



Pelagia Research Library

European Journal of Experimental Biology, 2012, 2 (4):1289-1301



Survey of indigenous vegetables species in parts of Ogoja and Cala Bar, Cross River State, Nigeria

¹Omara-Achong, T. E., ²*Edwin-Wosu, N. L., ³Edu, E. A. and ³A. E. Nkang

¹Raw Materials Research and Development Council, Federal Ministry of Science and Technology, Cross River State Office, Calabar, Nigeria

²Department of Plant Science and Biotechnology, University of Port Harcourt, P.M.B. 5323, Choba, Nigeria

³Department of Botany, University of Calabar Nigeria

ABSTRACT

An ethno-botanical survey of indigenous vegetable species was carried out in Calabar and Ogoja Local Government Areas of Cross River State. The study was aimed ascertaining their agronomic status, price trends, seasonal availability, culinary changes, medicinal values and consumption preference patterns. A total of 30 indigenous vegetable species serve as functional foods and play key roles in traditional medical practice. Some of these species now have limited geographical distribution due to habitat loss, degradation and fragmentation. Furthermore, they exhibit seasonal variability and varying consumption preferences. Telfairia occidentalis and Citrullus vulgaris demonstrated the most wide spread distribution trend and cultivation, with high consumption preference indices (27.55% and 30.44% respectively). Increasing and population pressure has led to deterioration of natural resources and consequent depletion of biodiversity in this ecozone. The situation is further aggravated by poor scientific knowledge about biology, ecology and population dynamics of these species. Consequently, there is need to promote both in-situ and ex-situ management of indigenous vegetable resources in order to maximize their potential utilitarian values.

Key words: Leafy vegetables, ethno-botany, Ogoja, Calabar Urban and vegetable seeds.

INTRODUCTION

Man's survival has been dependent on his innate curiosity to examine by trial and error all aspect of his environment. Every society tries to make meaning out of the nature surrounding it. This means that members of the society responds to their environment in their interpretation of various aspects of life (involving birth, ill health, mortality and other threats) to their basic survival and social existence [1].

The word "Ethno" means the way people see the world and with its' application to such discipline as botany it entails exploring the ordinary man's perception of cultural, natural or scientific knowledge [2]. Also seem to reflect the human evaluation, manipulation and cultural position of primitive aboriginal people and tribes who use plant for food, shelter or clothing [3, 4]. It is an important aspect of plant science particularly due to the global drive towards the documentation of customary use and knowledge of plants [5].

With the ethno-botanical dynamics of conceptualizing why, and how people use plant species in their local environment, it might also act as a door into cultural realities, to understanding the future of human relationship with the local environment and also play a role in contemporary approaches to traditional plant knowledge. Consequently, enhances plant species documentary, naming and utility values upon which the significant of a given plant environment on the lives, customs, religion, thought and every practical affairs of a given society can be reflected.

To this premise, the dynamics of some indigenous vegetables based on the degree of cultivation, seasonal availability, market price, culinary changes medicinal value consumption preference pattern were evaluated in parts of Cross River State.

The diet of most Nigerians and other Africans is dominated by starch rich staple foods (i.e. rice, cassava, yam, and plantain), which in the absence of cooked vegetables is considered incomplete. The consumption of indigenous vegetables thus serves as cheap and important source of protein, minerals, vitamins and amino acid [6]. In the rainy season, vegetables are abundant in the wild and home gardens and therefore relatively cheap. In the dry season there is general scarcity as demand cannot be met leading to higher prices [7]. A few of these vegetables are domesticated and marketed, thus serving as a source of household income. A large number have limited distribution and usage is further restricted to particular ethnic groups. However, a few of these vegetables have gained national acceptance. Some of these indigenous vegetables, though highly nutritious, are neglected or no longer consumed by the younger generation, many preferring exotic vegetables (i.e. tomatoes, cabbage, lettuce etc). Consequently, the food base has been narrowed and leaving communities more vulnerable to food shortages and nutrient – deficiency diseases [7]. This present study is aimed at bridging this information gap with the objectives of tracking and documenting the ethno-botanical uses of the various species of indigenous vegetables found in parts of Ogoja and Calabar Urban in Cross River State. Besides the need to develop accurate data, more efforts are needed toward the cultivation, improvement and conservation of the various germplasm.

MATERIALS AND METHODS

i) *Geomorphological description of the study areas*

Cross River State is one of the natural resource endowed States in Nigeria with its' situate lying between latitudes 5° 32¹ and 4° 27¹ north of the equator. The State falls within the mangrove swamp forest at coastline, the rain forest in the South and the sub-savanna grass-land in the extreme north of the State with a continuous but gradual recession of the rain forest in favour of grass land as one traverses the length of the State (FIG. 1). The State covers a total land area of 21,560km sq. of which 35% (7610kmsq) is covered by tropical high forest, while 5% is swamp and mangrove forest together. These account 2/3 of the remaining rain forest in Nigeria. It holds about a third of Nigeria's forest resources which cover about 25% of its total land areas [8]. The area is associated with diverse ecological, climate and geologic landforms associated with maximum rainfall and temperature. It is a State of 18 local government areas (LGA) among other States in Nigeria. Such LGA include: Abi, Akamkpa, Akpabuyo, Biase, Boki, **Calabar municipality and **Calabar South. Others are Ikom, Obanliku, Obura, Obudu, Odukpani, **Ogoja, Yakur, Yala, Bekwara, Etung and Bakassi.

The project sites-Calabar South and Calabar municipality with their situate lying between latitude 4° 27¹ N and 6° 53¹ N adjoins the Bight of Bonny in the Atlantic Ocean and borders the Republic of Cameroon to the East with network of creeks and rivers and falls within the low land rainforest vegetation zones with an annual precipitation approximately 314.24mm.

The Ogoja LGA with its situate lying between Lat. 6° 20¹N and 6° 40¹N and Long. 8° 30¹E and 9° 0¹E is a largely an agrarian area about 300km north of Calabar, falls within the derived savanna vegetation zone with an average annual precipitation approximately 165.77mm. Cross River is a State endowed with both human potential and natural forest resources including vegetables. Green vegetables are plant bioresources that constitute an indispensable part of the human diet in Africa generally and West Africa in particular [9].

ii) *Species Ethno-botanical survey*

Field and market surveys were carried out to generate information on availability and urban consumption patterns of indigenous leafy and seed vegetables in Calabar Municipality, Calabar South LGAs and Ogoja LGA of Cross River State, Nigeria.

