# **Determining the Local Importance of Non-Timber Forest Products Using Two Different Prioritization Techniques**

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**Abstract** Among the key uncertainties in the sustainable management of forest for non-timber forest products (NTFPs) is the high diversity of species and paucity of information on indigenous use pattern. In designing appropriate strategies for sustainable management of non-timber forest products, therefore, it is important to identify species with high local importance with the potential for sustainable and profitable extraction in a managed system. In this study, we assessed the use of two quantitative techniques including the Use-Value index (Phillips and Gentry, 1993) and Assigned-Value approach (Adeola *et al.*, 1994), as procedures for prioritization of NTFP species in a tropical lowland rainforest ecosystem, Omo Forest Reserve (OFR), southwest Nigeria. A simple random sampling approach was employed to obtain data on the uses of NTFP species through semi-structured interview of 81 households in four communities within the reserve. Descriptively, the data were analyzed using frequency distribution, tables, chart and percentages. The Spearman correlation coefficient was employed to test for relationship between the values obtained for each of the two techniques. Results obtained for both techniques were fairly positively correlated ( $\rho = 0.59$ ; P < 0.01), suggesting a cautious interchangeable use of the techniques for the same end. Based on our findings, we posit that in evaluating forest and NTFPs for local importance and use, the end objectives of such evaluation must be critically examined in the light of the interest of the different respondents' group.

Keywords Tropical Rainforest, Non-Timber Forest Products, Use-Value, Assigned-Value and Prioritization

# **1. Introduction**

There is a plethora of literature on the socio-economic potentials of Non-Timber Forest Products (NTFPs) as an important component of the livelihood strategies of people living in or adjacent to forest areas[1-5]. The growing number of reports has suggested that hundreds of millions of people world-wide currently derive a significant portion of their subsistence needs and livelihoods from gathered plant and animal products. For most of the world's rural households, NTFPs provide essential food and nutrition, medicine, fodder, fuel, thatch and construction materials, mulch and non-farm income. It was estimated by the Food and Agriculture Organization of the United Nations that the total value of internationally traded NTFPs for the year 2002 was about 5.56 trillion US Dollars for fifty five species assessed[6].

Despite the known and substantial economic value of few individual NTFPs, and the unknown, but likely high economic value of NTFPs in aggregate, forest managers havehistorically not included them as important factors in forest management. But not only do NTFPs comprise a significant

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part of the biological diversity of forest ecosystems, they are integral element of sustainable forestry[7]. Non-Timber Forest Products are particularly important in ensuring food security, maintaining nutritional balance in people's diets and contributing to health care system. They are also essential to human survival during famine and 'hungry season' (period when most agricultural crops are not yet matured)[5]. At other times, NTFPs serve and support income-earning activities in both rural and urban economies.

Forest management for NTFPs can provide a continuing source of livelihood and help to maintain the forest resource for future generations. It has been argued that establishing extractive reserves for the sustainable harvest of marketable NTFPs has the potential to unite economic and conservation goals by promoting nature conservation while maximizing long-term economic returns per unit area[8-10]. Nonetheless, it is noteworthy that the management of forest lands is complex, and this is never more so than when considering many competing and non-complementary uses for the same area of forest.

Among the key uncertainties in the sustainable management of forest for NTFPs is the high diversity of species and paucity of information on indigenous use pattern. For instance, there are indications that Nigeria has more than six thousand NTFPs growing in the wild[11]. However, there is no complete list of NTFPs in the country because most biotic species from which forest products are derived are not well

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documented[2]. Increasing population coupled with large scale depreciation as a result of shifting cultivation, bush burning, logging and forest conversion have continued to pose concern about the sustainability and need for conservation of these species. Similarly, inadequate information on the ecological productivity, growth forms, life history and maintenance of the various species used as NTFPs further complicate management scenarios and the setting of conservation priorities for this category of forest products[12]. Therefore, in the design of appropriate strategies for sustainable management of non-timber forest products, it is important to identify species with the potential for sustainable and profitable extraction in a managed system.

Since the economic importance of NTFPs are often reflected in the social and cultural values placed on the products, in this study we carried out a socio-economic survey of NTFPs commonly utilized and found within the tropical lowland rainforest of Omo Forest Reserve, southwestern Nigeria. The rainforest of Omo has been identified as of high priority for conservation attention on a continental scale[13]. In addition to being a reservoir of an enormous quantity of plant and animal species, the forest reserve also constitute an integral part of the rural economies within which it subsists. Given that the importance of NTFPs is location-specific and dynamic, and because local use of non-timber forest resource varies greatly, there is the need to conduct a survey that will provide a checklist of non-timber resources in the study area so that forest management plans consider all relevant information. We also conducted a prioritization of the NTFPs following the method of Adeola et al., [14] and the Use-Value index proposed by Phillips and Gentry[15]. Then we examined the relationship between the two prioritization procedures. This is with a view to determining the reliability of the different indices as substitutes to be used for the same end.

# 2. Materials and Methods

### 2.1. The Study Area

Omo Forest Reserve (OFR) is located between Latitudes  $6^{\circ}$  35' - 7° 05'N and Longitudes 4° 19' - 4° 40'E in the Ijebu East and North Local Government Areas of Ogun State, southwestern Nigeria (Figure 1). The Reserve covers an area of about 130,500 hectares forming common boundaries with Osun, Ago-Owu and Shasha Forest Reserves in Osun State and Oluwa Forest Reserve in Ondo State. It also shares some common natural endowments with these forest reserves. The Nigerian Government legally gazetted it a forest through Order No. 10 Gazette No. 40 of 7th May 1925 which was amended in 1952[16]. The forest was originally ceded to Government for reservation on the 8th of October, 1918 via an agreement made between the District Officer, Ijebu Ode on behalf of the British Colonial government and the Awujale of Ijebu Ode on behalf of the Ijebu Native Administration. The government in 1946 established a 460 ha Strict Nature Reserve (SNR) within Omo Forest Reserve. This was upgraded to a Biosphere Reserve (BR) in 1977 by UNESCO[17;18].

The rainy season in OFR usually commences in March. The mean annual rainfall in the area ranges from about 1600 to 2000 mm with two annual peaks in June and September. The driest months are November and February[19]. Temperature ranges from 32.15°C to 21.40°C and a minimum relative humidity of 76.34 %[20]. The vegetation of the Reserve is a mixed moist semi-deciduous rainforest. Earlier works in Omo reported by Okali and Ola-Adams[17] distinguished a dry forest in the northern part and a humid forest in the southern part. The plant families with the most abundant individuals include Araceae, Compositae, Ebenaceae, Lilliaceae. Papilionoideae, Poaceae, Rubiaceae and Violaceae. The most common tree species are *Diospyros* spp., Drypetes spp., Strombosia pustulata, Rinorea dentata and Voacanga africana[21]. Most of the forests are disturbed with a substantial parts converted to monoculture plantations of *Gmelina arborea* in a programme assisted by loans from the World Bank and the African Development Bank to provide material for a pulp mill at Iwopin.

For effective management, the reserve was subdivided into areas or sectors called J1, J3, J4 and J6. These subdivisions were apportioned to enclave dwellers in isolated villages or camps. In addition to these settlements (which have continued to grow), large numbers of migrant farmers have moved into the reserve, some of them encouraged as taungya farmers to help create the Gmelina plantations. Within the various sectors, there are several settlements (both legal and illegal enclaves). Estimated total population in the area is between 20,000 and 25,000. Farming, fishing, hunting and NTFPs gathering are the predominant occupations for the majority of the enclaves' population.

