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ETHNOBOTANICAL SURVEY OF INDIGENOUS LEAFY VEGETABLES CONSUMED IN EKITI STATE, NIGERIA

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ABSTRACT: *In tropical Africa, leafy vegetables traditionally cooked and eaten as a relish together with starchy staple foods have undocumented long tradition in different culture. To identify and transfer this valuable heritage to the new generation, an ethnobotanical study was carried out to investigate and document the consumption and utilization level of indigenous leafy vegetables in Ekiti State, Nigeria. Information on the availability and the consumption of the leafy vegetables obtained from respondents from across the 16 Local Government Areas of the state through semi-structured questionnaire were documented. Assessment of the Socio-economic characteristics of the respondents revealed that women (56.25%) were more than men (43.75%). The respondents were more illiterate (66.67%) than literate (33.33%). A total of 25 plant species belonging to 13 families were identified as being used as leafy vegetables for food and medicine, with variation in the level of their utilization in the study area. The succulent leaves and stems were the parts mostly used as food and medicine. The mostly consumed of these vegetables were Corchorus olitorius - consumed by 85.42% of the respondents, Amaranthus cruentus (83.33%) Talinum triangulare (81.25%) and Ocimum basilicum (78.54%). However, the least consumed vegetable was Myrianthus arboreus (8.33%) which was also found to be the most underutilized. Ekiti state is blessed with great diversity of leafy vegetables which are consumed differently for nutritional and medicinal purposes. However, proper orientation on the need to increase the consumption level and cultivation of some of these leafy vegetables by the people of the state is necessary*.

KEYWORDS: Ethnobotanical survey, leafy vegetables, Consumption, Nutritional, medicinal, Underutilized.

INTRODUCTION

Vegetables are the edible parts of plants which could be leaves, stems, roots, flowers, seeds, fruits, bulbs, tubers and fungi that are consumed wholly or in parts, raw or cooked as part of main dish (Nnamani *et al*., 2010). However, when the part eaten as vegetable is mainly from the leaves, such vegetables are referred to as leafy vegetables. They are also called potherbs, greens, vegetable greens, leafy greens, or salad greens. Although they come from a very wide variety of plants, some shared a great deal with other leafy vegetables in nutrition and cooking methods (Vainio-Mattila, 2000). Indigenous vegetables are getting popularity more than ever before due to their contributions in nutrition security to millions of people (Lyatuu and Lebotse, 2010).

According to Singh and Arora (1978), large section of the rural population of the world meets part of their nutritional requirements through the consumption of various leafy vegetables. Leafy vegetables contribute substantially to protein, minerals, vitamins, fibers and other nutrients which are usually in short supply in people's daily diets (Mohammed and Sharif, 2011; Omara-Achong *et al.,* 2012). It has been discovered that vegetables play a vital role in

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the food culture of people in Nigeria and Africa as a whole (Hart *et al*., 2005). Traditionally, leafy vegetables are often eaten by many African families. Out of 150 food-plants consumed daily by men, 115 are indigenous African species (Kimbi and Atta-Krah, 2003). Incidentally, the consumption of leafy vegetables has been reported to have many beneficial effects such as prevention of some age related degenerative diseases like arteriosclerosis and stroke (Lindeberg *et al*., 2003). Kimiywe *et al*. (2007), reported that many leafy vegetables have been implicated in curing some diseases. Apart from serving as complementary food and medicine, they also offer an alternative source of income to poor resource populace (Teklehaymanot and Giday, 2010). According to Jansen van Rensburg *et al*. (2004), Malnutrition and hunger have been reported by Obel-Lawson (2005) to threaten millions of people in Sub-Saharan Africa. However, consumption of leafy vegetables has been discovered to have a positive effect on nutrition, health and economic wellbeing of both rural and urban populations.

Nigeria is known worldwide for its great biodiversity of plants that could be exploited and used in several ways as culinary, medicinal, therapeutic and nutritional purposes (Arowosegbe, 2013). Leafy vegetables belong to this great biodiversity of plants. In many parts of Nigeria, green leafy vegetables have gained widespread acceptance as dietary constituents, generally forming a substantial portion of the diet in the preparation of soups and stews.

