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BIODIVERSITY AND SPECIES DISTRIBUTION OF INDIGENOUS UNDER-UTILIZED FRUIT AND VEGETABLE CROPS IN THE NORTH SENATORIAL DISTRICT OF NASARAWA STATE, NIGERIA

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ABSTRACT
Species distribution and diversity of indigenous fruit and vegetable crops were undertaken in three Local Government Areas of the North Senatorial Districts. Three locations were randomly chosen per LGA. Three random samplings were carried out in each location. A total of 27 localities were studied, each with a unique code and GPIS information. Qualitative and quantitative ecological approaches were adopted. Representative wild plant specimens were collected and identified. Herbarial specimens were also preserved. The Shannon-Wienner Diversity (H) computation was done for each LGA. The African butter pear and Black velvet Tamarind were rare in Akwanga LGA but Drum palm was frequently seen. Akwanga LGA had 7 species accounting for 64 species richness (Gudi=22, Alushi=17, Walko=25). H-diversity was 1.83 while species evenness was 0.938. In Wamba LGA, African Locust beans and Finger root were abundantly present. However, Desert date, Red bush willow, Baobab and Wild onion spring were rarely encountered. Wamba LGA had 9 species with species richness of 420 dominated by Wamba (263). H-diversity was 1.20. Hmax was 2.20 while species evenness was 0.54.The most abundant species in NasarawaEggon were Jute plants most especially at Mada station. NasarawaEggon LGA had 11 species where species richness was 609 cutting across Mada station (228), Kagbu (102) and Lambaga (279). H-diversity was 1.55; Hmax was 2.4 while species evenness was 0.65. The strength of biodiversity of indigenous fruit and vegetable crop was low in Wamba (H<1.5) but moderate in the two other LGAs (H>1.5). This could be attributed to various anthropogenic activities and pressure causing loss of biodiversity. Many plants such as African butter pear and Black velvet Tamarind, Desert date, Red bush willow, Baobab and Wild onion spring are rare. There is need for intensive domestication and conservation of these plants for sustainable utilization in the Northern Senatorial District of Nasarawa State Nigeria.
Key words: Biodiversity, Indigenous crops, Conservation, Sustainable utilization

INTRODUCTION
Indigenous or native crops have been defined as those crops that grow naturally in the wild and that are peculiar to a particular district or region in any part of the world (Adeboye*et al.*, 2003; Adewusi, 2012). Many authors have attested to the fact that tropical regions are richly endowed with diverse crops (Jimoh*et al.*, 2013). This is because of the favourable and stable environmental conditions optimally supporting plant growth. Nigeria as a tropical African country has been tagged "a blessed country" in terms of its diverse types of indigenous fruit and vegetable crops (Adeboye*et al.*, 2003; Jimoh*et al.*, 2013). Many of these crops are found in bushes, forests and uncultivated land growing naturally because they are rarely cultivated (Onyekwelu*et al.*, 2008). Within Nigeria, some tribes are known to possess localized or internally indigenous crops endemic to the regions. Many are unknown to other tribes and many of them have not been discovered. Presently, Nigeria is losing its native crops at a very fast rate (Ladipo, 2010). There is loss of biodiversity at a constant rate. The main factor responsible for this worrisome trend is largely anthropogenic (Aguoru*et al.*, 2015). Man has directly or indirectly eroded the genetic resources of the indigenous crops. Direct activities such as habitat destruction,

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habitat fragmentation, developmental activities, deforestation, poor agricultural practices, cultivation of exotic crops and unsustainable use of resources among others are huge threats to the native crops (Ladipo, 2010; Abere and Opara, 2012; Aguoru*et al.*, 2015). Indirect activities such as climate change, acid rainfall, flood, and overall consequence of pollution are also threatening (Aguoru*et al.*, 2015). If the native crops are not properly conserved and domesticated, many may disappear sooner or later. At present, some species can no longer be found in the wild (Abere and Opara, 2012). In spite of the threats to diversity of the native crops, many States and regions in Nigeria have been noted to be endowed with indigenous crops at present (Abere and Opara, 2012). There is lack of proper domestication, management, conservation and sustainable utilization of indigenous fruit and vegetable crops in Nigeria and other African countries. No proper attention has been given to these crops hence the situation today can be described as a gross abuse and mismanagement of endowed heritage. In the North Central part, Nasarawa State has received notable attention on biodiversity.This work aimed at studying the distribution and biodiversity of indigenous fruit and vegetable crops present in three LGAs of the North Senatorial District of Nasarawa State, Nigeria.

