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Dietary quality of some green leafy vegetables grown in Osun state, Nigeria

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ABSTRACT

The quality of some green vegetables grown in certain parts of Osun State of Nigeria, were analyzed to determine their nutritive qualities and the heavy metals present in the edible parts; the leaves and stems. The following range results in mg/g dry weight were obtained. Na 0.55-0.79, K 0.45-0.89 Ca 0.39-0.81, Mg 0.61-0.94, Zn 0.08-0.28, Mn 0.06-0.13, P 0.12-0.22 and Fe 0.14-0.86, while that of the heavy metals are; Co: 0.03-0.07, Cd: ND -0.02, Pb: 0.076 and Cr: ND -0.03. The values were subjected to statistical analysis, Univariate analysis of variance (ANOVA). The differences in values of the proximate analysis and two of the nutritive elements Mg and P among the vegetables from different locations showed no significant difference while the differences in values of other nutritive metals and heavy metals analysed showed significant difference among different vegetables from different locations across the state.

KEYWORDS

Vegetables;
Nutritive parameters;
Heavy metals;
Locations;
Statistical analysis.

INTRODUCTION

Vegetables form substantial part of human food, which could be eaten either raw or cooked[1] They are the succulent edible part of plants which could serve as supplementary food or as side dishes, or be served along with staple food.[2]. These plants contain both the essential dietary requirements and toxic metals with wide range of concentrations[3]. Albeit their concentrations can be related to amount present in the soil on which they were grown, the physico-chemical properties of the soil and the uptake ability of the plant;[4]. Thus, the composition and nutritional values of these tropical vegetables differ and contribution of each to man's diet differs.

They contribute to man's diet in different ways, *C. olitorius* is usually recommended to pregnant women, to lactating mothers and to anaemeric patients, because of its richness in iron a precursor of heamoglobin[5]. It was also reported by[6] that vegetables are rich in protein, vitamins, and essential amino acid, this could serve as cheap source of animal protein[3] especially in tropical Africa where cost of animal protein is high. Vegetable are reported to contain β-Carotene, folic acid, vitamin C, which are essential for women for replenishment of lost blood.

Heavy metals which are toxic to man are also present in some vegetables, depending on the type of soils grown, and consumption of such vegetable is one of the pathway by which man is exposed to these heavy metals, thus a veritable path way to food chain[7]. The toxic metals such as cobalt, lead, Arsenic and cadmium, which are ubiquitous in the ecosystem could find their way to the soil through amendment of the soil with ani-

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mal dung or irrigation with contaminated water, thus, according to[8] these metals gets to the agricultural ecosystem through various means.

Nigerians, according to[9] consume about 65g of fresh vegetables daily thus, making a comprehensive analysis of these plant very important, however paucity of reliable data on nutritional values of local vegetables[10] has resulted in a set-back in solving the nutritional problems of the local population with these vegetables.

In Osun State of Nigeria, it is common to cultivate vegetables at river banks during dry season and to amend soils of such area with the local manure-(animal dung), thus the need for their analysis, with a view to establishing a nutritive and toxicity data bank that may be of use health-wise, with the consumption of these vegetables which are commonly grown and consumed by the people in State of Osun Nigeria.

MATERIALS AND METHODS

Market survey of five commonly consumed leafy vegetables were made by purchasing the vegetables in the market of the following towns: Ilesa, Ife, Ede, Osogbo, Ila, Ikirun, Ikire and Iwo. These are towns located in various local governments of State Osun Nigeria. The vegetables are *Corchorus olitorius* (Ewedu) (labelled A), *Amaranthus caudateus* (Tete)(B), *Solanum macrocarpum* (Igbagba)(C) *Celosia argentea* (Sokoyokoto)(D) all are usually cultivated and *Talinum triangulare* (Gbure)(E) which grows wildly. The Yoruba names and identifiers are in bracket.