#### 2.2. Data Collection and Analysis

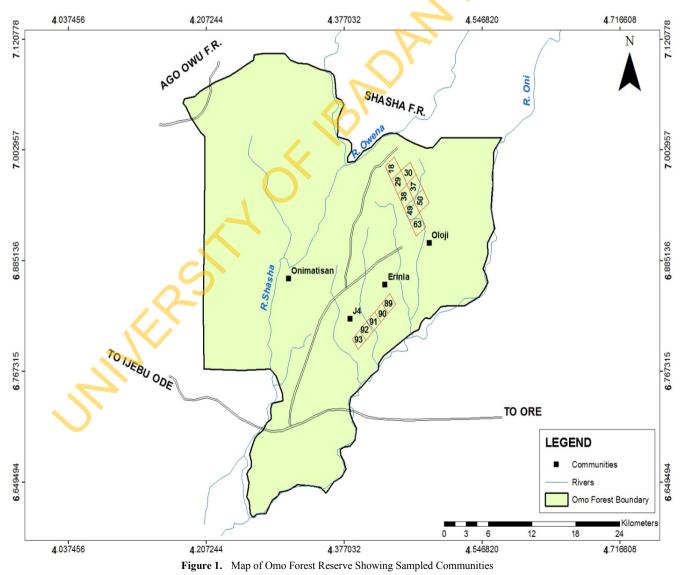
Socio-economic survey of NTFPs was carried out in the J4 sector of the reserve. Using a simple random sampling technique, four enclaves were selected for household survey. Data were obtained on the ethnobotanical uses of NTFP species through semi-structured interview. A total of 81 households were sampled. To complement information from the household survey, focus group discussion (FGD) was also conducted in each of the sampled community. This provided forum for weighing the relative importance of identified NTFPs and opportunity for more reliable data to be generated.

The ethnobotanical data generated were subjected to descriptive statistics using frequency distribution, tables, and percentages. For the ranking and prioritization exercise, we followed the method of Adeola *et al.*,[14] and the Use-Value index proposed by Phillips and Gentry[15]. Using the technique of Adeola *et al.*, each respondent was to list ten most important NTFPs derived from the forest in their order of importance. The list of NTFPs was then scored in ascending order from 1 - 10. The first most important product was scored 1 while the least was scored 10. The scores for all the respondents were pooled for all the identified NTFPs and the mean for each species calculated. Products with the least mean score was ranked highest and the trend continued in that order. To establish the final position of an NTFP species in the ranking exercise, the following parameters were calculated; i. number of times each NTFP was mentioned (a), ii. Mentioned Value (b), iii. Average Ranking (for a particular NTFP) by respondents (c), iv. Rank Value (d) and; v. Final Assigned Value (e). The number of times a particular NTFP was mentioned (a) was computed to obtain its Mentioned Value (b). Average Ranking (c) of each NTFP was calculated as a function of the sum of its assigned ranking by each respondents divided by the number of respondents. The Rank Value (d) was obtained by the tabulation and ordering of the position of the individual NTFP. Assigned Value (e) was determined by adding up Mentioned Value and the Rank Value and thereafter dividing the result by 2 i.e. e = b+d+2.

The technique of Use-Value is based on the number of

uses and the number of people that cite a given plant, indicating the species that are considered most important by a given population. We used the formula,  $UV = \sum U_i/n[22]$  to calculate the Use-value. Where:  $U_i$  = the number of uses mentioned by each informant for a given species, n = the total number of informants. For instance, if a species has 6 uses as mentioned by respondent A and the same species has 8 uses as mentioned by respondent B, then the Use-Value (UV) of that species would be: number of uses for the species divided by total number of respondents/informants citing the species (6+8/2). In this case, we have the UV as 7. Thus, the Use-Value of a given plant is determined by the number of uses locally attributed to it in relation to the number of informants.

We examined the correspondence between the abovestated techniques. To test for relationship between the values obtained for each of the two indices, the Spearman correlation coefficient was employed using the Statistical Package for Social Sciences (SPSS v. 15.0) software.



<i>C</i> /		Table 1. Checklist of NTFPS in J4 Sec				<b>D</b> (()
S/ N	Family	Species	Local Name	Habit	Use(s)	Part(s)us ed
1	Alliaceae	Allium sativum, L.	Ayuu (Garlic)	Creeper	Medicine	Fruit
2	Anacardiaceae	Spondias mombin L.	Iyeye	Tree	Medicine, Snacks	Fruit, Leaf
3	Annonacae	Monodora myristica (Gaertn) Dunal.	Ariwo	Tree	Medicine	Seed, Bark
4	7 unionacae	Annickia (syn. Enantia) chlorantha (Oliv.) Setten & Maas	Awopa (Yaani)	Tree	Medicine	Bark
5		Rauvolfia vomitoria Afzel.	Asofeyeje	Tree	Medicine	Leaf
6		Alstonia boonei De Wild.	Awun	Tree	Medicine	Bark
7	Apocynaceae	Hunteria umbellata (K. Schum)	Eerin	Tree	Medicine	Fruit
8		Picralima nitida (Stapf) Th. & H. Dur	Erin	Tree	Medicine	Seed, Bark
9		Mondia whitei (Hook.f.) Skeels	Isigun	Herb	Soup	Root
10	Asclepiadaceae	Gongronema latifolium Benth.	Iteji	Shrub or Tree	Soup	Leaf
11		Parquetina nigrescens (Afzel.) Bullock	Ogbo 🔥	Twine	Medicine	Leaf
12		Crassocephalum crepidioides (Benth.) S. Moore	Ebolo	Herb	Soup	Leaf
13	Asteraceae	Ageratum conyzoides, L.	Imi esu	Herb	Medicine	Leaf
14		Erigeron floribundus (Kunth) Sch.Bip.	Olowojeja	Herb	Medicine	Leaf
15	Bignoniaceae	Newbouldia laevis (P. Beauv.) Seem. ex Bureau	Akoko	Tree or Shrub	Medicine, Tra- ditional rite	Leaf
16		Kigelia africana (Lam.) Benth.	Pandoro	Tree	Medicine	Fruit
17	Boraginaceae	Cordia millenii, Baker	Omo	Tree	Medicine	Bark
18		Gossweilerodendron balsamiferum (Verm.) Harms	Agba	Tree	Medicine	Bark
19	Caesalpiniaceae	Brachystegia eurycoma Harms, B.	Akporachi (EKU)	Tree	Soup	Seed
20	Caesaipinaeeae	Afzelia Africana Sm.	Ара	Tree	Soup, Fodder	Seed, Leaf
21		Dialium guineense Willd.	Omoyin	Tree	Sweets	Fruit
22	Capparaceae	Buchholzia coriacea Engl.	Kokoroi- jemu/Obiikoro	Tree	Medicine	Seed
23	Celastraceae	Hippocratea indica Willd.	Mawole Climbing shrub		Medicine	Root
24	Chrysobalana- ceae	Parinari excelsa Sabine	Abere Tree		Medicine, Tra- ditional rites	Fruit, Bark
25	Clusiaceae	Garcinia kola, Heckel.	Orogbo	Tree	Snacks	Seed
26	Combretaceae	Terminalia ivorensis A. Chev.	Afara dudu	Tree	Medicine	Bark
27	Connaraceae	Cnestis ferruginea, DC	Gboyin-gboyin	Tree	Medicine	Leaf
28	Cucurbitaceae	Momordica foetida Schumach.	Ejinrin	Herb	Medicine	Leaf
29	Cucuionaceae	Momordica angusticephalas, Harms	Kainkan	Climber	Washing	Fruit
30	Dichapetalaceae	Dichapetalum pallidum	Marigbo	Tree	Soup	Leaf
31	Euphorbia hirta L		Tomide	Herb	Fodder	Leaf
32	Euphorbiaceae	Tetracarpidium conophorum (Mull.Arg.) Hutch.& Dalziel	Asala	Climbing shrub or Liana	Snacks	Fruit
33	Fabaceae	Erythrina senegalensis D.C	Ilaka ile	Tree	Soup	Leaf
34	1 abaccac	Abrus precatorius, L.	Ojuologbo	Tree	Medicine	Seed
35	Irvingiaceae	Irvingia gabonensis (Aubry-Lecomte ex O'Rorke) Baill	Aapon (Og- bono)	Tree	Soup	Seed
36		Irvingia wombulu	Ooro	Tree	Snacks	Fruit
37	Labiatae			Shrub	Medicine, Chew-stick	Stem, Branch
38	Lamiaceae	Culcasia saxatilis, A.Chev.	Agunmona	Herb	Medicine	Fruit
39	Lauraceae	Beilschimiedia mannii, (Meisn.) Benth. & Hook. f	Gbokoniga	Tree	Soup	Leaf