It is rather unfortunate that there is now a gradual neglect of some of the useful traditional leafy vegetables that have been used for food and medicine over the years. The neglect of some traditional leafy vegetables had generally made them to be underutilized. Factors responsible for such underutilization include civilization and inadequate information on their nutritional and medicinal benefits to many communities (Shei, 2008).

Were as, records on the vegetables available and consumed by communities in some parts of Nigeria is available (Hart *et al.,2005*; Banwat et al.,2012; Chubike *et al*, 2013;), information on the availability and consumption of leafy vegetables in Ekiti State had not been reported. It will therefore be a worthwhile effort to assess and document the availability and utilization level of leafy vegetables in Ekiti State, Nigeria.

MATERIALS AND METHODS

The Study Area.

The study was conducted between March and November, 2016 in the sixteen Local Government Areas of Ekiti State, Nigeria. Ekiti State is situated entirely within the tropics with a total land area of about 5,887.890km^2 (Kayode *et al*, 2016). It is located between longitudes 4^0 $33^{'}$ and 5^0 $55^{'}$ East of the Greenwich meridian and latitudes 7^0 $15^{'}$ and 8^0 $5^{'}$ North of the Equator.

The State enjoys a tropical climate with two distinct seasons; the rainy season (April - October) and the dry season (November - March). Temperature ranged between 21^0C and 38^0C. Based on the population census conducted by the Nation Population Commission (NPC 2010), the population of Ekiti state was 2,384,212. Agriculture is the major occupation of the people which provides income and employment for more than 75% of the population, while the dominating tribe is Yoruba popularly called the Ekitis.

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Delineation of the study Area for Ethnobotanical Survey

The study was carried out in the 16 Local Government Areas of Ekiti State to document the leafy vegetables used for food and medicinal purposes. Three communities were purposefully selected from each of the Local Government Areas to make a total of 48 communities. The choice of the communities from each local government areas was based on how rural and free they are from urban influence. Ten (10) respondents from each community, making a total of 480 respondents who have maintained domicile for a period of 20 years and above were chosen and interviewed with the aid of semi-structured questionnaire matrix. The interviews were conducted with a fairly open framework that allowed conversation and two-way communications between the interviewer and the respondents (Kayode *et al.*, 2009). The interviews were focused to obtain information on the local name of the vegetables, source of collection and the parts used. The utilization levels of the leafy vegetables were also determined. The voucher specimens of all the vegetables mentioned were prepared and taken to the Herbarium Unit of the Department of Plant Science and Biotechnology, Ekiti State University, Ado Ekiti for identification and deposit.

Determination of Utilization Level of the Vegetables

The frequency of consumption as revealed by the respondents was used in the classification of the vegetables into the utilization levels. Vegetables consumed at least twice a week were assigned 1, the vegetables consumed once a week were assigned 2, vegetables designated as 3 are the ones consumed once in two weeks, while vegetables assigned 4 and 5 were the ones consumed once in a month and occasionally, respectively. The vegetable with utilization level of 5 was taken to be underutilized.

RESULTS AND DISCUSSION

The result of this study revealed a wide range of respondents that cut across varying socio-economic groups with great ethnobotanical knowledge (Table 1). The ages of the respondents ranged from 20 to 100 years, with 58.33 % well above 50 years. Out of the 480 respondents, 270 were female and 210 were male. The respondents were mostly illiterates with medium to low economic status. Hence, they were of diverse socio-economic background. Despite the fact that they knew little about the importance of vegetables as part of food components that justifies adequate diet, they are familiar with the consumption and the use of leafy vegetables as food and as medicines for curing diseases. Their knowledge of these leafy vegetables justifies the level of acceptance as dietary constituent, forming a substantial portion of their diet. According to Hart *et al*. (2005), such knowledge has been discovered to play a vital role in the food culture of Nigerian populace and African as a whole.

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Table 1: Socio-economic characteristics of the respondents in the study area.