Samplings were done between the months of August 2012 to March, 2013 and usually in the morning, at the major markets of the towns afore-mentioned. The samples were immediately transferred to the laboratory in clean polythene bags. The leaves and tender Stems of the samples were removed, washed thoroughly with destilled water and left to drain at room temperature.

The samples were dried at 105^{0}C for 3hours and pulverized to uniform size with a mill[11]. The mill was thoroughly cleaned and dried after each grinding to avoid cross contamination. Sampling was done five times.

The proximate analysis of the samples: moisture content, total ash, crude fat, and crude fibre were determined using the[12] methods, crude protein by multiplying the percentage of the Kjedahl nitrogen result by a factor of 6.25 and carbohydrate obtained by difference[13]. The crude fat was obtained by Sohxlet extraction as described by[14].

The mineral elements were determined by digestion of the sample using[15] method. The digest was diluted to 20cm^3 with de-ionized water, and subsequently analysed with air-acetylene flame atomic absorption spectrophotometer (Perkin Elmer 23801) for the following elements Ca, Mg, Fe, Zn, Co, Ag, Cd, Pb and Cr,[13] while, K and Na were determined using flame photometer, and P was determined colorimeterically, using the phosphovanado hydrate method[16]. All reagents used were analytical grade (AR) and procedural blanks were also carried out under same conditions.

RESULTS AND DISCUSSIONS

The percentage results of the proximate analysis of the vegetable are shown in table 1. The crude fat for the vegetables in all locations ranged between 0.18% - 0.40%, the *Talinum triangulare* has the lowest from all locations. It has a range of 0.18% - 0.19%, while *Solalumm macrocarpum* species has the highest from all locations, its percentage value

Ranged between 0.38 - 0.42, the value is comparable to that obtained for three species of vegetables by[17], but less than that reported by[18]. The moisture contents of all the vegetables were high, it ranged between 70.90% - 80.12% and *Talinum triangulare* has the highest from all locations, its values ranged between 79.99% and 80.12% while *Chochorus olitorus* has the lowest, its value ranged between 70.90% - 71.00%. This is in agreement with the result of[18], where *Talinum triangulare* has a high value of 89.47% while C. olitorius has a lower value of 79.98%. However, the value obtained by[17] was far less for *Celosia argentea*, he reported a value of 15.60% and for *C.olitorius*, he reported a value of 30.90%.

The total ash value ranged between 8.60% and 14.60% with *Talinum triangulare* having the lowest from all locations, 8.60%,- 9.00% while *Solanum macrocarpum* has the highest from all locations- 14.02% - 14.60%. However, the values are less than that reported by[9] and[19], but the values for *Talinum*

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TABLE 1 : Percentage results of the proximate analysis of the vvegetables (means of 5 determinations)