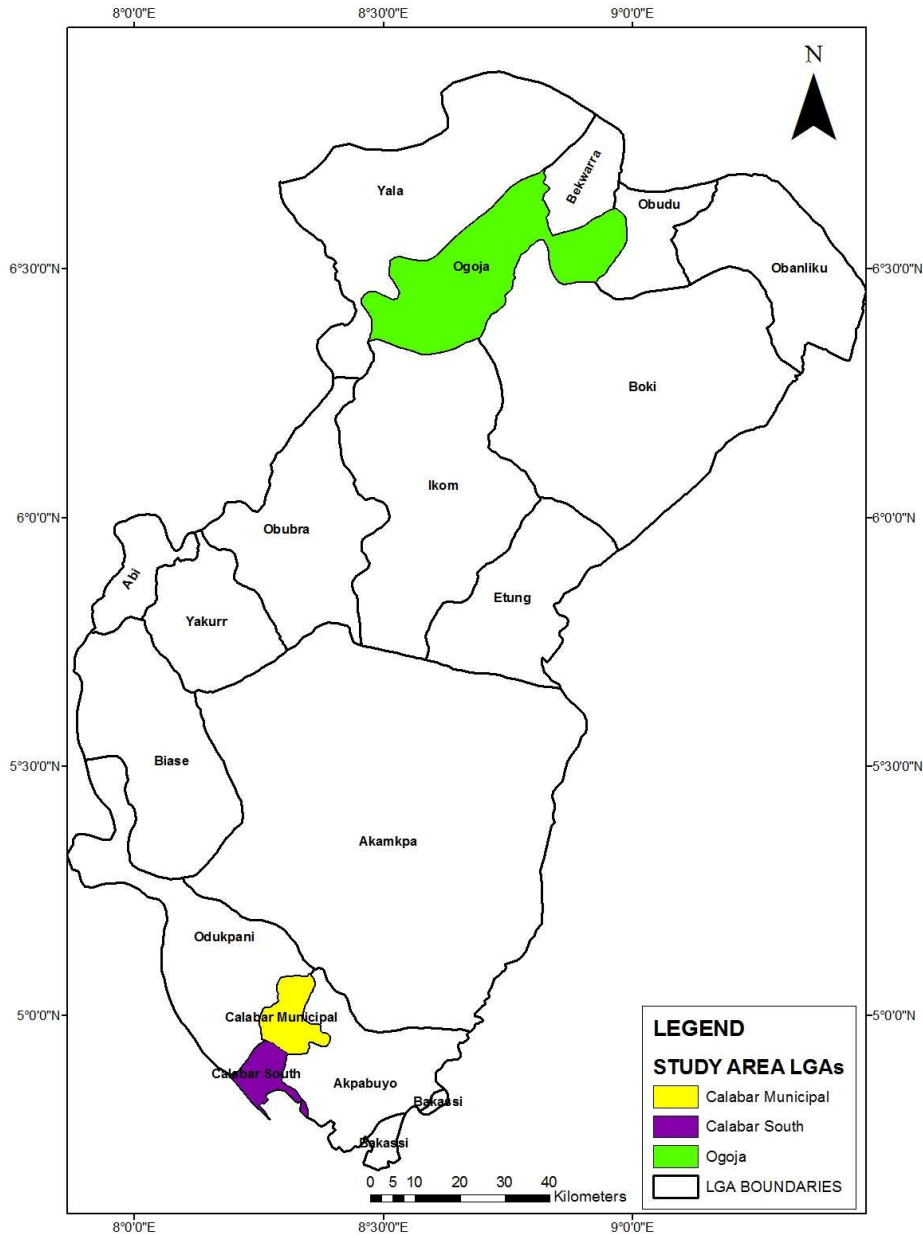


Fig. 1: Map of cross river state showing study area

Market survey

Two major markets frequently used by most residents were selected in each of the two Urban LGAs in the Calabar study area viz:

- i. Ikot Omin market, 8 miles with its situate lying between Lat. $05^{\circ} 03.473^1N$ and $05^{\circ} 4^1N$ and Long. $008^{\circ} 21.253^1E$ and $008^{\circ} 22^1E$ (FIG. 2) is located in Calabar Municipality.
- ii. Ika-Ika Qqua market with its situate lying between Lat. $04^{\circ} 58.538^1N$ and $05^{\circ} 0^1N$ and Long. $008^{\circ} 20.324^1E$ and $008^{\circ} 22^1E$ (FIG. 2) is located in Calabar Municipality.
- iii. Watt market with its situate lying between Lat. $04^{\circ} 57.413^1N$ and $04^{\circ} 57.537^1N$ and Long. $008^{\circ} 19.351^1E$ and $008^{\circ} 19.267^1E$ (FIG. 3) is located in Calabar South Local Government Area.
- iv. Mbukpa market with its situate lying between Lat. $04^{\circ} 56.288^1N$ and Long. $008^{\circ} 19.006^1E$ (FIG. 3) is located in Calabar South Local Government Area.