METHODOLOGY

Distribution and diversity of indigenous fruit and vegetable crops were undertaken in three Local Government Areas of the North Senatorial Senatorial Districts. Studies covered vegetations around major rural areas. Three locations were randomly chosen per LGA. Three random sampling were carried out in each location. A total of 27 locations were studied. Unique codes were assigned to each location in each LGA. Geographical Position Information System (GPIS) was recorded for all locations (Table 1).

Field Ecological Studies

Marked locations were re-visited for qualitatative and quantitative ecological studies. This took place when the field was fully green during rainy season. The random sampling technique was used in each plot of a location. The line transect, quadrat (small plants) and direct counting (shrubs/trees) methodswere used (Anders and Henrik, 2012).

Table 1: Study Locations in the North Senatorial District of Nasarawa State

Location code	Geographical Position Information System (GPIS)	Location name
GD1	N8°55' 0" E8°23' 0"	Gudi
GD2	N8°55' 12" E8°23' 25"	Gudi
GD3	N8°55' 38" E8°23' 26"	Gudi
AL1	N8°43' 15" E8°28' 21"	Alushi
AL2	N8°43' 0" E8°28' 0"	Alushi

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AL3	N8°43' 15" E8°28' 15"	Alushi
WA1	N8°46' 33" E8°13' 65"	Walko
WA2	N8°46' 46" E8°13' 20"	Walko
WA3	N8°46' 0" E8°13' 17"	Walko
WO1	N8°21' 57" E7°51' 57"	Wokio
WO2	N8°21' 51" E7°51' 65"	Wokio
WO3	N8°21' 43" E7°51' 50"	Wokio
WM1	N8°11' 16" E7°005' 16"	Wamba
WM2	N8°11' 03" E7°005' 0"	Wamba
WM3	N8°11' 31" E7°005' 28"	Wamba
SH1	N8°35' 41" E7°009' 41"	Shishinbaki
SH2	N8°35' 41" E7°009' 41"	Shishinbaki
SH3	N8°35' 0" E7°009' 0"	Shishinbaki
MA1	N8°43' 05" E8°32' 11"	Mada station
MA2	N8°43' 0" E8°32' 0"	Mada station
MA3	N8°43' 17" E8°32' 17"	Mada station
KA1	N8°41' 58" E8°35' 33"	Kagbu
KA2	N8°41' 29" E8°35' 65"	Kagbu
KA3	N8°41' 15" E8°35' 0"	Kagbu
LA1	N8°33' 0" E8°20' 0"	Lambaga
LA2	N8°33' 22" E8°20' 11"	Lambaga
LA3	N8°33' 28" E8°20' 30"	Lambaga

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Plant Collection

Representative wild plant specimens were collected as described in Judd *et al.* (1999) and Olasan (2013). This was carried out during the preliminary field trips based on the list collated dueing the interview. Collection was done using cutlass, pocket knife and go-to-hell. Each plant specimen was tagged appropriately and bagged. Only complete plants were collected. Parts of trees with flowers and fruits were also collected for ease of identification. Documentations were done in the field log book. The following pieces of information were documented: exact place of collection, description of habitat, plant description and any other information that may fade away with time. Coloured images of the collected plants were obtained using digital camera (Shannon™).

Plant Identification

Collected plant specimens were identified using one or a combination of the following: Taxonomic experts in Federal University Lafia and Federal University of Agriculture Makurdi. Local herbaria were also consulted. Flora of West Africa (Hutchinson and Dalziel, 1958)and weed of West Africa(Akobundu and Agyakwa, 1998) were used.Interview and the internet were also helpful.

Herbarial Preparation

Collected plants were preserved permanently following standard herbarial practices (Judd *et al.*, 1999; Aguoru*et al.*, 2009). Plants were pressed in Newspapers arranged in between woooden frame plant press ($1m^2$ each). The plant press was fastened by tight belts and dried in the sun for 7 day. They were labeled, mounted and filed. Biocide was applied to avert microbial biodeterioration. Specimens were deposited in the UAM herbarium for reference purposes.

Qualitatitive Ecology

This was determined using the ACFOR scale (Taylor *et al.*, 2007).