Locations	Vegetable	Crude fat	Moisture content	Total ash	Crude protein	Carbohydrate	Crude fibre
EDE	A	0.31 ±0.01	70.90±1.25	14.00±2.10	7.90±1.50	3.40±1.12	3.49±0.40
	B	0.30 ±0.02	75.00±1.12	10.50±2.50	7.50±2.20	3.00±1.11	3.30±2.00
	C	0.40 ±0.04	72.15±0.50	14.50±2.00	5.88±3.50	3.06±1.12	4.01±1.00
	D	0.20 ±0.05	76.00±1.60	11.00±1.16	6.90±4.00	3.00±1.20	2.50±1.11
	E	0.19 ±0.02	80.00±0.80	9.00±2.10	4.98±1.00	3.03±1.02	2.80±0.45
OSOGBO	A	0.30 ±1.11	71.00±1.25	13.80±1.25	8.00±0.50	3.41±0.80	3.49±0.90
	B	0.38 ±0.05	74.22±0.40	11.10±2.00	7.98±1.00	3.01±1.12	3.31±1.40
	C	0.40 ±0.05	71.95±1.50	14.60±1.00	6.00±2.05	3.06±1.11	3.99±1.45
	D	0.20 ±0.08	75.58±0.50	10.98±2.00	7.11±1.25	3.01±1.00	3.12±0.60
	E	0.15 ±0.06	79.99±1.50	8.93±2.00	4.95±0.11	3.06±2.00	2.88±0.80
ILESA	A	0.28 ±0.20	71.00±1.00	13.77±2.00	8.11±2.10	3.38±0.85	3.46±2.00
	B	0.32 ±0.10	75.00±2.50	10.46±2.50	8.10±2.00	3.06±1.12	3.06±1.40
	C	0.42 ±0.40	72.01±1.25	14.60±2.45	5.50±1.80	3.08±1.18	3.95±1.00
	D	0.22 ±0.04	75.80±0.18	10.90±1.00	6.58±1.50	3.10±0.45	3.00±1.45
	E	0.19 ±0.15	80.00±0.50	9.00±1.00	4.95±1.80	3.00±1.00	2.86±0.55
ILE-IFE	A	0.33 ±1.02	71.00±0.30	13.78±1.05	8.00±1.11	3.40±1.15	3.49±1.22
	B	0.40 ±0.60	73.91±0.75	11.30±1.00	8.00±1.50	3.09±1.11	3.30±1.45
	C	0.42 ±0.50	72.41±0.80	14.20±1.00	5.50±2.50	3.06±1.13	4.01±1.25
	D	0.20 ±0.45	75.90±0.65	10.80±1.00	7.00±3.15	3.01±0.50	3.09±2.00
	E	0.19 ±0.50	80.08±0.40	8.60±0.55	5.15±2.11	3.00±2.00	2.98±1.20
IKIRUN	A	0.31 ±1.00	70.80±1.25	14.00±2.00	7.90±1.15	3.40±1.12	3.45±1.40
	B	0.30 ±2.00	75.00±1.45	10.50±2.50	7.90±2.20	3.00±1.15	3.30±1.00
	C	0.40 ±1.50	72.15±1.50	14.50±2.45	5.88±2.05	3.06±1.15	2.40±1.11
	D	0.20 ±0.05	76.00±0.60	11.00±1.11	6.50±2.50	3.00±1.20	2.50±0.50
	E	0.19 ±1.20	80.00±1.11	9.00±2.00	4.98±1.25	3.03±1.00	2.80±0.99
ILA	A	0.29 ±1.11	31.00±1.06	13.90±2.01	8.00±0.90	3.31±1.11	3.50±0.09
	B	0.30 ±1.00	75.50±1.08	10.60±2.21	7.11±0.80	3.00±1.21	3.49±0.08
	C	0.39 ±0.50	73.00±1.08	13.60±2.21	5.80±1.00	3.10±0.90	4.11±0.10
	D	0.21 ±0.90	75.90±0.90	10.50±1.98	7.00±0.55	3.20±1.00	3.19±0.11
	E	0.19 ±1.05	80.11±0.88	8.95±2.00	5.00±1.10	3.05±1.12	2.72±0.10
IWO	A	0.30 ±1.10	30.95±0.90	13.95±2.00	8.00±1.10	3.40±1.11	3.40±1.15
	B	0.36 ±1.00	75.50±1.11	10.00±2.05	8.11±1.12	2.93±1.12	3.10±1.11
	C	0.39 ±0.98	72.59±1.05	14.02±2.00	6.00±1.20	3.00±1.11	4.00±1.10
	D	0.20 ±0.88	75.90±1.15	11.00±2.00	6.80±1.12	3.00±0.98	3.10±0.98
	E	0.19 ± 0.75	80.12±1.05	8.90±2.11	4.99±2.00	3.00±1.10	2.80±1.00
IKIRE	A	0.30±0.08	70.92±1.00	14.10±1.50	8.00±1.12	3.22±0.50	3.46±1.00
	B	0.38±0.07	74.91±1.10	10.11±2.00	8.11±1.10	3.01±0.85	3.48±0.80
	C	0.43±0.10	72.21±0.85	14.35±1.85	6.00±1.50	3.02±0.98	3.99±1.11
	D	0.21±0.20	76.01±0.95	10.55±1.30	7.13±1.30	3.10±0.90	3.00±0.85
	E	0.18±0.25	80.12±0.92	8.75±2.15	5.00±0.89	3.00±0.95	2.95±0.75

triangulare is comparable to that of *Hibiscus esculentus* 8.00% as reported[20].