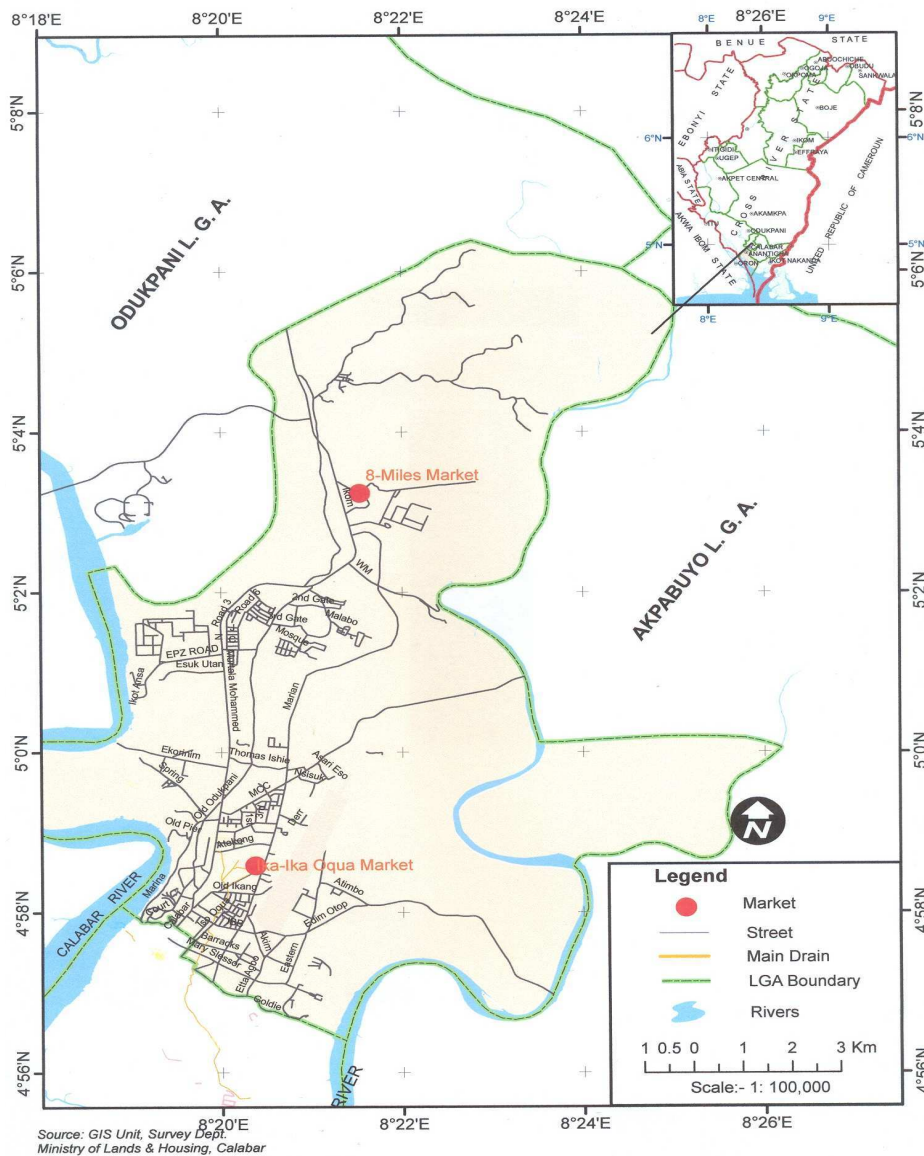


Fig. 2: Map of calabar municipality showing sampled market location

Field survey

This was carried out in and around home gardens and nearby forested areas lying between Lat. 06° 34.927¹N and 06° 34.444¹N and Long. 008° 56.425¹E and 008° 56.565¹E in Oboso-Mbube communities in Ogoja LGA (FIG.4). Community based ethno-botanical rural appraisal through the traders, buyers / consumers, community key informant and farmers were carried out by oral interview and questionnaire administration.

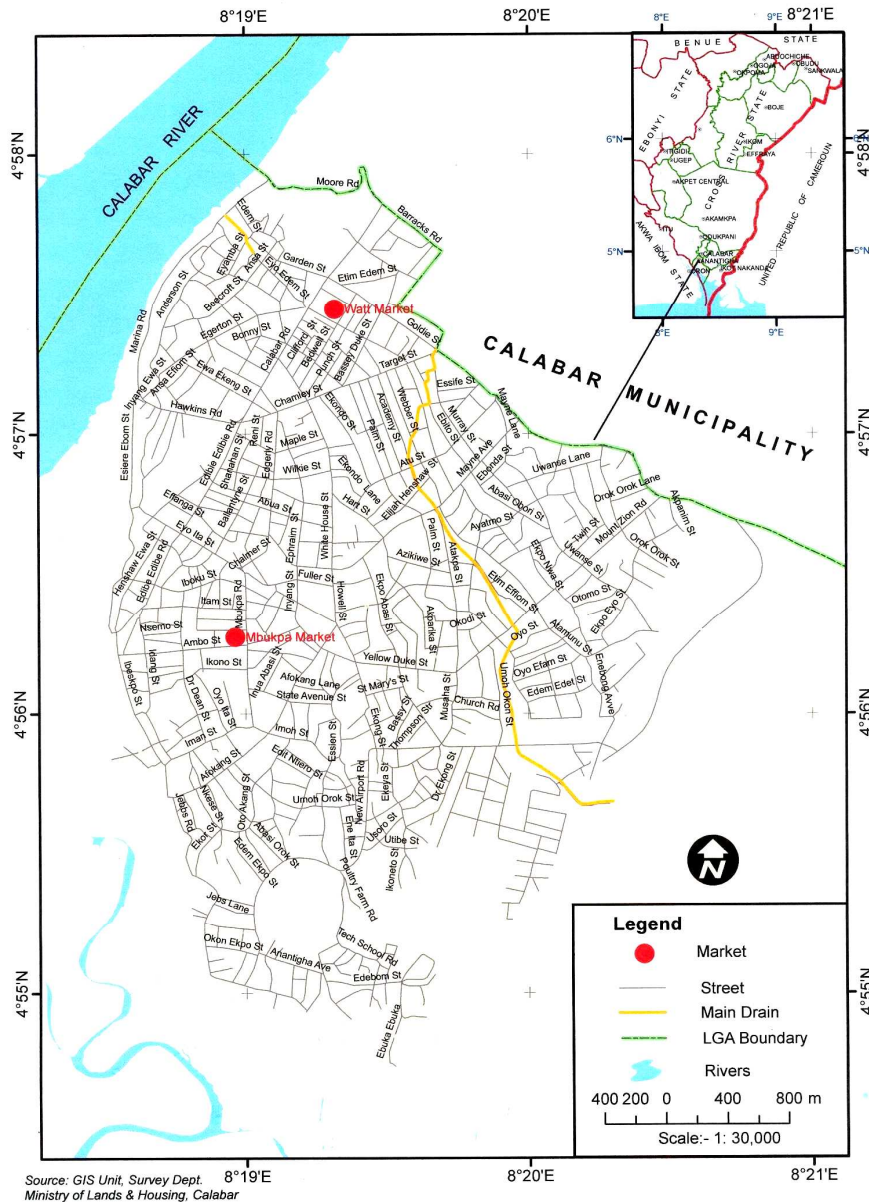


Fig. 3: Map of calabar south local government area showing sampled market location.

Consumption index.

On a ranking of 1st, 2nd, or 3rdly preferred of the seven commonest vegetable in the market in Calabar, a Consumption Preference Index (CPI) was drawn as follows:

1st consumption preference for a vegetable (Veg. A1) is given thus,

$$\text{Veg. A1} = \text{No of persons with Veg. as 1}^{\text{st}} \text{ most preferred} / \text{Total no questionnaires assessed} \times 100$$

2nd consumption preference for a vegetable (Veg. A2) is given thus,

$$\text{Veg. A2} = \text{No of persons with Veg. as 2}^{\text{nd}} \text{ most preferred} / \text{Total no questionnaires assessed} \times 100$$

3rd consumption preference for a vegetable (Veg. A3) is given thus,
 Veg. A3 = No of persons with Veg. as 3rd most preferred / Total no questionnaires assessed x 100
 Total (300%) = Veg. A1+ Veg. A2+ Veg. A3
 Total consumption (% Average) = Total (300%) / 3 which is being designated as CONSUMPTION INDEX.