A=Abundant:>5 per plot/present in all plots/>50 in any plot
C= Common:At least 5 per plot/absent in not more than one plot
F=Frequent: At least 4-5 per plot/absent in not more than 3 plots
O=Occassional: At least 3 per plot/absent in not more than 4 plots
R=Rare: <3 per any plot/absent in more than 4 plot
Native plants confined to a particular locality were reported as endemic.

Statistical Analysis

The Microsfot Excel 2010 and Minitab 16 software were used. Data were subjected to descriptive and inferential statistics. Frequencies of in each location and across LGAs were computed. Results of qualitatitiveassessments were tabulated. The Kruskal-Wallice(H)non parametric test of hypothesis was used to determine if significant differences exist or not among the wild plants counted in each LGA. The 95% confidence level was adopted.The Shannon-Wienner Diversity (H) computation was done for each LGA. The H- index formulae is given as:

$$H = \sum[(pi) \times In(pi)]$$

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Where:
pi = Number of individuals species i/total number of samples
H_{max} = Maximum diversity possible
ln = log base 10

Plant evenness (distribution) was calculated based on the formulae:

$$E = \frac{H}{H_{max}}$$

Species richness (density) was computed as total number of members of a species found in all locations within a LGA. Bar graphs were constructed for species richness and evenness. Nutritional components were revealed in tables and radar plots.

RESULTS

Table 2 provides a list of indigenous plants or their parts that were preserved in the herbarium. A total of 24 species were preserved. Among them were: *Balanitesrotundifolia, Combretumapicalatum, Canariumschweinfurthii, Dacryodesedulis, Persea*spp, *Cucumismelo, Moringa*spp, *Dialeumguineensis, Allium* spp and *Gongronemalatifolium.*

Table 2: List of Plants or Plant Parts Preserved in Herbarium Based on Status (Rarity)

S/N	Local name	Common name	Scientific name
1	Adua	Desert date	*Balanitesrotundifolia*
2	Aganga	Red bush willow	*Combretumapicalatum*
3	Atili	African butter pear	*Canariumschweinfurthii*
4	Atili 2	African pear	*Dacryodesedulis*
5	Ayaba	Avocado	*Persea*spp
6	Dabino	Dates	*Phonixdactytera*
7	Diniya	Black plum	*Vitexdamina*
8	Fasa	Mint leaves	*Mentha*spp
9	Gwadandaji	Wild custard apple	*Anonasenegalensis*
10	Gwadandaji2	Monkey bread	*Pitusgmathongi*
13	Hami	Sweet melon	*Cucumismelo*
12	Zongole	Bush moringa	*Moringa*spp
13	Kabewa	Pumpkin	*Curcubita*spp
14	Kede	Shear butter tree	*Vitellariaparadoxa*
15	Kuka	Baobab	*Adansoniadigitata*
16	Rama	Bush buck	*Gongronemalatifolium*
17	Rimi	Silk cotton tree	*Bombax*spp
18	Rukuki	Finger root	*Uvariachamae*
19	Saada	Hug plum.	*Spondiasmombin*
20	SamiyaBiri	Black velvet Tamarind	*Dialeumguineensis*
21	Tapasa	Deodar cedar	*Cedrusdeodara*
22	Tsamiya	Tamarind	*Tamarindusindica*
23	Unknown	Prune plum	*Prunusdomestica*
24	Albasa	Wild onion spring	*Allium* spp

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Table 3 contains the list of plants encountered in Akwanga LGA. Drum palm (*Elaeisguineensis*) had the highest total count of 17 trees frequently and symmetrically found in all the three locations (Gudi=6, Alushi=6, Walko=5). Avocado (*Perseas*pp) was occasionally seen with a total count of 11. They were more in the Walko community (6 trees) than other locations. Others in the "occassional" catergories were Shear butter (found only in Gudi and Walko). Plants in the "rare" categories were African butter pear and Black velvet Tamarind. The differences observed are not significant (H = 9.13, P = 0.167). Table 4 enlists all indigenous plants found in Wamba LGA. African Locust beans (*Pakiasenegalensis*) and Finger root (*Uvariachamae*) were abundantly present in the Wamba community with total values exceeding the countable limits (>100). The Plum tree had a total of 16 trees frequently seen followed by the Drum palm (13 trees). Rarely found were: Desert date (*Balanitesrotundifolia*), Red bush willow (*Combretumapicalatum*), Baobab (*Adansoniadigitata*) and Wild onion spring (*Allium* spp). The last two species had a total of 3 plants each. The observed differences are statistically significant (H = 50.03, P = 0.000).