 Table 1.
 Checklist of NTFPs in J4 Sector of Omo Forest Reserve

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40		Ceiba pentandra, (L.) Gaertn.	Eegun	Tree	Medicine, Soup	Leaf
40 Malvaceae		Sida veronicifolia, Lam.	Esi-ile	Creeper	Sweet	Fruit
41	Malvaceae- Sterculoidae	Cola acuminata Schott & Endl.	Obi Abalaye	Tree	Traditional rites	Fruit
43	Marantaceae	Thaumatococcus daniellii (Benn.) Benth.	Ewe eeran	Herb	Packaging leaves	Leaf
44	Meliaceae Trichilia rubescens, Oliv		Kurere	Tree	Medicine	Stem, Branch
45		Khaya ivorensis A. Chev.	Oganwo	Tree	Medicine	Bark
46	Menisper- maceae	Cissampelos owariensis, P. Beau	Jenjoko Climber		Medicine, Soup	Leaf, Bark
47	Minner	Piptadeniastrum africanum, (Hook.f.) Brenan	Agboin	Tree	Medicine	Root
48	Mimosaceae	Tetrapleura tetraptera (Schumach. & Thonn.) Taub.	Aidan	Tree	Medicine	Fruit
49		Treculia africana Decne.	Afon	Tree	Medicine, Food, Snacks	Fruit, Seed
50	Moraceae	Musanga cecropioides R.Br.	Aga	Tree	Medicine	Stem, Branch
51		Artocarpus altilis (Parkinson) Fosberg	Berefuutu	Tree	Food	Fruit
52		Ficus exasperata Vahl	Ipin 💊	Tree	Medicine	Leaf
53	Nyctaginaceae	Boerhavia diffusa, L.	Etiponnla	Herb	Soup	Leaf
54	Ochnaceae	Lophira alata Banks ex Gaertn.	Pahan	Tree	Medicine	Bark
55	Palmae	Raphia hookeri G.Mann & H.Wendl.	Ako (Raffia palm)	Palm	Beverage, Con- struction	Stem, Leaf
56	Phytolaccacea	Pativera alliaceae, L.	Awogba	Herb	Medicine	Leaf
57	Piperaceae	Piper guineense Schumach. & Thonn.	Iyere Liana		Spices	Seed, Leaf
58	Poaceae Chloris pilosa Schumach.		Eeran	Grass	Medicine	Leaf
59	Poaceae	Bambusa vulgaris Schrad.	Oparun Grass		Construction	Stem, Leaf
60	Polygalaceae	Carpolobia lutea G. Don	Osunsun/Sanda	Shrub	Animal care	Stem
61		Mitragyna ciliata, Aubrév. & Pellegr	Abura	Tree	Medicine, Packaging	Leaf, Bark
62		Nauclea diderrichii (De Wild. & T.Durand) Merrill	Opepe	Shrub	Medicine	Leaf
63	Rubiaceae	Gardenia erubescens, Stapf & Hutch.	Orunwo	Shrub or Tree	Medicine	Leaf
64	Kublaceae	Morinda lucida Benth.	Oruwo	Tree	Medicine, Con- struction	Leaf, Bark
65		Massularia acuminata (G Don) Bullock	Pako	Shrub or Tree	Chew-stick	Stem, Branch
66	Rusca- ceae-Agavaceae	Sansevieria trifasciata, Prain.	Oja ikoko Creeper		Medicine	Leaf
67	Rutaceae	Zanthoxylum zanthoxyloides, (Lam.) Zepern. & Timler	Igi ata Shrub		Spices	Leaf, Root, Bark
68	Sapindaceae	indaceae Blighia sapida, K.D.Koenig		Isin Tree		Fruit, Leaf, Bark
69		Chrysophylum albidum, G. Don	Agbalumo	Tree	Snacks	Fruit
70	Sapotaceae	Synsepalum dulcificum (Schumach. & Thonn.) Daniell	Agbayun	Shrub	Snacks	Fruit
71	Solanaceae	Capsicum spp.	Ata ijosi	Shrub	Spices	Fruit
72	Varies	Edible mushrooms	Ataase (Olu)	Fungi	Food supple- ment	Whole fungus
73		Aframomum sceptrum (Oliv. & Hanb.) K Schum.	Ata oguro	Herb	Spices	Fruit, Seed
74	Zingiberaceae	Aframomum melegueta K. Schum.	Ataare	Herb	Medicine	Fruit, Seed
75		Zingiber officinale, Roscoe	Ata-ile (Ginger)	Tuber	Spices	Root