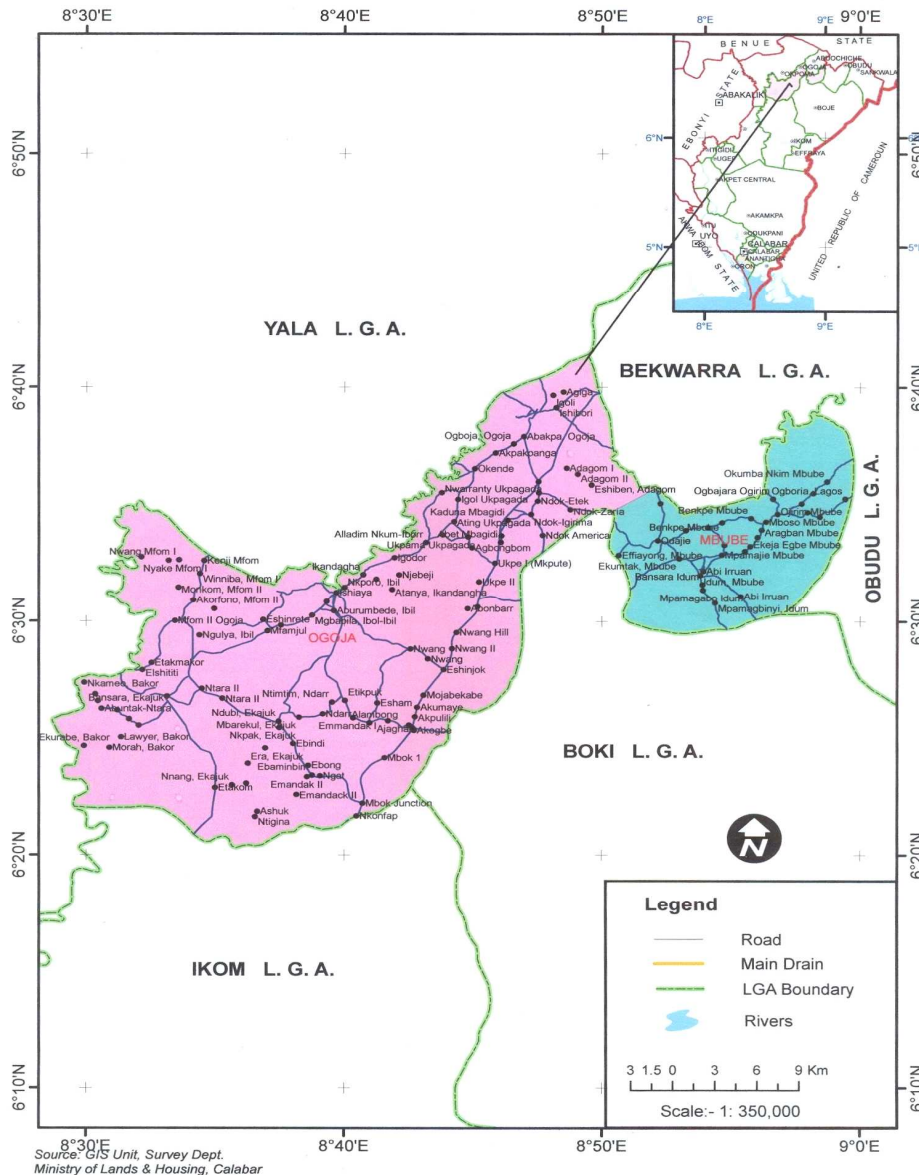


Fig. 4: Map of ogoja local government area

RESULTS

Market Survey

The two local government areas making up Calabar Urban (Calabar municipality and Calabar South) have a concentration of diverse ethnic group from within and outside the State. The survey has recorded many vegetable gardens found within and around the Calabar area. The characteristics of the four major market selected are shown

in Table 1. The survey also revealed the availability of a wide range of indigenous leafy vegetable (approximately 30 species) and a total of eight vegetable seeds of economic importance (Tables- 2 and 3). Some of these vegetables and seeds respectively are currently domesticated around home gardens and hamlet farms and also harvested from the wild in forested areas (Tables 4 and 5)

Among these indigenous crops, *T. occidentalis* and *C. vulgaris* were selected for further study, as the leaves and seeds were available in abundance and these species are most favoured for cultivation. *Telfairia occidentalis* was cultivated mainly for its leaves while *C. vulgaris* was cultivated for its seeds.

Table- 1: Characteristics of Markets Employed In the Calabar Study Area

S/No	Name of Markets	Type of Markets	Urban/Peri-Urban	Status
1.	Watt	Daily	Urban	Highly populated market with a wide variety of items, most centrally located, accessible to most people.
2.	Ika-Ika Oqua	Daily	Urban	Preferred by many because of the general neatness and good layout of stores.
3.	Ikot-Omin	Daily	Peri-urban	Though daily operated, its peak days are Tuesdays, Thursdays, and Saturdays.
4.	Mbukpa	Daily	Peri-urban	Small market visited by residents around the area.

Table- 2: Holistic List of Representative Indigenous Vegetablesurveyed In the Study Area

S/No	Species	Family	Common Name
1.	<i>Telfairia occidentalis</i> Hook. f.	Cucurbitaceae	Fluted pumpkin
2.	<i>Talinum triangulare</i> (Jacq.) Wild	Portulacaceae	Water leave
3.	<i>Vernonia amygdalina</i> Del.	Asteraceae	Bitter leave
4.	<i>Heinsia crinita</i> (Afzel.) G. Tayl.	Rubiaceae	Bush apple
5.	<i>Lasianthera africana</i> P. Beauv.	Icacinaceae	NA
6.	<i>Gnetum africanum</i> Welw.	Gnetaceae	Okazi
7.	<i>Gnetum buchholzianum</i> Engl.	Gnetaceae	NA
8.	<i>Amaranthus hybridus</i> Linn.	Amaranthaceae	African spinach
9.	<i>Celosia argentea</i> Linn.	Amaranthaceae	Quail tail
10.	<i>Occimum gratissimum</i> Linn.	Lamiaceae	Fever plant
11.	<i>Occimum basilicum</i> Linn.	Lamiaceae	Sweet basil
12.	<i>Piper guineense</i> Schum and Thonn.	Piperaceae	West African black pepper
13.	<i>Gongronema latifolium</i> Benth.	Asclepiadaceae	NA
14.	<i>Corchorus olitorius</i> Linn.	Tiliaceae	Bush okra, vegetable juts
15.	<i>Pennisetum purpureum</i> Schumach.	Poaceae	Elephant grass
16.	<i>Pterocarpus mildbreadii</i> Harms.	Fabaceae-papilio	NA
17.	<i>Cucurbita moschata</i> (Duch.) Duch	Cucurbitaceae	Winter squash, musk melon
18.	<i>Solanum macrocarpon</i> Linn.	Solanaceae	African egg-plant
19.	<i>Bombax buonopozense</i> P. Beauv.	Bombacaceae	Red-flowered silk-cotton tree
20.	<i>Pterocarpus santalinooides</i> L' Her. ex. Dc.	Fabaceae-papilio	NA
21.	<i>Erythrina senegalensis</i> DC	Fabaceae-papilio	Coral tree
22.	<i>Ficus glumosa</i> Del.	Moraceae	Fig tree
23.	<i>Ficus</i> sp.	Moraceae	Fig tree
24.	<i>Amaranthus viridis</i> Linn.	Amaranthaceae	Green amaranth
25.	<i>Albizia zygia</i> (DC.) J.F Macbride	Fabaceae-mimo	West African albizia
26.	<i>Zheneria cordifolia</i>	Cucurbitaceae	NA
27.	<i>Vitex donania</i> Sweet.	Verbenaceae	Black plum
28.	<i>Uapaca heudeloti</i> Baill	Euphorbiaceae	NA
29.	<i>Solanum nigrum</i> Linn.	Solanaceae	Black night shade
30.	<i>Solanum gito</i> Raddi (syn. <i>S. aethiopicum</i> Linn.)	Solanaceae	NA

NA – Not available.