The percentage protein content of all the vegetables were low. It ranged between 4.98% and 8.11%. *Talinum triangulare* has the lowest value in all the locations, its value ranged between 4.98% - 5.15%, while *Amaranthus caudatus* has the highest value, that ranged between 7.90% - 8.11%. The crude protein from all the vegetables are higher than that of *Momorshica foecide leaves* (4.6%) , but are lower than the value reported by[21], and ; Amaranthus caudatus (20.5% Dry Weight) *Talinum triangulare* (31.00%); Albeit

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TABLE 2 : Mineral contents of some green leafy vegetables grown in four major towns of Osun state, Nigeria.

Locations	Label	MINERAL	CONTENTS	Mg/g	DRY	WEIGHT			
		K	Na	Ca	Mg	Fe	Zn	Mn	P
EDE	A	0.88±0.01	0.70±0.02	0.47±0.01	0.85±0.01	0.79±0.04	0.08±0.01	0.11±0.01	0.17±0.01
	B	0.59±0.02	0.77±0.02	0.72±0.04	0.75±0.02	0.38±0.04	0.12±0.03	0.07±0.01	0.18±0.01
	C	0.45±0.01	0.55±0.03	0.42±0.01	0.67 ± 0.01	0.18±0.03	0.28±0.01	0.08±0.02	0.21±0.01
	D	0.49±0.02	0.67±0.05	0.41±0.01	0.61±0.03	0.25±0.03	0.14±0.02	0.06±0.03	0.17±0.02
	E	0.82±0.02	0.76±0.03	0.52±0.04	0.77±0.01	0.51±0.03	0.06±0.03	0.13±0.01	0.18±0.01
OSOGBO	A	0.65±0.03	0.74±0.02	0.81±0.01	0.94±0.02	0.86±0.02	0.09±0.03	0.08±0.01	0.19±0.02
	B	0.76±0.03	0.56±0.02	0.75±0.02	0.75±0.01	0.33±0.01	0.14±0.02	0.08±0.02	0.19±0.01
	C	0.88±0.04	0.79±0.01	0.56±0.04	0.76±0.03	0.15±0.02	0.08±0.04	0.09±0.01	0.16±0.01
	D	0.89±0.01	0.73±0.03	0.73±0.01	0.87±0.01	0.26±0.04	0.13±0.03	0.11±0.03	0.16±0.02
	E	0.72±0.03	0.78±0.01	0.48±0.05	0.66±0.03	0.14±0.02	0.09±0.03	0.09±0.01	0.18±0.01
ILESA	A	0.63±0.02	0.70±0.01	0.72±0.04	0.70±0.01	0.29±0.02	0.07±0.02	0.05±0.01	0.22±0.01
	B	0.63±0.03	0.78±0.03	0.56±0.05	0.72±0.03	0.37±0.01	0.10±0.03	0.08±0.01	0.19±0.01
	C	0.53±0.02	0.79±0.03	0.73±0.04	0.77±0.04	0.16±0.03	0.11±0.04	0.06±0.01	0.16±0.02
	D	0.65±0.03	0.76±0.04	0.77±0.03	0.83±0.01	0.32±0.04	0.07±0.03	0.03±0.01	0.15±0.01
	E	0.72±0.03	0.78±0.01	0.48±0.05	0.66±0.03	0.14±0.02	0.09±0.03	0.09±0.01	0.18±0.01
ILE-IFE	A	0.65±0.03	0.72±0.01	0.65±0.04	0.78±0.04		0.10±0.02	0.11±0.01	0.21±0.01
	B	0.60±0.03	0.64±0.02	0.74±0.02	0.78±0.02	0.86±0.01	0.14±0.02	0.12±0.01	0.15±0.01
	C	0.56±0.01	0.67±0.01	0.39±0.01	0.70±0.02	0.41±0.02	0.11±0.03	0.08±0.01	0.15±0.01
	D	0.64±0.03	0.78±0.04	0.56±0.03	0.72±0.03	0.20±0.03	0.12±0.01	0.09±0.01	0.21±0.01
	E	0.74±0.01	0.66±0.04	0.66±0.01	0.66±0.03	0.54±0.02	0.08±0.01	0.11±0.01	0.12±0.01

