the other hand, *Pennisetum purpureum* grown in Ohaozara is considered the richest source of copper, while *Colocasia esculenta* grown in Afikpo location is considered the most available source of zinc. Therefore, local dwellers in Abakaliki can depend on *Pennisetum purpureum* for magnesium and potassium which very essential to health. Also, Abakaliki *Colocasia esculenta* and *Ipomoea aquatica* can be depended on for sodium and iron respectively. Finally, *Pennisetum purpureum* and *Colocasia esculenta* grown in Ohaozara and Afikpo can be relied on as rich soucres of copper and zinc respectively.

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