S         Species         Lead Name         times Mon- times Mon- Mon- Mon- Mon- Mon- Mon- Mon- Mon-			Table 2. Ranking and pl			1 01 050	Reserve	1	1
N         Species         Local Name         times Men- tonic         totale         Rage         Value         Value         Value         Value         Value         (Path) and Carl, 1994)         (Gentri, 1993)           1         Termenform complo- tion         Asan         39         4         38         13         85.5         0.05           3         Massuffra acumuta         Pplao         33         6         37.7         12         9         0.03           4         Anninskia chioania         Avorga Yani         51         1         42         2         4.3         20         11.5         0.05           6         Bucholia contace         Kovorgens/Oblikov         42         4.5         22         12         0.02           8         Euroriga vombulu         Ocro         15         15         3.3         11         1.5         0.07           10         Atranoneum metgoria         Ataase         6         31         2         3         17         0.07           11         Trectaigenta difficition         Ataase         6         31         2         3         17         0.05           12         Zariboxyim zaninox-         Masia         6	S/			Number of	Men-	Aver-	Rank	Assigned	Use-Value
I         Invingia gabonensis         Investigia gabonensis <thinvestigia gabonensis<="" th="">         Investigia gabonen</thinvestigia>		Species	Local Name	times Men-		-		· ·	<b>`</b>
2         Terracingulum compleximation         Asala         39         4         3.8         13         8.5         0.06           3         Massularia acuminatia         Palo         33         6         3.7         12         9         0.03           4         Amainski obhoratia         Navaga Yama         51         1         1.42         18         9.5         0.06           5         Piper guinense         Navaga Yama         42         3         4.3         20         11.5         0.05           6         Bucholáz coriacese         Koronjemu/Onitoro         48         2         4.5         22         12         0.02           7         Felible matheoms         Anaser (DM)         18         8         4.8         25         18         0.02           8         Ivirgia vombulu.         Ooro         15         15         3.3         11         12         0.02           10         Afamomum melayata         Alaare         6         31         2         3         17         0.03           11         Tectolas african         Aja         12         17         4.5         22         19.5         0.06           12	19			tioned	Value	Rank	value	et al., 1994)	Gentry, 1993)
1         run         Asia         59         4         58         15         8.5         000           3         Massiaria acumitati acumitati         Pako         33         6         37         12         9         0031           4         Anninckia chirantia         AwogaYaani         51         1         4.2         18         9.5         006           5         Piper guineense         Lyav         4.2         3         4.3         20         11.5         0002           7         Edible mushcours         Atasse (Dip)         18         8         4.8         22         12         0.02           9         Hirpigua wombula         Orro         15         15         3.3         11         13         0.07           10         Annaroum melegueat         Ataar         6         31         2         3         17         0.17           11         Ternphour melegueat         Ataan         9         20         4         44         17         0.11           14         Artecapus artitis         Betrefutut         9         20         4         3         10         20         0         11           11	1		Aapon (Ogbono)	18	8	2.3	9	8.5	0.03
	2	Tetracarpidium conopho-	Asala	30	4	3.8	13	8.5	0.06
4         Amunsku choranta         Avega Yami         51         1         4.2         18         9.5         0.06           5         Piper guinenes         Dur         42         3         4.3         20         11.5         0.005           6         Bucholza coriacca         Kokorojiemu Ohikor         42         3         4.5         22         12         0.02           7         Edible mushrous         Anase (Oh)         18         8         4.8         2.5         3         0.02           8         Tringis wombula         Oro         15         15         3         11         15         0.07         0.07           9         Hippoenti indica         Mawole         6         31         2         3         17         0.37           10         Aframomum melegaeta         Atane         6         31         2         3         17         0.33           11         Arconya artiis         Baccontat         6         31         2         17         0.33           12         Zantoxyium anthoxy-         Igi ata         6         31         2         17         0.33           13         Tetrapas artiis         Bacconta <td>2</td> <td>rum</td> <td>Asala</td> <td>39</td> <td>4</td> <td>5.8</td> <td>15</td> <td>0.5</td> <td>0.00</td>	2	rum	Asala	39	4	5.8	15	0.5	0.00
5         Piper guinesse         byte         42         3         43         20         11.5         0.05           6         Bucholza coriaceae         Kebtorjemu/bikor (wenderful kola)         48         2         4.5         22         12         0.02           7         Edble mushrooms         Ataas (Oh)         18         8         4.8         22         8         0.02           9         Hippesria andica         Mawele         6         31         12         3         0.17         0.17           10         Affancoman melogueta         Affate         6         31         2         3         0.17         0.33           12         Zanthovyum zanthovy         Igitat         6         31         2         3         1.7         0.33           13         Tetrapleum tetraptera         Aidan         9         20         4         1.44         1.7         0.11           14         Artocarpus attilis         Berefutu         9         20         4.5         2.2         1.9         0.08           16         Chysophylum albidum         Agbalumo         9         20         5         2.6         2.3         0.17           17	3	Massularia acuminata	Pako	33	6	3.7	12	9	0.03
6         Bucholzia coriacea         Kakaronjerna/Ohilaro (wonderfil kola)         48         2         4.5         22         12         0.02           7         Edible mushrooms         Atase (Oh)         18         8         4.8         25         13         0.02           8         Pringis wombulu         Oror         15         15         3.3         11         15         0.07           9         Hippoerata indica.         Mawole         6         31         2         3         17         0.17           10         Afranomum melogueta         Atase         6         31         2         3         17         0.33           12         Zanthoxylum zanthoxy- loids         Igi ata         6         31         2         3         17         0.33           13         Tetraplerun tetrapiera         Aidan         9         20         4         14         17         0.11           14         Artocargue artiits         Bertefutu         9         20         4         3         20         20         0.01         11           15         Garcinia kola         Orogbo         36         5         5.3         35         20         0.02	4	Anninckia chloranta	Awopa/Yaani	51	1	4.2	18	9.5	0.06
b         Buchovin contracted         (wonderful kola)         45         2         4.5         2.2         1.2         0.02           8         Tringia wonbulu         Ooro         15         15         3.3         11         13         0.07           9         Hippoznia indica.         Mawole         6         31         1.5         2         3         17         0.17           10         Aframonum molegueta         Abare         6         31         2         3         17         0.50           11         Trecelular ateraptera         Aidan         9         20         4         44         17         0.11           12         Zanthoxylum anthoxy-         Igi ata         6         31         2         3         17         0.13           13         Tetapletrait ateraptera         Aidan         9         20         4         44         17         0.11           14         Artocapus annis         Becchuru         9         20         4         3         10         20         0.11           17         Garcina kola         Orkagan         12         17         4.8         25         21.0         0.03 <t< td=""><td>5</td><td>Piper guineense</td><td>Iyere</td><td>42</td><td>3</td><td>4.3</td><td>20</td><td>11.5</td><td>0.05</td></t<>	5	Piper guineense	Iyere	42	3	4.3	20	11.5	0.05
Image         Image         Image         Image         Image         Image           8         Irvingia wombulu.         Ocro         15         15         3.3         11         15         0.07           9         Hippocrata indica.         Mawolc         6         31         2         3         17         0.17           10         Aframomum negueta         Ataare         6         31         2         3         17         0.33           11         Treculu africana         Afon         6         31         2         3         17         0.33           12         Zanthoxylum zubinov-         Igi ata         6         31         2         3         17         0.33           13         Pstrapbeura struits         Berefinutu         9         20         4         14         17         0.11           14         Artoscovarus dimielli         Droge         20         4         3         10         20.5         0.017           15         Momordica forida         Eimrin         12         17         4.8         25         21.0         0.008           16         Chrasphylum albidum Agabyun         12         17         4.8	(	Duch deie coniectes	Kokoroijemu/Obiikoro	40	2	4.5	22	12	0.02
8         Irvingia wombulu         Oero         15         15         33         11         13         007           9         Hippocrata indica         Mawele         6         31         1.5         2         10.5         0.17           11         Treculia aficana         Afon         6         31         2         3         17         0.50           12         Zanthoxylum zanthoxy         Igi ata         6         31         2         3         17         0.33           13         Tetraplerar tetraptera         Aidan         9         20         4         14         17         0.11           14         Atocarpus artilis         Berefutu         9         20         4         14         17         0.11           15         Monocica focida         Lipinin         12         17         4.5         20         0.0         0.03           16         Chrysophylum albidum         Agbutron         9         20         4.5         25         10         0.08           20         Beilschumiduia manaii         Gbokonga         18         8         5.5         36         22         0.06           21         Parinar excelsa <td>0</td> <td>Bucholzia coriaceae</td> <td>(wonderful kola)</td> <td>48</td> <td>Z</td> <td>4.5</td> <td>22</td> <td>12</td> <td>0.02</td>	0	Bucholzia coriaceae	(wonderful kola)	48	Z	4.5	22	12	0.02