they are greater than the values reported by[18] *Talinum triangulare* (3.24%).

The percentage carbohydrate content in all the vegetable were lower in concentration when compared to that reported by[18], *Corhorous olitorius* 6.25% and *Talinum triangulare* (4.45%) while in this analysis Corchorus olitorius has the highest value. It ranged between 3.38% - 3.41%, *Amaeanthus caudatus* has the lowest range value of 2.93% - 3.10%.

However,the value got for all the vegetables were lower than the recommended carbohydrate dietary allowance for children, adult, pregnant and lactating mothers.[17] The percentage fibre ranged between 2.95% - 4.11%. Vegetables are good source of fibres, that lowers the body cholesterol, and are useful in keeping the digestive system healthy and functioning properly and helps in digestion, and excretion of toxins, whose build up can lead to various deseases such an cancer[22]. The percentage value of the crude fibre of all the vegetables studied are less than those reported by[18] but higher than those reported by[17].

The mineral content results of the vegetables are shown in table 2. All the nutritive elements were present in all the vegetables, Magnesium has the highest value (0.94mg/g) in *Corchorus. olitorius* from Osogbo; its lowest values was detected in *Talinum triangulare* from Ede with a value of (0.61 mg/g).[23] also reported that Magnesium was the most abundant minerals of the vegetables analyzed; albeit, value obtained was higher (1.76mg/g). Other nutritive metals were also present and their range values are K: 0.45 - 0.89, Na; 0.55 - 0.79, Ca: 0.39 - 0.81, Fe: 0.14 - 0.86, Zn: 0.08 - 0.28, Mg: 0.06 - 0.13, P: 0.12 - 0.22 mg/g dry weight respectively.

Potassium is also predominant, but the value obtained was less than that reported by[23], Na was also

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TABLE 2 (Continued) : Mineral contents of some green leafy vegetables grown in four major towns of Osun state, Nigeria.