Table -3: List of Seeds of Economic Importance

SPECIES	FAMILY	COMMON NAME
1. <i>Citrullus vulgaris</i> Linn.	Cucurbitaceae	Melon
2. <i>Arachis hypogaea</i> Linn.	Fabaceae- Papilio.	Groundnut
3. <i>Mucuna sloanei</i> Fawett & Rendle.	Fabaceae- Papilio.	Horse eye bean
4. <i>Brachystegia eurycoma</i> Harms	Fabaceae- Caesal.	NA
5. <i>Elaeis guineensis</i> Jacq.	Arecaceae	Oil palm tree
6. <i>Telfairia occidentalis</i> Hook.f	Cucurbitaceae	Fluted pumpkin
7. <i>Irvingia gabonensis</i> (Aubry-Lecomte) Baill.	Ixonanthaceae	Bush mango
8. <i>Sesamum indicum</i> Linn.	Pedaliaceae	Beniseed

NA- not available.

Table- 4: Indigenous Vegetables of Significant Economic Importance in Calabar Markets

Botanical Name	Family	Vernacular Name (Efik)	Vernacular Name (Mbube East)	Agronomic Status
1. <i>Telfairia occidentalis</i> Hook.f.	Cucurbitaceae	Ikong-ubong	Irimagba Okara	C
2. <i>Talinum triangulare</i> (Jacq.). Wild	Portulacaceae	Mmon-mmon-ikong	Eshian mgbakobo	C / W
3. <i>Vernonia amygdalina</i> Del.	Asteraceae	Etidot	Mbun	C / W
4. <i>Heinsia crinata</i> (Afzel.) G. Tayl.	Rubiaceae	Atama	Ofefe	C / W
5. <i>Lasianthera africana</i> P.Beauv.	Icacinaceae	Editan	Erishian	C / W
6. <i>Gnetum africana</i> Welw.	Gnetaceae	Afang	Mfun	W
7. <i>Gnetum buchholzianum</i> Engl.	Gnetaceae	Afang	Mfun	W
8. <i>Amaranthus hybridus</i> Linn.	Amaranthaceae	Inyang afia	Alefu	C
9. <i>Celosia argentea</i> Linn.	Amaranthaceae	Efa-ekiko	Idordor	C / semi-wild
10. <i>Occimum gratissimum</i> Linn.	Lamiaceae	Ntong	Oshunkor	C / W
11. <i>Occimum basilicum</i> Linn.	Lamiaceae	Iko	Anwanashu	C / W
12. <i>Piper guineense</i> Schum & Thonn.	Piperaceae	Etinken	Eshiesebe	W
13. <i>Gongronema latifolium</i> Benth.	Asclepiadaceae	Utasi	Otasi	W
14. <i>Corchorus olitorius</i> Linn.	Tiliaceae	Etinyung	Krinkrin / (Ikumode)	C / semi-wild

C – Cultivated. W - Wild

Table 5: Seeds of importance in food and nutrition sold in Calabar market

S/N	Species name	Family	Vernacular name		Status
			Efik	Mbube-East	
1.	<i>Citrullus vulgaris</i> Linn.	Cucurbitaceae	Ikon	Esan	Cultivated
2.	<i>Arachis hypogaea</i> Linn.	Fabaceae - Papilio.	Mbansang	Sankele	Cultivated
3.	<i>Mucuna sloanei</i> Faweett & Rendle	Fabaceae - Papilio.	Ibaba / Ukop	Nkpalobije	Cultivated/wild
4.	<i>Brachystegia eurycoma</i> Harms.	Fabaceae – Caesal.	Ukung /Achi	Isang-uitere	wild
5.	<i>Elaeis guineensis</i> Jacq.	Aracaceae	Isip eyop	Ekop	Cultivated / wild
6.	<i>Telfairia occidentalis</i> Hook. F.	Cucurbitaceae	Mkpasip-ubong	Irimagba-okara	Cultivated
7	<i>Irvingia gabonensis</i> (Aubry- Lecomte) Baill.	<i>Ixonanthaceae</i>	Mbukpabuyo	Ojiep	Wild / rarely cultivated
8.	<i>Sesamum indicum</i> Linn.	<i>Pedaliaceae</i>	Udot / udot- iyeiye	Isoo	Cultivated

Table- 6: Seasonal Available of Selected Indigenous Species in Calabar Markets

S/N	Species	Seasonal Available (High / Medium/Low)	
		WET	DRY
1.	<i>Telfairia occidentalis</i> Hook. f.	High	Medium
2.	<i>Gnetum</i> spp	High / medium	Medium
3.	<i>Talinum triangulare</i> (Jacq.). Wild	High / low	Medium
4.	<i>Heinsia crinata</i> (Afzel.) G. Tayl.	High / medium	Medium
5.	<i>Lasianthera africana</i> P.Beauv	High / medium	Medium
6.	<i>Vernonia amygdalina</i> Del.	High	Medium / low
7.	<i>Amaranthus hybridus</i> Linn.	High / low	High / medium
8.	<i>Corchorus olitorius</i> Linn.	High / low	Medium
9.	<i>Piper guineense</i> Schum & Thonn.	High	High / medium
10	<i>Citrullus vulgaris</i> Linn.	Medium	High
11	<i>Sesamum indicum</i> Linn.	Low	High
12	<i>Mucuna sloanei</i> Faweett & Rendle	Medium	High
13.	<i>Irvingia gabonensis</i> (Aubry- Lecomte) Baill	High / medium	Medium / low

Wet Season (April-October): Abundant rains, high humidity

Dry Season (November-March): Dry, low humidity.