9         Hippocrata indica.         Mawole         6         31         1.5         2         105         0.17           10         Arianoum melegated         Atarc         6         31         2         3         17         0.59           12         Zanboxylun znihoxy- loides         Igi ata         6         31         2         3         17         0.33           13         Terapleura terriptera         Aidan         9         20         4         44         17         0.11           14         Artocarpus artils         Berefutu         9         20         4         44         17         0.11           15         Momordica fortula         Ejinrin         12         17         4.5         2.2         0.06         0.08           16         Chrysophyum albidum         Agbuno         9         20         4.8         2.2         10.5         0.01           17         Garcinia kola         Orogbo         36         5         5.3         35         2.0         0.05           18         Testimatine coccus daniciliti         Eve ceran         18         8         5.8         38         23         0.017           20	7	Edible mushrooms	Ataase (Olu)	18	8	4.8	25	13	0.02
10         Aramonum melgueta         Atare         6         31         2         3         9         0         17         0.17           11         Treenbulk african         Afon         6         31         2         3         17         0.50           12         Zanthoxylun zanthoxy- loides         Igi ata         6         31         2         3         17         0.13           13         Terapleura tetraptera         Aidan         9         20         4         14         17         0.11           14         Atocarpus artilis         Berefutu         9         20         4         14         17         0.11           15         Monordica foetida         Eipinrin         12         17         4.5         22         0.0         0.11           17         Garcinia kola         Orogbo         36         5         53         35         20         0.00           18         Thaumatocecous danielli         Eve ceran         6         31         -3         10         20.5         26         23         0.01           22         Chloris pilosa         Ecran         18         8         58         38         23         0	8	Irvingia wombulu.	Ooro	15	15	3.3	11	13	0.07
10         Afranomum negueta         Atare         6         31         2         3         17         0.17           11         Tresulto alricona         Afon         6         31         2         3         17         0.50           12         Zathboylum znitoxy- loides         Igi ata         6         31         2         5         17         0.33           13         Terapleura tetraptera         Aidan         9         20         4         14         17         0.11           14         Arocarpus artils         Bercfutu         9         20         4         14         17         0.11           15         Monoclea foetda         Eginin         12         17         4.5         22         0.0         0.11           16         Chrysophylum albidum         Agbayun         12         17         4.8         25         21.0         0.08           18         Thaumatocecous danielli         Ewe ceran         6         31         4.1         16         22.5         0.6         0.17           20         Belischinieda manni         Gokoniga         18         8         5.8         38         23         0.01           21	9	Hippocrata indica.	Mawole	6	31	1.5	2	16.5	0.17
I1         Treculia aficana         Afon         6         31         2         3         17         0.50           12         Zantholym zanthoy- loides         Igi ata         6         31         2         3         17         0.33           13         Tetrapleara setraptera         Aidan         9         20         4         14         17         0.11           14         Artocarpus artifis         Bereflutu         9         20         4         14         17         0.11           15         Momordica foetida         Ejinrin         12         17         4.5         22         0         0.11           16         Chrysophyma albidum         Agbayun         12         17         4.8         20         20         0.17           19         Synsephalum ducificam         Agbayun         12         17         4.8         25         36         22         0.05         0.17           21         Derinari excela.         Abere         9         20         5         26         23         0.17           22         Choloris plisat         Fernan         18         8         5.8         38         23         0.06	10	Aframomum melegueta	Ataare	6	31	2	3	17	0.17
12         Zanthoylum zanthoy- loides         Igi ata         6         31         2         3         17         0.33           13         Tetrapleva tetraplera         Aidan         9         20         4         14         17         0.11           14         Artocarpus atrilis         Berefluttu         9         20         4         14         17         0.11           15         Momorida fecifid         Ejinrin         12         17         4         5         22         19.5         0.08           16         Chrysophylum albidum         Agbayun         12         17         4         8         22         10.5         0.03           18         Thaumatococus danellit         Eve eran         6         31         2         3         10         20.5         26         22         0.06           20         Beikschimiedia mamiti         Obkohnga         18         8         5.8         38         23         0.11           23         Cola acuminate         Obi Abalaye         18         5.8         38         23         0.17           24         Monodora myristica         Arixo         0         3         50         1         <	11		Afon	6	31			17	0.50
12         bids         19 ata         6         31         2         17         0.3           13         Tetraplera tetrapera         Aidan         9         20         4         14         17         0.11           14         Artocarpus artilis         Berefnatu         9         20         4         14         17         0.11           15         Momordics foctida         Ejinrin         12         17         4.5         22         19.5         0.08           16         Chrysophylum albulum         Agbalum         9         20         4.3         20         20         0.11           17         Garcinia kola         Orogbo         36         5         5.3         35         20         0.03           18         Tharmadoccocus danifili         Eve ceran         6         31         4.8         25         36         22         0.06           21         Parinari excelsa.         Abere         9         20         5         26         23         0.17           22         Chloris plosa         Erean         18         8         5.8         38         23         0.06           23         Cha acuminate         O		Zanthoxylum zanthoxy-							
14         Artocarpus artiks         Berefuttu         9         20         4         14         17         0.11           15         Monordica foctida         Ejinrin         12         17         4.5         22         19.5         0.08           16         Chrsyophylum alloldum         Agbalumo         9         20         4.3         20         20         0.11           17         Garcinia kola         Orogbo         36         5         5.3         35         20         0.01           18         Thaumatocceus danilli         Eve ceran         6         31         7.3         10         20.5         0.17           20         Beikschimiedia mannii         Gbokoniga         18         8         5.5         36         22         0.06           21         Parinari excesa.         Abere         9         20         5         2.6         23         0.17           22         Chloris pilosa         Eeran         18         8         5.8         38         23         0.06           24         Monodora myristica         Ariwo         6         31         4.1         16         2.5         0.33           27         Mitagy	12		Ig1 ata	6	31	2	3	17	0.33
14         Artocarpus artiks         Berefuttu         9         20         4         14         17         0.11           15         Monordica foctida         Ejinrin         12         17         4.5         22         19.5         0.08           16         Chrsyophylum alloldum         Agbalumo         9         20         4.3         20         20         0.11           17         Garcinia kola         Orogbo         36         5         5.3         35         20         0.01           18         Thaumatocceus danilli         Eve ceran         6         31         7.3         10         20.5         0.17           20         Beikschimiedia mannii         Gbokoniga         18         8         5.5         36         22         0.06           21         Parinari excesa.         Abere         9         20         5         2.6         23         0.17           22         Chloris pilosa         Eeran         18         8         5.8         38         23         0.06           24         Monodora myristica         Ariwo         6         31         4.1         16         2.5         0.33           27         Mitagy	13	Tetrapleura tetraptera	Aidan	9	20	4	14	17	0.11
15         Morrodica foetida         Ejinrin         12         17         45         22         19.5         0.08           16         Chrysophylum albidum         Agbalumo         9         20         43         20         20         0.11           7         Garcinia kola         Orogbo         36         5         53         35         20         0.03           18         Thaumatoccocus danielli         Ewe ceran         6         31         -3         10         20.5         20.17           9         Synsephalum duleificum         Agbayun         12         -7         4.8         25         21.0         0.08           20         Beilschimiedia mannii         Gibokoniga         18         8         5.8         38         23         0.11           21         Phiringinas         Ecran         18         15         5.2         34         24.5         0.07           25         Bambusa vulgaris         Oparun         15         15         5.2         34         24.5         0.07           26         Altium sativum         Ayuu (Garlic)         3         50         2         3         26.5         0.33           20		* *		9					
16         Chrysophylum albidum         Aghalumo         9         20         43         20         20         0.11           17         Garcinia kola         Orogbo         36         5         5.3         35         20         0.03           18         Thaumatocccus daniellii         Ewe ceran         6         31         4.8         25.5         36         22         0.06           20         Belischniedin annii         Gbokoniga         18         8         5.5         36         22         0.06           21         Parinari excelsa         Abere         9         20         5         26         23         0.11           22         Chloris pilosa         Eeran         18         8         5.8         38         23         0.01           23         Cola acuminate         Obi Abalaye         18         5.8         38         23         0.06           24         Monodora myristica         Ariwo         6         31         4.1         16         2.5         0.33           25         Bambus vulgaris         Oparun         15         5.0         2         3         2.6.5         0.03           26         Akimagyna c		*		-					