Characteristic	Description	Proportion of Respondents
Sex	Male	210 (43.75%)*
	Female	270 (56.25%)
Age (years)	20	55 (11.46%)
	21-50	145 (30.21%)
	>50	280 (58.33%)
Literacy Status	Illiterate	320 (66.67%)
	Literate	160 (33.33%)
Economic Status	High	48 (10%)
	Medium	340 (70.83%)
	Low	92 (19.17%)

*Percentage of the total respondents

In all, twenty-five (25) species belonging to 13 families were identified as being used as vegetables. Respondents were only able to give the local names of these vegetables. This agrees with Singh (2008), who reported that plants are generally known by their local names in every part of the world. Such local names play a vital role in ethnobotanical study of a specific tribe or region (Shosan *et al.*, 2014). The families Solanaceae and Asteraceae had highest representative of 5 species each, followed by Amarantheceae (4 species) and Cucurbitaceae (2 species), whereas Portulaceae, Basellaceae, Tiliaceae, Euphorbaceae, Lamiaceae, Moraceae, Nyctaginaceae, Pedaliaceae and Malvaceae were with 1 species each (Table 2). These present a wide range of plants biodiversity from which the people of Ekiti State can meet some of their nutritional and medicinal needs. According to the respondents, the leaves and stems of most of the plant species were harvested at the succulent stage for consumption. Leafy vegetables are known to be the cheapest and most valuable source of nutrient needed in daily diet (Okafor *et al*., 2004).

Table 2: List of identified leafy vegetables in the study area showing the family, local name(s) and part(s) used

S/n.	Botanical Name	Family	Local Name(s)	Part(s) Used
1	*Amaranthus cruenthus* L	*Amaranthaceae*	Arowojeja	Succulent Leaf and Stem
2	*Amaranthus dubius* Tell	*Amarantheceae*	Atetedaye	Succulent Leaf and Stem
3	*Basella alba* L	*Basellaceae*	Amunutitu/Laali	Leaf
4	*Bidens pilosa* L	*Asteraceae*	Aganranmonyan	Succulent Leaf and Stem
5	*Boerhavia diffusa L*	*Nyctaginaceae*	Etipa elila	Succulent Leaf and Stem
6	*Ceiba pentandra L*	*Malvaceae*	Egungun	Succulent Leaf and Stem
7	*Celosia argentea* L	*Amarantheceae*	Shoko	Succulent Leaf and Stem

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8	*Celosia leptostachya* Benth	*Amaranthaceae*	Ajefowo	Succulent Leaf and Stem
9	*Cnidoscolus aconitifolius* (Mayer) L. M. Johnston	*Euphorbiaceae*	Iyanapaja	Leaf
10	*Corchorus olitorius* L	*Tiliaceae*	Ewedu	Succulent Leaf and Stem
11	*Crassocephalum rubens* Juss. ex Jacq	*Asteraceae*	Ebolo/Ebire	Succulent Leaf and Stem
12	*Cucurbita pepo* L	*Cucurbitaceae*	Elegede/Agbeje	Leaf
13	*Launaea tara*xacifolia Willd	*Asteraceae*	Yanri	Young leaf
14	*Myrianthus arboreus* P. Beaul	*Moraceae (Cecropiaceae)*	Odo Ade	Young leaf
15	*Ocimum basilicum* L	*Lamiaceae*	Efinrin wewe	Leaf
16	*Sesamum radiatum* L	*Pedaliaceae*	Ekiku	Succulent Leaf and Stem
17	*Solanecio biafrae* Oliv.& Hiern	*Asteraceae*	Woorowo	Succulent Leaf and Stem
18	*Solanum aethiopicum* L	*Solanaceae*	Osun	Succulent Leaf and Stem
19	*Solanum indicum L*	*Solanaceae*	Ikan/Igbayinrin	Leaf
20	*Solanum macrocarpon* L	*Solanaceae*	Igbagba/Papatako	Succulent leaf and stem
21	*Solanum nigrum L*	*Solanaceae*	Odu	Succulent Leaf and Stem
22	*Solanum scabrum L*	*Solanaceae*	Egunmo	Succulent Leaf and Stem
23	*Talinum triangulare* Willd	*Portulacaceae*	Egbure/Poroporo	Succulent Leaf and Stem
24	*Telfairia occidentalis* Hook F	*Cucurbitaceae*	Ugu/Iroko	Leaf
25	*Vernonia amygdalina* Del.	*Asteraceae*	Ewuro	Leaf