Variations in fruit colour and size, leaf size and thickness etc were observed in most of the species; possibly resulting from the varying sources of seed collection for cultivation. Among the cultivated and wild harvested species, *Gnetum africanum* and *Gnetum buchholzianum* are brought in from neighbouring local government areas (Akamkpa, Odukupani, Biase and Boki LGAs of Cross River State) and also from the neighboring Republic of Cameroon. These Vegetables and seeds show seasonal variations in availability (Table 6). The trend in pricing revealed that most indigenous crops were cheap and affordable by all categories of resident in the State. (Tables 7 and 8)

Table- 7: Average Retail Prices (Naira) of Available Indigenous Leafy Vegetable in Four Markets in Calabar Area [₦152=1USD]

s/no	Traditional Leafy Vegetables			Markets			
	Species	Local names (Efik)	Unit of sale (retail)	Calabar Municipality Ikot Omin (₦)	Ika-Ika Oqua (₦)	Calabar South Watt market (₦)	Mbukpa market (₦)
1.	<i>Telfairia occidentalis</i>	Ikong ubong	Small bundle	20.00	20.00	20.00	20.00
			Large bundle	50.00	80.00	80.00	70.00
2.	<i>Talinum Triangulare</i>	Mmon-mmon ikong	Small bundle	5.00	5.00	5.00	5.00
3.	<i>Vernonia amygdalina</i>	Etidot ikong	Small bundle	20.00	20.00	30.00	20.00
			(processed)	10.00	10.00	10.00	10.00
4.	<i>Heinsia crinata</i>	Atama ikong	Small	20.00	20.00	20.00	20.00
			Bundles	10.00	20.00	20.00	20.00
5.	<i>Lasianthera Africana</i>	Editan ikong	Sliced	10.00	20.00	20.00	20.00
			Vegetables	20.00	20.00	20.00	20.00
6.	<i>Gnetum africanum</i>	Afang	Small	80.00	70.00	70.00	70.00
7.	<i>Gnetum buchholzianum</i>	Afang	Bundles	300.00	250.00	250.00	300.00
			Sliced vegetables	50.00	50.00	50.00	50.00
8.	<i>Amaranthus hybridus</i>	Inyang afia	Small bundles	20.00	20.00	30.00	20.00
9.	<i>Occimum basilicum</i>	Iko	Large bundles	10.00	10.00	10.00	10.00
10.	<i>Occimum gratissimum</i>	Ntong	Sliced vegetables	20.00	20.00	20.00	20.00
11.	<i>Piper guineense</i>	Etinkeni	Small bundles	20.00	20.00	20.00	20.00
12.	<i>Gongronema latifolium</i>	Utasi	Small bundles	20.00	20.00	20.00	20.00
13.	<i>Corchorus olitorius</i>	Etinyung	Small bundles	20.00	20.00	20.00	20.00
14.	<i>Pennisetum purpureum</i>	Nsana	Small bundles	20.00	--	--	--
15.	<i>Pterocarpus mildbreadii</i>	Mkpa (Nkpafere)	Small bundles	20.00	20.00	20.00	20.00
16.	<i>Curcubita moschata</i>	Ndise	Small bundles	20.00	20.00	20.00	--
17.	<i>Solanum macrocarpum</i>	Ayanha (Angara)	Small bundles	20.00	20.00	--	--

Table- 8: Average Retail Prices (Naira) of Available Indigenous Seeds in Four Markets in Calabar Area [₦150 = 1USD]

S/N	Traditional seeds		Unit of sale (retail)	MARKETS			
	Species	Local name (Efik)		Calabar Municipality		Calabar South	
				Ikot Omin (₦)	Ika-Ika Oqua (₦)	Watt (₦)	Mbukpa (₦)
1.	<i>Citrullus vulgaris</i>	Ikon	Cup (unshelled)	70	80	80	80
2.	<i>Citrullus vulgaris</i>	Ikon	Cup shelled	90	100	100	110
3.	<i>Arachis hypogaea</i>	Mbansang	Cups(fresh)	30	30	30	30
			(roasted)	25	40	40	40
4.	<i>Elaeis guineensis</i>	Isip eyop	Small heaps	10(for about 20 seeds)	10(for about 15 seeds)	10	10
5.	<i>Brachystegia eurycoma</i>	Ukung	„ „	20	20	20	20
6.	<i>Mucuna sloanei</i>	Ibaba	„ „	20 (6 seeds)	20 (4 seeds)	20(4 seeds)	20 (4 seeds)
7.	<i>Telfairia occidentalis</i>	Mkpasip Ubong	„ „	20	20	20	20
			„ „			20	20
8.	<i>Irvingia gabonensis</i>	Mbukpabuyo	„ „	20 (8 seeds)	20 (5-6 seeds)	(5-6 seeds)	(5-6 seeds)
9.	<i>Sesamum indicum</i>	Udot	„ „	60	—	—	—

The study period (February-March) falls within the late dry season. This corresponds to the post-harvest period for most of these species.

Table - 9: Other Leafy Vegetables Used In Oboso-Mbube, Ogoja LGA

S/N	Family	Botanical name	Vernacular name (Mbube East)	Uses
1.	Bombacaceae	<i>Bombax buonopoze nse</i>	Onwukem	Leaves for soup
2.	Fabaceae – Papilio.	<i>Pterocarpus santalinoides</i>	Oturukpa	Leaves for soup
3.	Fabaceae - Papilio.	<i>Erythrina senegalensis</i>	Onugobi	Leaves used in soup / Medicinal
4.	Moraceae	<i>Ficus glumosa</i>	Udung	Leaves for soup
5.	Moraceae	<i>Ficus sp.</i>	Isize	“
6.	Amaranthaceae	<i>Celosia argentea</i>	Idordor	“
7.	Amaranthaceae	<i>Amaranthus viridis</i>	Alefu	“
8.	Cucurbitaceae	<i>Zheneria cordifolia</i>	Irimagba	“
9.	Cucurbitaceae	<i>Cucurbita moschata</i>	Ufe	“
10.	Fabaceae – Mimo.	<i>Albizia zygia</i>	Akpine	“
11.	Verbenaceae	<i>Vitex doniana</i>	Ufuru	Leaves for soup & medicinal purpose
12.	Euphorbiaceae	<i>Uapaca heudeloti</i>	Opipe	Leaves for soup & medicinal purpose
13.	Solanaceae	<i>Solanum nigrum</i>	Ufop	Leaves for soup
14.	Solanaceae	<i>Solanum gilo</i>	Ichi / utu	Soup & medicinal purpose.