17         Garcinia kola         Orogbo         36         5         5.3         35         20         0.03           18         Thaumatococous daniellii         Eve ceran         6         31         3         10         20.5         0.17           19         Synsephalum dulcifrum         Agbayun         12         17         4.8         25         21.0         0.06           20         Beitschimiedia mannii         Gokoniga         18         8         5.5         36         22         0.06           21         Parinan excelsa.         Abere         9         20.6         5         26         23         0.11           22         Chloris pilosa         Eeran         18         8         5.8         38         23         0.06           24         Monodora myristica         Ariwo         6         31         4.1         16         25.5         0.33           26         Allum sativum         Ayuu (Gariic)         3         50         2         3         26.5         0.33           27         Mitragyna ciliata         Abara         24         7         6.9         45         26         0.08           28         Garcen			3						
18         Thaumateccous daniellii         Ewe erran         6         31         3         10         20.5         0.17           19         Synsephalum dulcificum         Agbayan         12         47         4.8         25         21.0         0.08           20         Belischimiedia mannii         Gbokoniga         18         8         5.5         36         22         0.06           21         Parinari excelsa.         Abere         9         20         5         26         23         0.17           22         Chloris pilosa         Erran         18         8         5.8         38         23         0.06           24         Monodora myristica         Ariwo         6         31         4.1         16         23.5         0.17           25         Barnbusa vulgaris         Oparun         15         15         5.2         34         24.5         0.07           26         Allum sativum         Ayuu (Carile)         3         50         2         3         26.5         0.33           28         Grassocphalum creipdi- oides         Ebolo         3         50         2         3         26.5         0.17           31				·					
19         Synsephalum dulcificum         Agbayun         12         17         4.8         25         21.0         0.08           20         Beilschimiedia mannii         Gokoniga         18         8         5.5         36         22         0.06           21         Parinari excelsa.         Abere         9         20         5         26         23         0.11           22         Choirs pilosa         Eeran         18         8         5.8         38         23         0.11           23         Cola acuminate         Obi Abalaye         18         8         5.8         38         23         0.17           25         Bambusa vulgaris         Oparun         15         15         5.2         34         24.5         0.07           26         Allium sativum         Ayua (Garlik)         3         50         1         1         25.5         0.33           27         Mitragyna ciliata         Abura         24         7         6.9         45         26         0.08           28         Gracenia erubescens         Orunwo         3         50         2         3         26.5         0.17           30         Blighia s			U						
20         Beilschimiedia mannii         Gbokoniga         18         8         5.5         36         22         0.06           21         Parinari excelsa.         Abere         9         20         5         26         23         0.17           22         Choris pilosa         Eeran         18         8         5.8         38         23         0.11           23         Cola acuminate         Obi Abalaye         18         8         5.8         38         23         0.06           24         Monodora myristica         Ariwo         6         31         4.1         16         23.5         0.17           25         Bambusa valgaris         Oparun         15         15         5.2         34         24.5         0.07           26         Altiurn sativum         Ayuu (Garici)         3         50         2         3         26.5         0.33           28         Crassocephalum crepidi- oides         Ebolo         3         50         2         3         26.5         1.00           31         Brachystegia spp.         Akparchi (EU)         6         31         4.5         22         26.5         0.17           33						~ ~			
21         Parinari excelsa.         Abere         9         20         5         26         23         0.17           22         Chloris pilosa         Eeran         18         8         5.8         38         23         0.01           23         Cola acuminate         Obi Abalaye         18         8         5.8         38         23         0.06           24         Monodora myristica         Ariwo         6         31         4.1         16         23.5         0.07           25         Bambusa vulgaris         Oparun         15         5.2         34         24.5         0.07           26         Altium sativum         Ayuu (Garlic)         3         50         1         1         25.5         0.33           27         Mitragyna cilata         Abura         2.4         7         6.9         45         2.6         0.08           28         Crassocephalum crepidi- oides         Ebolo         3         50         2         3         2.6.5         0.33           29         Gardenia erubescens         Orunwo         3         50         2         3         2.6.5         0.17           31         Brachystegia spp.									
$\begin{array}{c c c c c c c c c c c c c c c c c c c $			U						
23         Cola acuminate         Obi Abalaye         18         8         5.8         38         23         0.06           24         Monodora myristica         Ariwo         6         31         4.1         16         23.5         0.17           25         Bambusa vulgaris         Oparun         15         15         5.2         34         24.5         0.07           26         Allium sativum         Ayuu (Gartic)         3         50         1         1         25.5         0.33           27         Mitragyna ciliata         Abura         24         7         6.9         45         26         0.08           28         Crassocephalum crepidi- oides         Ebolo         3         50         2         3         26.5         0.33           29         Gardenia erubescens         Orunwo         3         50         2         3         26.5         0.17           30         Blighia sapida         Isin         3         50         2         3         26.5         0.17           31         Brachystegia spp.         Akporachi (EKU)         6         31         4.5         22         26.5         0.11           34 <td< td=""><td></td><td></td><td></td><td>-</td><td></td><td></td><td></td><td></td><td></td></td<>				-					
$ \begin{array}{c ccccccccccccccccccccccccccccccccccc$					-				
25         Bambusa vulgaris         Oparun         15         15         5.2         34         24.5         0.07           26         Allium sativum         Ayuu (Garlic)         3         50         1         1         25.5         0.33           27         Mitragyna ciliata         Abura         24         7         6.9         45         26         0.08           28         Crassocephalum crepidi- oides         Ebolo         3         50         2         3         26.5         0.33           30         Blighia sapida         15m         3         50         2         3         26.5         0.13           31         Brachystegia spp.         Akporachi (EKU)         6         31         4.5         22         26.5         0.17           33         Momordica angusticephalas         Kainkan         9         20         5.7         37         28.5         0.11           34         Erythrina senegalensis         Jenjoko         3         50         4.1         16         33         0.32           35         Matonia bonci         Avun         18         8         7.3         46         33         0.22           36			5						
26         Allium sativum         Ayuu (Garlic)         3         50         1         1         25.5         0.33           27         Mitragyna ciliata         Abura         24         7         6.9         45         26         0.08           28         Crassocephalum crepidi- oides         Diblo         3         50         2         3         26.5         0.33           29         Gardenia erubescens         Orunvo         3         50         2         3         26.5         0.33           30         Bilghia sagida         Isim         3         50         2         3         26.5         0.17           31         Brachystegia spp.         Akporachi (EKU)         6         31         4.5         22         26.5         0.17           33         Momordica angusticephalas         Kainkan         9         20         5.7         37         28.5         0.11           34         Erythrina senegalensis         Ilaka ile         9         20         6         40         30         0.21           36         Cissampelos ovariensis         Jenjoko         3         50         4.1         16         33         0.22           37									
27         Mitragyna ciliata         Abura         24         7         6.9         45         26         0.08           28         Crassocephalum crepidi- oides         Ebolo         3         50         2         3         26.5         0.33           29         Gardenia erubescens         Orunwo         3         50         2         3         26.5         0.33           30         Blighia sapida         Jsin         3         50         2         3         26.5         0.10           31         Brachystegia spp.         Akprachi (EKU)         6         31         4.5         22         26.5         0.17           33         Momordica angusticephalas         Kainkan         9         20         5.7         37         28.5         0.11           34         Erythrina senegalensis         Jenjoko         3         50         4.1         16         33         0.33           37         Raffia hooker         Ako (Raffia palm)         9         20         7         46         33         0.22           38         Trichilia rubescens         Kurere         6         31         5.5         36         35.5         0.17           39<		6	1						
28         Crassocephalum crepidi- oides         Ebolo         3         50         2         3         26.5         0.33           29         Gardenia erubescens         Orunwo         3         50         2         3         26.5         0.33           30         Blighia sapida         Isim         3         50         2         3         26.5         0.10           31         Brachystegia spp.         Akporachi (ERU)         6         31         4.5         22         26.5         0.17           32         Aframomum sceptrum         Ata oguro         6         31         5         26         28.5         0.17           34         Erythrina senegalensis         Ilaka ile         9         20         5.7         37         28.5         0.11           35         Alstonia boonei         Awun         18         8         7.3         54         31         0.06           36         Cissampelos owariensis         Jenjoko         3         50         4.1         16         33         0.22           38         Trichilia nobocer         Ako (Raffia palm)         9         20         7         46         33         0.22           39									