Table 5 presents the lists of indigenous plants found in NasarawaEggon LGA. The most abundant species was Jute plants (*Corchorus*) with values exceedind the countable level most especially at Mada station followed by Lambaga community. Rosele (*Hibiscus sabdariffa*) was also abundant with a total count of 183 plants (Lambaga=112, Kagbu=47, Mada station =24). Bush Moringa(*Moringaoleifera*) was frequently found in Mada station and Kagbucommunities with a total count of 46 plants. Those in the rare categories were: Baobab, Black plum, Bush buck and Sweetmelon. The observed differences in plant counts are significant (H = 28.57, P = 0.001).

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http://www.casirmediapublishing.com

Plant Species											
Scientific name	GD1	GD2	GD3	AL1	AL2	AL3	WA1	WA2	WA3	T count	ACFOR
Canariumspp	0	0	1	0	1	0	0	0	1	3	R
Vitellariaparadoxa	1	2	3	0	0	0	2	1	1	10	O
Anona	2	0	1	1	0	1	2	0	3	10	O
Perseaspp	0	1	1	0	3	0	4	2	0	11	O
Spondiasmombin	2	0	0	0	3	1	0	1	2	9	O
Elaerisguineensis	4	2	0	1	3	2	0	1	4	17	F
Dialeum	1	0	1	0	0	1	1	0	0	4	R

Table 3: Qualitative and Quantitative Assessment of Indigenous Plants in Akwanga LGA
Kruskal-WalliceH = 8.13 DF = 6 P = 0.229
GD= Gudi, AL= Alushi, WA= Walko
A=Abundant; C=Common; F=Frequent; O=Occasional; Rare=Rare

Table 4: Qualitative and Quantitative Assessment of Indigenous Plants in WAMBA LGA
Kruskal-Wallice H = 46.59 DF = 8 P = 0.000
WO= Wokio, WM= Wamba, SH= Shishinbaki
A=Abundant; C=Common; F=Frequent; O=Occasional; Rare=Rare

Plant Species											
Scientific name	WO1	WO2	WO3	WM1	WM2	WM3	SH1	SH2	SH3	TC	ACFOR
Balanites	0	0	0	1	0	3	0	3	0	7	R
Elaeisguineensis	2	0	4	1	1	2	0	1	2	13	F
Zixipusspp	0	1	0	2	3	2	1	3	4	16	F
Combretum	2	0	0	1	5	0	1	0	0	9	R
Adansoniadigitata	0	1	0	1	0	0	0	1	0	3	R
Pakiasenegalensis	5	15	5	18	6	100	8	14	20	191	A
Uvariachamae	5	15	4	9	100	6	4	20	5	168	A
Allium spp	0	0	2	0	0	0	0	0	1	3	R
Perseaspp	4	0	2	0	1	1	0	2	0	10	O

Table 5: Qualitative and Quantitative Assessment of Indigenous Plants in NasarawaEggon LGA

Plant Species											
Scientific name	MA1	MA2	MA3	KA1	KA2	KA3	LA1	LA2	LA3	Tcount	ACFOR
Adansoniadigitata	1	1	0	0	0	1	3	0	0	6	R
Tamarindusindica	7	0	4	1	3	5	8	5	6	39	C
Vitellariaparadoxa	1	1	5	0	2	3	3	6	1	22	C
Vitexdomina	1	1	0	0	0	0	1	0	0	3	R
Moringaoleifera	4	2	17	5	6	11	1	0	0	46	F
SpondiasMombin	3	0	0	1	3	0	2	0	1	10	O
Corchorus	100	0	44	0	0	0	64	0	58	266	A
Pilostigmathangari	5	3	1	5	3	1	0	6	1	25	C
Gongronema	0	0	0	1	0	1	0	0	0	2	R
Cucumismelo	2	0	1	3	0	0	0	1	0	7	R
Hibiscus sabdariffa	24	0	0	36	2	9	0	12	100	183	A

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Kruskal-WalliceH = 26.42 DF = 10 P = 0.003
MA= Mada station, KA= Kagbu, LA= Lambaga
A=Abundant; C=Common; F=Frequent; O=Occasional; Rare=Rare