Table -10: Vegetable of Medicinal Value in Oboso-Mbube (Ogoja LGA)

S/N	Species	Family	Vernacular name (Oboso-Mbube)	Medicinal use / parts used
1.	<i>Stachytapheta indica</i>	Verbenaceae	Otuikum	Leaf extracts used for treating fever
2.	<i>Vitex doniana</i>	Verbenaceae	Ufuru	For treatment of fever / anaemia
3.	<i>Scoparia dulcis</i>	Scrophularaceae	Anyin-dede	Leaf extracts for cough treatment
4.	<i>Senna hirsuta</i>	Fabaceae - Caesal.	Oziza-okani	Leaf extracts used as eye / ear drops
5.	<i>Aspilla Africana</i>	Asteraceae	Ifakop	Leaf extract for wounds
6.	<i>Vernonia amygdalina</i>	Asteraceae	Mbum	Anaemic patients, diabetic & dysentery
7.	<i>Erythrina senegalensis</i>	Fabaceae- Papilio.	Onugobi	For treatment of stomach pains
8.	<i>Trema guineensis</i>	Ulmaceae	Osusungbon	Treatment for measles
9.	<i>Paulinia pinnata</i>	Sapindaceae	Ochireritem	Treatment of chest / heart conditions
10.	<i>Sarcocephalus latifolius</i> (<i>Nuclea latifolia</i>)	Rubiaceae	Italebe	Bark & leaves for treatment of pile
11.	<i>Kallachum pinnatum</i>	Crassulaceae	Itoli	Leaf extract used to treat cough in children and healing of navels / umbilical cord in new born
12.	<i>Alstonia bonnie</i>	Apocynaceae	Aku	Stomach problem
13.	<i>Costus afer</i>	Costaceae	Igun / Osirakata	The shoot is chewed in the treatment of snake bite to cause urination of poison
14.	<i>Cola milleni</i>	Sterculiaceae	Rieborke	Pains and hearts diseases
15.	<i>Cymbopogum citrates</i>	Poaceae	Igenokara	Leaves used for treatment of dysentery, treatment of fever
16.	<i>Piper guineense</i>	Piperaceae	Eshiesebe	Leaves used for treatment of dysentery, treatment of fever
17.	<i>Occimum gratissimum</i>	Lamiaceae	Oshunkor	Stomach pains / cough and catarrh
18.	<i>Triclisia subcordata</i>	Menispermaceae	Ofum	Leaves used for treatment of fever

FIELD SURVEY

The field survey has shown that homestead farming (vegetable gardening) for the purpose of income is rare in the Ogoja area. Vegetable farming is not considered lucrative as most farmers are into cultivation of major staples (cassava, yam, and rice). However, a number of important vegetables, which were not found in the survey markets in the Calabar area, were found in the Ogoja area (Table 9). These indigenous crops are mainly collected from the wild, and are usually available to the local people at no cost but contribute significantly to the nutritional well being of the rural people. Some of these indigenous plant species also play important roles in ethno- medical practice in the area (Table 10).

With the exception of *T. occidentalis* and *C. vulgaris*, most of the indigenous leafy vegetables/seeds available in markets in Calabar urban were largely uncultivated in Oboso communities (Ogoja LGA). Respondent during the study indicated their consumption preference for indigenous vegetables available in the local markets in Calabar. The results showed that *T. occidentalis* is the most preferred indigenous leafy vegetable, with a percentage consumption index of 27.55% (Table 11a) while *C. vulgaris* is the most preferred indigenous seed purchased for consumption, with an index of 30.44% (Table 11b).

Table- 11a: Consumption Preferences for Leafy Vegetables in Calabar

S/N	Leafy vegetable	Consumption preference			Total (300%)	Total average consumption (%)
		1 st	2 nd	3 rd		
1.	<i>Telfairia occidentalis</i>	42.86	37.50	2.30	82.66	27.55
2.	<i>Gnetum</i> spp.	29.00	25.00	23.00	77.00	25.67
3.	<i>Piper guineense</i>	13.28	21.00	0.00	34.28	11.43
4.	<i>Talinum triangulare</i>	0.00	12.50	21.50	34.00	11.33
5.	<i>Vernonia amygdalina</i>	14.29	1.11	18.00	33.40	11.33
6.	<i>Heinsia crinata</i>	0.00	0.55	18.30	18.85	6.28
7.	<i>Lasianthera africana</i>	0.00	2.11	16.20	18.31	6.10

Table -11b: Consumption Preferences for Seed Plants Soup by Residents in Calabar

S/N	Leafy vegetable	Consumption preference			Total (300 %)	Total average consumption (%)
		1 st	2 nd	3 rd		
1.	<i>Citrullus vulgaris</i>	39.13	43.48	8.70	91.31	30.44
2.	<i>Arachis hypogaea</i>	4.35	13.04	21.74	39.13	13.04
3.	<i>Elaeis guineensis</i>	13.04	4.35	17.39	34.78	11.59
4.	<i>Brachystegia eurycoma</i>	0.00	4.35	17.39	21.74	7.25
5.	<i>Mucuna sloanei</i>	4.35	4.35	4.35	13.04	4.36
6.	<i>Telfairia occidentalis</i>	0.00	4.35	4.35	8.70	2.90
7.	<i>Irvingia gabonee nsis</i>	21.74	17.39	21.74	60.87	20.29
8.	<i>Sesamum indicum</i>	17.39	8.70	4.35	30.43	10.14

DISCUSSION

Traditional vegetables offer variety and have been noted to contribute to broadening the food base of African people [10]. The results of the field survey in Calabar and Ogoja indicated a wide range of leafy vegetables, which are available in the wild (Tables 4 - 9). Many of them fill the scarcity gap especially in the markets when exotic vegetables (e.g. lettuce, cabbage) become scarce and expensive [11, 12, 13]. In the communities surveyed in Ogoja, both *Gongronema latifolium* and *Piper guineense*, which have food and medicinal value, are no longer available in nearby bushes and may be considered as rare by reason of their limited distribution/availability. Bush burning for farming purposes is also threatening a good number of species, which are currently being collected from the wild.

These indigenous vegetables help the rural people avert malnutrition as they are valuable source of minerals, proteins and fats/oils. On the basis of proximate analysis of leaves of some indigenous vegetables (*Vernonia amygdalina*, *Gnetum africanum*, *Gongronema latifolium* and *Piper guineense*) report shows that they are good sources of minerals: iron (Fe), magnesium (Mg), sodium (Na) potassium (K) and calcium (Ca) [14]. In addition these vegetables do not require high inputs of fertilizers or pesticides and labour in their production.

It was also observed that some of the lesser known vegetable species, many of which occur in the wild are not sold in Calabar markets and are also becoming rare in the communities surveyed in Ogoja. A number of this species are being discriminated against by the younger generation due to an increasing taste for processed foreign foods. Since they are not frequently used in preparation of food, knowledge of their use as food is being eroded. Such species may be considered as 'threatened' [15] as a result of changes in life style, land use and bush burning. Some of these vegetables have medical value in the rural communities and if promoted could be cultivated to earn some income for the rural farmers.