28         oides         E000         3         50         2         3         20.5         0.53           29         Gardenia erubescens         Orunwo         3         50         2         3         26.5         0.33           30         Blighia sapida         Jsin         3         50         2         3         26.5         1.00           31         Brachystegia spp.         Akporachi (EKU)         6         31         4.5         22         26.5         0.17           32         Aframomum sceptrum         Ata oguro         6         31         5         26         28.5         0.11           34         Erythrina senegalensis         Ilaka ile         9         20         6         40         30         0.11           35         Alstonia boonei         Awun         18         8         7.3         54         31         0.06           36         Cissampelos owariensis         Jenjoko         3         50         4.1         16         33         0.22           38         Trichila rubescens         Kurcre         6         31         5.5         36         33.5         0.17           39         Nauclea diderichi	27		Abura	24	/	0.9	45	20	0.08
29         Gardenia erubescens         Orunwo         3         50         2         3         26.5         0.33           30         Blighia sapida         Jsin         3         50         2         3         26.5         1.00           31         Brachystegia spp.         Akporachi (EKU)         6         31         4.5         22         26.5         0.17           32         Aframonum sceptrum         Ata oguro         6         31         5         26         28.5         0.17           33         Momordica angusticephalas         Kainkan         9         20         5.7         37         28.5         0.11           34         Erythrina senegalensis         Ilaka ile         9         20         6         40         30         0.11           35         Alstonia boonei         Awun         18         8         7.3         54         31         0.06           36         Cissampelos owariensis         Jenjoko         3         50         4.1         16         33         0.22           38         Trichilia rubescens         Kurere         6         31         5.5         36         33.5         0.17           39	28		Ebolo	3	50	2	3	26.5	0.33
30         Blighia sapida         Isin         3         50         2         3         26.5         1.00           31         Brachystegia spp.         Akporachi (EKU)         6         31         4.5         22         26.5         0.17           32         Aframonum sceptrum         Ata oguro         6         31         5         26         28.5         0.17           33         Momordica angusticephalas         Kainkan         9         20         5.7         37         28.5         0.11           34         Erythrina senegalensis         Ilaka ile         9         20         6         40         30         0.11           35         Alstonia boonei         Avun         18         8         7.3         54         31         0.06           36         Cissampelos owariensis         Jenjoko         3         50         4.1         16         33         0.33           37         Raffia hooker         Ako (Raffia palm)         9         20         7         46         33         0.22           38         Trichila rubescens         Kurere         6         31         5.5         36         33.5         0.17           39	20				50	-	2	26.5	0.00
31         Brachystegia spp.         Akprachi (EKU)         6         31         4.5         22         26.5         0.17           32         Aframomum sceptrum         Ata oguro         6         31         5         26         28.5         0.17           33         Momordica angusticephalas         Kainkan         9         20         5.7         37         28.5         0.11           34         Erythrina senegalensis         Iaka ile         9         20         6         40         30         0.11           35         Alstonia boonei         Awun         18         8         7.3         54         31         0.06           36         Cissampelos owariensis         Jenjoko         3         50         4.1         16         33         0.33           37         Raffia hooker         Ako (Raffia palm)         9         20         7         46         33         0.22           38         Trichilia rubescens         Kurere         6         31         5.5         36         33.5         0.17           39         Nauclea diderichii         Opepe         3         50         4.2         18         34         0.33           41									
32         Aframomum sceptrum         Ata oguro         6         31         5         26         28.5         0.17           33         Momordica angusticephalas         Kainkan         9         20         5.7         37         28.5         0.11           34         Erythrina senegalensis         Ilaka ile         9         20         6         40         30         0.11           35         Alstonia boonei         Awun         18         8         7.3         54         31         0.06           36         Cissampelos owariensis         Jenjoko         3         50         4.1         16         33         0.33           37         Raffia hookeri         Ako (Raffia palm)         9         20         7         46         33         0.22           38         Trichilia rubescens         Kurere         6         31         5.5         36         33.5         0.17           39         Nauclea diderichii         Opepe         3         50         4.2         18         34         0.06           41         Spondis mombin         Iyeye         18         8         8         60         34         0.06           42									
33         Momordica angusticephalas         Kainkan         9         20         5.7         37         28.5         0.11           34         Erythrina senegalensis         Ilaka ile         9         20         6         40         30         0.11           35         Alstonia boonei         Awun         18         8         7.3         54         31         0.06           36         Cissampelos owariensis         Jenjoko         3         50         4.1         16         33         0.33           37         Raffia hooker         Ako (Raffia palm)         9         20         7         46         33         0.22           38         Trichilia rubescens         Kurere         6         31         5.5         36         33.5         0.17           39         Nauclea diderichi         Opepe         3         50         4.2         18         34         0.06           41         Spondis mombin         Iyeye         18         8         8         60         34         0.06           42         Ceiba pentadra         Eegun         12         17         7.5         56         36.5         0.08           43         Kha									
34         Erythrina senegalensis         Ilaka ile         9         20         6         40         30         0.11           35         Alstonia boonei         Awun         18         8         7.3         54         31         0.06           36         Cissampelos owariensis         Jenjoko         3         50         4.1         16         33         0.33           37         Raffia hookeri         Ako (Raffia palm)         9         20         7         46         33         0.22           38         Trichilia rubescens         Kurere         6         31         5.5         36         33.5         0.17           39         Nauclea diderichi         Opepe         3         50         4.2         18         34         0.03           41         Spondis mombin         Iyeye         18         8         8         60         34         0.06           42         Cerba pentadra         Eegun         12         17         7.5         56         36.5         0.08           43         Khaya ivorensis         Oganvo         9         20         7.3         54         37         0.11           44         Picralima nitid			¥						
35         Alstonia boonei         Awun         18         8         7.3         54         31         0.06           36         Cissampelos owariensis         Jenjoko         3         50         4.1         16         33         0.33           37         Raffia hookeri         Ako (Raffia palm)         9         20         7         46         33         0.22           38         Trichilia rubescens         Kurere         6         31         5.5         36         33.5         0.17           39         Nauclea diderchi         Opepe         3         50         4.2         18         34         0.33           40         Piptedeniastum africanum         Agboin         18         8         8         60         34         0.06           41         Spondis mombin         Iyeye         18         8         8         60         34         0.06           42         Ceba pentadra         Eegun         12         17         7.5         56         36.5         0.08           43         Khaya ivorensis         Oganwo         9         20         7.3         54         37         0.11           44         Picralima nitida </td <td></td> <td>*</td> <td></td> <td></td> <td></td> <td></td> <td></td> <td></td> <td></td>		*							
36         Cissampelos owariensis         Jenjoko         3         50         4.1         16         33         0.33           37         Raffia hooker         Ako (Raffia palm)         9         20         7         46         33         0.22           38         Trichilia rubescens         Kurere         6         31         5.5         36         33.5         0.17           39         Nauclea diderichii         Opepe         3         50         4.2         18         34         0.33           40         Piptedeniastum africanum         Agboin         18         8         8         60         34         0.06           41         Spondis mombin         Iyeye         18         8         8         60         34         0.06           42         Ceba pentadra         Eegun         12         17         7.5         56         36.5         0.08           43         Khaya ivorensis         Oganwo         9         20         7.3         54         37         0.11           44         Picralima nitida         Erin         3         50         5         26         38         0.33           45         Capsolobia lutea </td <td></td> <td></td> <td></td> <td></td> <td></td> <td></td> <td></td> <td></td> <td></td>									
37         Raffia hooker         Ako (Raffia palm)         9         20         7         46         33         0.22           38         Trichilia rubescens         Kurere         6         31         5.5         36         33.5         0.17           39         Nauclea diderichii         Opepe         3         50         4.2         18         34         0.33           40         Piptedeniastrum africanum         Agboin         18         8         8         60         34         0.06           41         Spondis mombin         Iyeye         18         8         8         60         34         0.06           42         Ceiba pentadra         Eegun         12         17         7.5         56         36.5         0.08           43         Khaya ivorensis         Oganwo         9         20         7.3         54         37         0.11           44         Picalima nitida         Erin         3         50         5         26         38         0.33           45         Capsicum spp         Ata ijosi         3         50         5         26         38         0.33           46         Sida veronicifolia			_						