Locations	Vegetable	K	Na	Ca	Mg	Fe	Zn	Mn	P
	A	0.67±0.01	0.71±0.02	0.50±0.02	0.85±0.01	0.40±0.02	0.09±0.01	0.11±0.01	0.12±0.01
	B	0.60±0.01	0.65±0.11	0.59±0.11	0.77±0.01	0.45±0.03	0.16±0.02	0.08±0.01	0.18±0.02
IKIRUN	C	0.62±0.02	0.60±0.02	0.40±0.03	0.78±0.10	0.35±0.03	0.18±0.04	0.09±0.01	0.17±0.01
	D	0.49±0.03	0.68±0.10	0.45±0.03	0.75±0.03	0.30±0.03	0.09±0.02	0.10±0.02	0.16±0.02
	E	0.75±0.02	0.66±0.10	0.55±0.02	0.70±0.03	0.39±0.01	0.08±0.02	0.08±0.01	0.20±0.02
	A	0.81±0.01	0.70±0.01	0.60±0.10	0.80±0.04	0.45±0.03	0.10±0.03	0.11±0.02	0.21±0.02
	B	0.62±0.02	0.68±0.12	0.60±0.12	0.82±003	0.42±0.02	0.17±0.03	0.07±0.01	0.18±0.01
ILA	C	0.55±0.03	0.62±0.01	0.50±0.04	0.78±0.03	0.38±0.03	0.08±0.02	0.10±0.01	0.16±0.01
	D	0.58±0.02	0.65±0.12	0.50±0.04	0.76±0.03	0.44±0.02	0.16±0.03	0.09±0.02	0.15±0.02
	E	0.74±0.02	0.68±0.10	0.58±0.10	0.77±0.04	0.56±0.04	0.11±0.02	0.08±0.01	0.13±0.02
	A	0.70±0.02	0.71±0.01	0.62±0.10	0.80±0.02	0.38±0.03	0.22±0.02	0.08±0.01	0.14±0.03
	B	0.62±0.02	0.66±0.10	0.69±0.12	0.70±0.03	0.45±0.02	0.19±0.01	0.09±0.02	0.16±0.01
IWO	C	0.60±0.02	0.59±0.01	0.59±0.10	0.69±0.02	0.42±0.03	0.17±0.02	0.10±0.02.	0.11±0.02
	D	0.63±0.01	0.69±0.10	0.66±0.03	0.79±0.02	0.50±0.04	0.09±0.01	0.06±0.02	0.16±0.03
	E	0.75±0.01	0.70±0.10	0.60±0.01	0.75±0.03	0.65±0.02	0.11±0.01	0.07±0.01	0.19±0.03
	A	0.60±0.01	0.69±0.01	0.69±0.12	0.80±0.02	0.71±0.02	0.18±0.01	0.09±0.01	0.16±0.02
	B	0.65±0.02	0.68±0.10	0.68±0.11	0.83±0.03	0.60±0.03	0.19±0.02	0.11±0.02	0.12±0.02
IKIRE	C	0.59±0.01	0.60±0.10	0.62±0.03	0.79±0.03	0.55±0.04	0.11±0.01	0.08±0.01	0.14±0.02
	D	0.66±0.02	0.70±0.01	0.58±0.10	0.75±0.03	0.48±0.10	0.12±0.02	0.06±0.01	0.15±0.03
	E	0.77±0.03	0.71±0.10	0.66±0.02	0.76±0.04	0.52±0.04	0.13±0.01	0.08±0.01	0.21±0.01

present, its lowest concentration was 0.55mg/g, Ca was present at low value compared to values reported by[17], values of 17.7mg/g and 23.3mg/g were reported for *Colesia argentea and Corchorus olitorius* respectively; but higher than the values reported by[23]. Zn, Mn, and P have the lowest mean values followed by Fe. These minerals are important in man's diet for proper functioning of the body's physiological fluid and ogans; Ca, is important for growth, development and maintance of brains[24]; Fe is an important constituent of the blood. These vegetables can therefore provide substantial amount of the daily needs of these minerals since they are present in adequate amount and values compared favourably with the macro elements recommended dietary Allowance by the[24].

Some of the toxic metals were also present in the vegetables analzes as shown in Table 3 but at levels lower than the standard range recommended (mg/kg) by[26,27].

The toxic metals detected are Co, Cd, Cr and Pb. at the following range values mg/g dry weight respectively Co: 0.03-0.07, Cd: ND—0.03, Cr: ND-0.03, Pb: 0.06-0.18; Pb was found in all the vegetables, this metal could get to environment through old battery wastes. However, the recommended standard range values by[23,24] for these elements are Pb:300-1200, Co: 10-100, Cr: 200-1200, Cd: 10-100 mg/kg respectively, thus higher than values detected in all the samples analysed.

The values for different vegetables from different locations were statistically analysed using *factorial design analysis*. The *software package SPSS 16.0* was used. The differences in the values of all the proximate analysis for different vegetables from different locations showed that the difference is insignificant ($P > 0.05$) also those of the two of nutritive metals Mg and P were insignificant. However, the difference in the values of other nutritive metals: Na,K,Ca, Fe, Zn, Mn and those of heavy metals analysed Co, Cd,Cr and Pb were all significant ($P < 0.5$).