Table 6- 8 accounts for total species diversity in each LGA of Nasarawa State based on Shannon Weiner indices and measured in terms of species richness and species evenness.Akwanga LGA had 7 species (Table 6) accounting for 64 species richness (Gudi=22, Alushi=17, Walko=25). H-diversity was 1.83. Hmax was 1.95 while species evenness was 0.938. Wamba LGA had 9 species (Table 7) with species richness of 420 dominated by Wamba (263). H-diversity was 1.20. Hmax was 2.20 while species evenness was 0.54. NasarawaEggon LGA had 11 species (Table 8). Species richness was 609 cutting across Mada station (228), Kagbu (102) and Lambaga (279). H-diversity was 1.55. Hmax was 2.4 while species evenness was 0.65.

Table 6: Measurement of Species Diversity in Akwanga LGA

AKWANGA										
Cultural name	**Scientific name**	**GD**	**AL**	**WA**	**TOTAL**	**Pi**	**pi*ln(pi)**	**H**	**Hmax**	**E**
Atili	*Canarium*spp	1	1	1	3	0.047	0.144	1.8286	1.95	0.938
Kede	*Vitellaria*	6	0	4	10	0.156	0.2898			
GwadanDaji	*Anona*	3	2	5	10	0.156	0.2898			
Ayaba	*Persea*spp	2	3	6	11	0.172	0.303			
Sada	*Spondias*	2	4	3	9	0.141	0.276			
Goruba	*Elaeris*	6	6	5	17	0.266	0.352			
SamiyaBiri	*Dialeum*	2	1	1	4	0.063	0.174			
	∑	22	17	25	64		1.8286			

GD= Gudi; AL= Alushi; WA= Walko
H= Shannon Weinner Diversity Index
Hmax= Maximum Diversity Possible
E= Species Evenness

Table 7: Measurement of Species Diversity in Wamba LGA

Scientific name	WO	WM	SH	TOTAL	pi	pi*ln(pi)	H	Hmax	E
Balanitesrotundifolia	0	4	3	7	0.017	0.069	1.196	2.197	0.544
Elaeisguineensis	6	4	3	13	0.031	0.11			
Zixipusspp	1	7	8	16	0.038	0.124			
Combretumapicalatum	2	6	1	9	0.021	0.008			
Adansoniadigitata	1	1	1	3	0.007	0.035			
Pakiasenegalensis	25	124	42	191	0.455	0.358			
Uvariachamae	24	115	29	168	0.400	0.367			
***Allium* spp**	2	0	1	3	0.007	0.035			
***Persea*spp**	6	2	2	10	0.024	0.09			
∑	67	263	90	420		1.196			

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WO= Wokio; WM= Wamba; SH= Shishinbaki
H= Shannon Weinner Diversity Index
Hmax= Maximum Diversity Possible
E= Species Evenness

Table 8: Measurement of Species Diversity in NasarawaEggon LGA
MA= Mada station; KA= Kagbu; LA= Lambaga
H= Shannon Weinner Diversity Index

Scientific name	MA	KA	LA	TOTAL	pi	pi*ln(pi)	H	Hmax	E
Adansoniadigitata	2	1	3	6	0.01	0.046	1.551	2.4	0.646
Tamarindusindica	11	9	19	39	0.064	0.176			
Vitellaria	7	5	10	22	0.036	0.12			
Vitexdomina	2	0	1	3	0.005	0.027			
Moringaoleifera	23	22	1	46	0.076	0.196			
Spondiasmombin	3	4	3	10	0.016	0.066			
Corchorus	144	0	122	266	0.437	0.362			
Pilostigma	9	9	7	25	0.041	0.131			
Gongronema	0	2	0	2	0.003	0.017			
Cucumismelo	3	3	1	7	0.011	0.049			
Hibiscus	24	47	112	183	0.3	0.361			
$\sum$	228	102	279	609		1.551			