Calabar being an urban center is populated by residents of diverse ethnic groups. Many residents might experience culinary changes, thus abandoning their preferred traditional foods and vegetables. This is because many of the traditional vegetables common in their local communities might not be readily available in the markets in Calabar. Therefore, residents are constrained to choices available in the markets. The market survey revealed that the most commonly purchased traditional vegetable and seed for soup preparation from the markets in Calabar were *Telfairia occidentalis*, and *Citrullus vulgaris* respectively. They were also noted as the most cultivated and were found in almost all the home gardens. *Telfairia occidentalis* and *Citrullus vulgaris* were the most commonly preferred indigenous vegetable and seed for consumption through out the entire State. The units of sale of the various traditional vegetable were similar. The prices were cheapest in markets where there is direct access of buyers to farmers (e.g. Ikot Omin market). The prices of these crops also increased as the day progressed (perhaps as a result of reselling by middle men).

The most expensive of the identified indigenous vegetables in the market was *Gnetum* species (Table 7) and appeared to be commonly purchased by higher income earning residents and those in the catering industry. The relative high cost of the *Gnetum* spp may be attributed to: - (a) its being collected mainly from the wild (b) its transportation over long distances (from Biase, Boki and the Cameroon) to the markets (c) processing by slicing before marketing (d) activities of middle men. It may be important to note here that *Gnetum*, which is becoming scarce in local markets, provides export opportunities for Cameroonians. Domestication efforts made so far are hardly successful due to seed germination problems [16] and forest conversion.

Most vegetable production is rain-fed, with dry season production being usually done along riverbanks. Hence the supply of vegetables to the markets is higher in the rainy season as cultivation is more widespread. However, many of the forest species e.g. *Gnetum* produce leaves throughout the year and are available in both dry and rainy seasons. Limitations on availability may result from inaccessibility of the forest during the rains, thus peak production of forest species is in the dry season [17].

In Oboso community (Ogoja LGA). Vegetable supply during the dry season is dependent on fresh green leaves of wild tree species (Table 9) when most other sources of green leafy vegetable species are limited. It may be important to note that *Talinum triangulare* is not cultivated in this area as it is considered a wild and weedy species. Many other wild and weedy species such as *Piper guineense* and *Gongronema latifolium* are difficult to come by in the area surveyed, mainly as a result of bush burning.

The result from the field survey in Ogoja LGA reveal that many of the edible vegetable growing in the wild and homestead gardens also medicinal importance to the people (Table 10). However, there is no sustainable management of biodiversity, which is being threatened especially by changing land use and customs.

CONCLUSION

The Cross River State forests represent an important site for endemism in West Africa. These forest escaped overexploitation due to the nature of the terrain and the lack of bridges across the Cross River until 1973. The Cross River National Park (CRNP) was created in 1991 to protect the last significant area of undisturbed lowland rainforest in Nigeria. Cross River State thus yields a large number of indigenous vegetables. These vegetables have limited circulation, being found mostly within ethnic boundaries. A number of these vegetables play important roles in traditional medical practice and local diets. Increased production of traditional vegetables offer a significant opportunity to improve income generation for both rural and urban households, and in addition, broaden the food base of urban dwellers. There is, therefore, a need to enhance further development/exploitation of indigenous vegetables so that their potential utilitarian benefits can be maximized.

Acknowledgement

We acknowledge with thanks the assistance of Mr. Frank Apejoye (Herbarium/Botanical Garden Unit, University of Calabar) in the identification of vegetable species and Dr. N.L. Edwin-Wosu, of the University of Port Harcourt for the proper taxonomic authentication of the species.

REFERENCES

- [1] Victor, A.A. and Haberta, I.A. *African Journal of Pharmacology and Drug Research*. **1991**. 10:131.
- [2] Martin, O.J. *Ethno-botany*. London, Chapman and Hall, 288 pp, **1995**.
- [3] Jain, S.K. Methods and approaches in ethno-botany. In: *Proceedings of the 2nd Training Course and Workshop in Ethno-botany* held at Lucknow, March **1989**.
- [4] Richard, E.J. *The Role of Plants in Society*. Ethno-garden botanicals. **2003**.
- [5] Cunningham, A.B. *The Role of Ethno-Botany and Customary Knowledge in the Conservation of Plant in Safeguarding the Genetic Basis of Africa's Traditional Crops*. CTA. Rome, The Netherlands / IPERI, pp 20-25, **1994**.
- [6] Okafor, J.C. *Acta Horticulturae*. **1983**, 123: 165-176.
- [7] Okafor, J.C. Survey on horticultural crops found in Enugu's urban and peri-urban markets. In: Guarino, L. (Ed). *African Indigenous Vegetables*. (pp 149 - 151). Limbe, Cameroon. IPGRI Workshop Forest Proceedings, January 13 - 18, **1997**.

-
- [8] RMRDC. Profile of Local Resource-Based Investment Opportunities in Cross River State. Raw Materials Research and Development Council in collaboration with the Cross River State Industrial Development committee. **1994**.
- [9] Oguntona, T. *Nutr. Qual. Plant Food*, **1988**, 2: 120 – 133.
- [10] Okigbo, B.N. *Acta Horticulturae*, **1977**, 53:131 -150.
- [11] Nicol.B.M. Food from the forest. In *Report of FAO Conference on the Establishment of Cooperative Agriculture Research Programmes between Countries with Similar Ecological Conditions in Africa*, (pp. 293). Rome, Food and Agricultural Organization. **1972**.
- [12] Okafor, J. C. The place of wild (uncultivated) fruits and vegetables in the Nigeria diet. In: Ojehomon, O.O., Town, P.A and McLean, K. (Eds.), *Proceedings of National Seminar on Fruits and Vegetables*, (pp. 153 – 171) Ibadan, National Horticultural Research Institute, **1975**.
- [13] Uzo, J.O. Yield and harvest periodicities of some indigenous perennial fruits, nuts and leafy vegetables in tropical West Africa. *Proceedings of International Symposium on Current Problems on Fruits and Vegetables (Tropical and Sub-tropical)* (pp 6-9), Los Banos, Laguna, Phillipines. April 8-14, **1980**,
- [14] Okafor, J.C., Okolo, H.C and Ejiofor, M.A.N. Strategies for enhancement of utilization potential of edible woody forest species of South-eastern Nigeria. In: Vander-Maesens, L.J.G. (Ed.). *The Biodiversity of African Plants*, (pp. 684 – 695). Dordrecht, Kluwer Academic, **1996**.
- [15] National Resources Conservation Council *National Resources Conservation Action Plan*, (Vols.1 and 2). Abuja: National Resources Conservation Council, **1992**.
- [16] Schippers, R. Priorities for research on Africa's indigenous vegetables. In: Guarino L. (Ed). *African Indigenous Vegetables*, (pp. 4-7). Limbe Cameroon, IPGRI Workshop Proceedings, January 13 – 18, **1997**.
- [17] Nde, P.S. Domestication of *Gnetum* spp. by vegetative propagation techniques. In Guarino, L. (Ed.), *African Indigenous Vegetables*, (pp.31–35). Limbe, Cameroon. IPGR Workshop Proceedings, January 13 – 18, **1997**,