As revealed in the study, there were three major sources of collecting the leafy vegetables in the study area (Table 3). According to the respondents,17 species were collected from farm land, 5 from backyard of the respondents, while 3 species were collected from open forest. The mostly consumed vegetables were *Corchorus olitorius* consumed by 85.42% of the respondents, Amaranthus *cruentus* (83.33%) *Talinum triangulare* (81.25%) and *Ocimum basilicum* (78.54%). However, the least consumed vegetable was *Myrianthus arboreus* (8.33%). Incidentally, the utilization level of these vegetables as indicated by the frequency of consumption follow the same pattern. Nine (9) of the species are consumed at least twice a week, hence they are highly utilized; 5 species are consumed once a week; 6 species are consumed once in two weeks; 4 species are consumed once in a month, while 1 species (*Myrianthus arboreus*) is consumed occasionally, hence it is seen as being underutilized.

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Table 3: Sources of collection and utilization level of identified leafy vegetables in the study area

S/N	Botanical Name	Source of collection	Number of consumers	Utilization level**
1	*Amaranthus cruenthus*	Farm land	400 (83.33%)*	1
2	*Amaranthus dubius*	Farm land	391 (81.46%)	1
3	*Basella alba*	Backyard garden	350 (72.92%)	1
4	*Bidens pilosa*	Farm land	83 (17.29%)	4
5	*Boerhavia diffusa*	Farm land	87 (18.13%)	3
6	*Ceiba pentandra*	Open forest	85 (17.71%)	4
7	*Celosia argentea*	Farm land	302 (62.92%)	1
8	*Celosia leptostachya*	Farm land	90 (18.75%)	4
9	*Cnidoscolus aconitifolius*	Backyard garden	360 (75%)	1
10	*Corchorus olitorius*	Farm land	410 (85.42%)	1
11	*Crassocephalum rubens*	Farm land	126 (26.25%)	3
12	*Cucurbita pepo*	Farm land	190 (39.58%)	2
13	*Launaea tara*xacifolia	Farm land	118 (24.58%)	3
14	*Myrianthus arboreus*	Open forest	40 (8.33%)	5
15	*Ocimum basilicum*	Backyard garden	377 (78.54%)	1
16	*Sesamum radiatum*	Farm land	87 (18.13%)	4
17	*Solanecio biafrae*	Open forest	320 (66.67%)	1
18	*Solanum aethiopicum*	Farm land	133 (27.77%)	3
19	*Solanum indicum*	Farm land	122 (25.42%)	3
20	*Solanum macrocarpon*	Farm land	192 (40%)	2
21	*Solanum nigrum*	Farm land	183 (38.13%)	2
22	*Solanum scabrum*	Farm land	130 (27.08%)	3
23	*Talinum triangulare*	Backyard garden	390 (81.25%)	1
24	*Telfairia occidentalis*	Farm land	380 (79.17%)	1
25	*Vernonia amygdalina*	Backyard garden	174 (36.25%	2

*Percentage of the respondents that consume the vegetables

** Vegetables consumed (VC) at least twice a week = 1, VC once a week = 2, VC once in two weeks = 3, VC once in a month = 4, VC occasionally/ underutilized = 5.

According to the respondents, factors such as difficulty in harvesting as well as cultural barrier were responsible for this underutilization. *M. arboreus* is called 'Igi-Ade' by most communities, meaning, the crown tree. As such, some have the belief that noble people from royal family should not eat it at all. According to Thongpukdee *et al*. (2014), most of the traditional knowledge on utilization of plants were inherited and transferred from generation to generation. However, the pattern of transferring such knowledge is unlimited to the indigenous plant resources available in the respective communities (Mesfin *et al*., 2009)

Preliminary studies earlier carried out by Arowosegbe (2013) on the cultivation of leafy vegetables in Ekiti State revealed that most of these vegetables could be cultivated successfully, thereby ensuring their sustainability. Apart from this, their cultivation could enhance rural empowerment in the developing countries, boost commerce around the world

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and probably contribute to the health (Anita, 2004) and nutritional wellbeing of millions of people.

CONCLUSION AND RECOMMENDATION

This study has revealed that Ekiti State, Nigeria is blessed with a wide variety of leafy vegetables that could be of nutritional and medicinal benefits. However, there is a need for both the governmental and non-governmental agencies to sensitize the people more, on the need to cultivate and consume leafy vegetables more regularly, to be able to maximize the great benefits derivable from these vegetables.

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