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TABLE 3 : Results of heavy metals content of some green vegetables in state of Osun, Nigeria.

		Co	Cd	Cr	Pb
EDE	A	0.05±0.01	ND	ND	0.06±0.01
	B	0.06±0.02	0.01±0.02	0.02±0.01	0.06±0.01
	C	0.05±0.01	0.01±0.01	ND	0.10±0.01
	D	0.07±0.02	0.01±0.01	ND	0.12±0.01
	E	0.07±0.02	0.02±0.01	0.01±0.01	0.13±0.01
OSOGBO	A	0.06±0.01	0.01±0.01	0.02±0.02	0.11±0.01
	B	0.05±0.02	0.02±0.02	0.02±0.01	0.14±0.01
	C	0.05±0.02	0.01±0.01	ND	0.18±0.02
	D	0.05±0.01	0.02±0.01	ND	0.17±0.02
	E	0.06±0.01	0.02±0.01	ND	0.12±0.02
ILESA	A	0.05±0.01	ND	ND	0.07±0.01
	B	0.06±0.02	ND	0.01±0.01	0.11±0.02
	C	0.06±0.02	0.01±0.01	0.2±0.01	0.14±0.01
	D	0.07±0.02	0.02±0.01	0.02±0.01	0.18±0.02
	E	0.06±0.02	0.02±0.02	0.01±0.01	0.11±0.01
ILE-IFE	A	0.06±0.01	0.02±0.01	0.01±0.01	0.07±0.01
	B	0.04±0.01	ND	0.01±0.01	0.07±0.01
	C	0.09±0.01	ND	0.02±0.01	0.06±0.01
	D	0.01±0.02	ND	0.01±0.01	0.06±0.02
	E	0.08±0.01	0.01±0.01	0.01±0.01	0.06±0.03
IKIRUN	A	0.06±0.01	ND	0.02±0.01	0.06±0.03
	B	0.07±0.02	ND	ND	0.06±0.02
	C	0.05±0.01	ND	ND	0.07±0.02
	D	0.04±0.01	ND	ND	0.11±0.02
	E	0.02±0.02	ND	ND	0.18±0.03
ILA	A	0.05±0.02	0.01±0.01	ND	0.12±0.02
	B	0.04±0.01	0.02±0.01	ND	0.11±0.02
	C	0.03±0.01	ND	0.12±0.01	0.10±0.01
	D	0.07±0.02	ND	0.03±0.01	0.06±0.02
	E	0.05±0.01	ND	0.01±0.01	0.07±0.02
IWO	A	0.04±0.01	0.01±0.01	ND	0.08±0.01
	B	0.05±0.01	0.02±0.01	ND	0.08±0.02
	C	0.06±0.02	0.01±0.01	ND	0.09±0.03
	D	0.03±0.01	0.02±0.01	ND	0.09±0.02
	E	0.04±0.01	0.03±0.02	ND	0.11±0.03
IKIRE	A	0.05±0.02	ND	ND	0.09±0.01
	B	0.06±0.01	0.02±0.02	ND	0.08±0.02
	C	0.05±0.02	0.03±0.01	ND	0.10±0.02
	D	0.06±0.01	ND	ND	0.15±0.03
	E	0.07±0.02	ND	ND	0.13±0.02

The variations in concentrations of the parameters analysed in some vegetables from different zones could be due to the concentrations of the metals in the soils of the various locations, the climatic conditions and uptake of scuh by different plants, since according to[21], concentration of minerals in plants are related to con-

centration in the soil, and the soil's physico- chemical parameters. However, vegetables are nutritious foods that can provide nutrients needed for proper functioning of body fluids and organs. Its lower fat content makes it good for health, but also the low carbohydrate content showed that it cannot supply enough energy requirements unless it is supplemented with other diets. This analysis had shown that agricultural products could contain toxic metals, hence the need for proper monitoring of the nations agricultural soils, products and the environment in general.

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