Hmax= Maximum Diversity Possible
E= Species Evenness

DISCUSSION

From these findings, many plants are over exploited. The people of Nasarawa State tend to rely on these crops mainly for their existence without any form of conserving them for the future generation. Other causes of loss of species diversity are predominant most especially in communities that are close to major cities. These include: deforestation, overgrazing by cattles, habitat destruction, expansion and intensification of farming activities and indiscriminate bush burning. These are factors that have been linked to rapid loss of biodiversity in all parts of the world (Aguoru*et al.*, 2015a; Alamu and Agbeja, 2011). Based on the criteria used in the classification, many of the plants are classified as rare, occasional and endemic. This means the plants are threatened by forces which are mainly anthropogenic. Only few plants are commonly seen with high abundant level. For instance, Desert date "Adua" (*Balanitesrotundifolia*) is present only in Wamba (7 plants). Red bush mallow "Aganga" (*Combretumapicalatum*) could be found only in Wamba with 9 members. Wild spring onion is found only at Wokio and Shishinbaki locations in Wamba LGA with a population size of 3. The only wild crops with large population size and wider spreads across LGAs are Jute plant "Lalo" (*Corchorus*), African Locust beans "Dorowa" (*Pakiasenegalensis*) and plum trees "Magarya". It is evident that the three crops found in abundant level have higher rate of proliferation, tolerance and better growth form than others despite being exploited and not because of under-utilization. This view

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agrees with basic principles of phytogeography (Hutchison and Dalziel, 1958) that range of distribution of plants is limited by their tolerances. Since each plant species has a range of climatic and edaphic conditions (Taylor *et al.*, 2007), tolerance of a large taxon is the sum of tolerances of its constituent species. Moreover, the response of plants to environment is governed by their genetic makeup (Berg, 1992).It is not sure if the climate change might have affected the diversity of the wild crops in Nasarawa State, although climate change is widely implicated in global loss of biodiversity (Aguoru*et al.*, 2015). What is certain is that there is unsustainable utilization or gross over exploitation of wild fruit and vegetables crops in the study area coupled with high rate of habitat destruction. Many authors are advocates of sustainable utilization, domestication and efficient management of indigenous crops in Nigeria (Abere and Opara, 2012; Adekanmbi, and Ogundipe, 2009; Jimoh*et al.*, 2013).

Species diversity of a place is measured in terms of richness and evenness at a particular time or period (Aguoru*et al.*, 2015). NasarawaEggon is largely populated by Rosele "Yakwa" (*Hibiscus sabdariffa*), Jute plant "Lalo" (*Corchorus*), Bush moringa "Zongole" (*Moringa*spp) and Tamarind "Tsamiya" *Tamarindusindica*). The success of the above plants dominating in the three areas may be due to the favourable environmental factors suitable for optimal performances (NSG, 2017). It is also possible that people in these areas have a better way of managing the crops than in other areas. This area could be described as the hotspot of plant diversity in the State because it is rich in both functional types and fairly distribution. NasarawaEggon, a region with the highest species density also suffers uneven distribution of species to an extent (E=0.646) and number of functional types of species contributing to the richness are lower than in Awe LGA thereby lowering its overall biodiversity. From the LGAs investigated, indigenous crops have been classified based on the frequency of presence. Those in the "common" and "frequent" categories need not be mentioned. However, those in other categories should be mentioned. The"occasional" group, has plants such as: *Dacryodesedulis* (African pear), *Phonixdactytera*(dates), *Cucumismelo* (sweet melon), *Moringa*spp (bush moringa), *Bombax*spp (silk cotton tree), *Uvariachamae*(finger root) and *Hibiscus sabdariffa*(Rosele). Plants that are rare and endemic to only one area are: *Mentha*spp (mint leaf), *Allium* spp (wild spring onion) and *Curcubita*spp (pumpkin). These two categories are considered highly threatened and deserve urgent conservation ex-situ. Losing plants are that are endemic to a particular region is worrisome as they may be hard to come by in Nasarawa state in the nearest future. The in-situ method is not recommended for such group unless the factors causing their rarity are completely eliminated in their natural habitats (Durugbo*et al.*, 2012). Removal from natural habitats and introduction in places with no disturbances with high tendencies to acclimatize in new areas such as botanical gardens are strategies that are recommended for threatened species (IUCN, 2010).

CONCLUSION

The strength of biodiversity of indigenous fruit and vegetable crop was low in Wamba (H<1.5) but moderate in the two other LGAs (H>1.5). This could be attributed to various anthropogenic activities and pressure causing loss of biodiversity. Many plants such as

African butter pear and Black velvet Tamarind, Desert date, Red bush willow, Baobab and Wild onion spring are rare. There is need for intensive domestication and conservation of these plants for sustainable utilization in the Northern Senatorial District of Nasarawa State Nigeria.

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