38         Trichilia rubescens         Kurere         6         31         5.5         36         33.5         0.17           39         Nauclea diderichii         Opepe         3         50         4.2         18         34         0.33           40         Piptedeniastrum africanum         Agboin         18         8         8         60         34         0.06           41         Spondis mombin         Iyeye         18         8         8         60         34         0.06           42         Ceiba pentadra         Eegun         12         17         7.5         56         36.5         0.08           43         Khaya ivorensis         Oganwo         9         20         7.3         54         37         0.11           44         Pioralima nitida         Erin         3         50         5         26         38         0.33           45         Capsicum spp         Ata ijosi         3         50         5         26         38         0.33           46         Sida veronicifolia         Esi-ile         3         50         5         26         38         0.33           47         Ocimum basilicum         <			, ,						
39         Nauclea diderichii         Opepe         3         50         4.2         18         34         0.33           40         Piptedeniastrum africanum         Agboin         18         8         8         60         34         0.06           41         Spondis mombin         Iyeye         18         8         8         60         34         0.06           42         Ceiba pentadra         Eegun         12         17         7.5         56         36.5         0.08           43         Khaya ivorensis         Oganwo         9         20         7.3         54         37         0.11           44         Picralima nitida         Erin         3         50         5         26         38         0.33           45         Capsicum spp         Ata ijosi         3         50         5         26         38         0.33           46         Sida veronicifolia         Esi-ile         3         50         5         26         38         0.33           47         Ocimum basilicum         Igi ota         3         50         5         26         38         0.33           48         Carpolobia lutea.         Os				-					
40         Piptedeniastrum africanum         Agboin         18         8         8         60         34         0.06           41         Spondis mombin         Iyeye         18         8         8         60         34         0.06           42         Ceiba pentadra         Eegun         12         17         7.5         56         36.5         0.08           43         Khaya ivorensis         Oganwo         9         20         7.3         54         37         0.11           44         Picralima nitida         Erin         3         50         5         26         38         0.33           45         Capsicum spp         Ata ijosi         3         50         5         26         38         0.33           46         Sida veronicifolia         Esi-ile         3         50         5         26         38         0.33           47         Ocimum basilicum         Igi ota         3         50         5         26         38         0.33           48         Carpolobia lutea.         Osunsun/Sanda         3         50         5         26         38         0.33           50         Dialium guineense         <									
41         Spondis mombin         Iyeye         18         8         8         60         34         0.06           42         Ceiba pentadra         Eegun         12         17         7.5         56         36.5         0.08           43         Khaya ivorensis         Oganwo         9         20         7.3         54         37         0.11           44         Picralima nitida         Erin         3         50         5         26         38         0.33           45         Capsicum spp         Ata ijosi         3         50         5         26         38         0.33           46         Sida veronicifolia         Esi-ile         3         50         5         26         38         0.33           47         Ocimum basilicum         Igi ota         3         50         5         26         38         0.67           48         Carpolobia lutea.         Osunsun/Sanda         3         50         5         26         38         0.33           50         Dialium guineense         Omoyin         6         31         7         46         38.5         0.17           51         Morinda lucida         Oruwo<									
42Cerba pentadraEegun12177.55636.50.08 $43$ Khaya ivorensisOganwo9207.354370.11 $44$ Picralima nitidaErin350526380.33 $45$ Capsicum sppAta ijosi350526380.33 $46$ Sida veronicifoliaEsi-ile350526380.33 $47$ Ocimum basilicumIgi ota350526380.67 $48$ Carpolobia lutea.Osunsun/Sanda350526380.33 $49$ Afzelia AfricanaApa63174638.50.33 $50$ Dialium guineenseOmoyin63174638.50.17 $51$ Morinda lucidaOruwo9207.75939.50.11 $52$ Parquetina nigrescenOgbo9208.366430.11 $53$ Abrus precatoriusOjuologbo6317.55643.50.17 $54$ Musanga cecropioidesAga350640450.33 $55$ Zingiber officinaleAta-ile (Ginger)350640450.33			Ũ						
43         Khaya ivorensis         Oganwo         9         20         7.3         54         37         0.11           44         Picralima nitida         Erin         3         50         5         26         38         0.33           45         Capsicum spp         Ata ijosi         3         50         5         26         38         0.33           46         Sida veronicifolia         Esi-ile         3         50         5         26         38         0.33           47         Ocimum basilicum         Igi ota         3         50         5         26         38         0.67           48         Carpolobia lutea.         Osunsun/Sanda         3         50         5         26         38         0.33           49         Afzelia Africana         Apa         6         31         7         46         38.5         0.33           50         Dialium guineense         Omoyin         6         31         7         46         38.5         0.17           51         Morinda lucida         Oruwo         9         20         7.7         59         39.5         0.11           52         Parquetina nigrescen <td< td=""><td></td><td></td><td></td><td></td><td></td><td></td><td></td><td></td><td></td></td<>									
44       Picralima nitida       Erin       3       50       5       26       38       0.33         45       Capsicum spp       Ata ijosi       3       50       5       26       38       0.33         46       Sida veronicifolia       Esi-ile       3       50       5       26       38       0.33         47       Ocimum basilicum       Igi ota       3       50       5       26       38       0.67         48       Carpolobia lutea.       Osunsun/Sanda       3       50       5       26       38       0.33         49       Afzelia Africana       Apa       6       31       7       46       38.5       0.33         50       Dialium guineense       Omoyin       6       31       7       46       38.5       0.17         51       Morinda lucida       Oruwo       9       20       7.7       59       39.5       0.11         52       Parquetina nigrescen       Ogbo       9       20       8.3       66       43       0.11         53       Abrus precatorius       Ojuologbo       6       31       7.5       56       43.5       0.17         5			Eegun						
45       Capsicum spp       Ata ijosi       3       50       5       26       38       0.33         46       Sida veronicifolia       Esi-ile       3       50       5       26       38       0.33         47       Ocimum basilicum       Igi ota       3       50       5       26       38       0.33         47       Ocimum basilicum       Igi ota       3       50       5       26       38       0.67         48       Carpolobia lutea.       Osunsun/Sanda       3       50       5       26       38       0.33         49       Afzelia Africana       Apa       6       31       7       46       38.5       0.33         50       Dialium guineense       Omoyin       6       31       7       46       38.5       0.17         51       Morinda lucida       Oruwo       9       20       7.7       59       39.5       0.11         52       Parquetina nigrescen       Ogbo       9       20       8.3       66       43       0.11         53       Abrus precatorius       Ojuologbo       6       31       7.5       56       43.5       0.33 <t< td=""><td></td><td></td><td>Oganwo</td><td></td><td></td><td></td><td></td><td></td><td></td></t<>			Oganwo						
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47       Ocimum basilicum       Igi ota       3       50       5       26       38       0.67         48       Carpolobia lutea.       Osunsun/Sanda       3       50       5       26       38       0.33         49       Afzelia Africana       Apa       6       31       7       46       38.5       0.33         50       Dialium guineense       Omoyin       6       31       7       46       38.5       0.17         51       Morinda lucida       Oruwo       9       20       7.7       59       39.5       0.11         52       Parquetina nigrescen       Ogbo       9       20       8.3       66       43       0.11         53       Abrus precatorius       Ojuologbo       6       31       7.5       56       43.5       0.17         54       Musanga cecropioides       Aga       3       50       6       40       45       0.33         55       Zingiber officinale       Ata-ile (Ginger)       3       50       6       40       45       0.33         56       Gossweilerodendron bal-       Apha       3       50       6       40       45       0.33	45	Capsicum spp	Ata ijosi				26		0.33
47       Ocimum basilicum       Igi ota       3       50       5       26       38       0.67         48       Carpolobia lutea.       Osunsun/Sanda       3       50       5       26       38       0.33         49       Afzelia Africana       Apa       6       31       7       46       38.5       0.33         50       Dialium guineense       Omoyin       6       31       7       46       38.5       0.17         51       Morinda lucida       Oruwo       9       20       7.7       59       39.5       0.11         52       Parquetina nigrescen       Ogbo       9       20       8.3       66       43       0.11         53       Abrus precatorius       Ojuologbo       6       31       7.5       56       43.5       0.17         54       Musanga cecropioides       Aga       3       50       6       40       45       0.33         55       Zingiber officinale       Ata-ile (Ginger)       3       50       6       40       45       0.33         56       Gossweilerodendron bal-       Aeba       3       50       6       40       45       0.33	46		Esi-ile				26		0.33
48         Carpolobia lutea.         Osunsun/Sanda         3         50         5         26         38         0.33           49         Afzelia Africana         Apa         6         31         7         46         38.5         0.33           50         Dialium guineense         Omoyin         6         31         7         46         38.5         0.17           51         Morinda lucida         Oruwo         9         20         7.7         59         39.5         0.11           52         Parquetina nigrescen         Ogbo         9         20         8.3         66         43         0.11           53         Abrus precatorius         Ojuologbo         6         31         7.5         56         43.5         0.17           54         Musanga cecropioides         Aga         3         50         6         40         45         0.33           55         Zingiber officinale         Ata-ile (Ginger)         3         50         6         40         45         0.33           56         Gossweilerodendron bal-         Aeba         3         50         6         40         45         0.33	47	Ocimum basilicum	Igi ota	3	50	5	26	38	0.67
49       Afzelia Africana       Apa       6       31       7       46       38.5       0.33         50       Dialium guineense       Omoyin       6       31       7       46       38.5       0.17         51       Morinda lucida       Oruwo       9       20       7.7       59       39.5       0.11         52       Parquetina nigrescen       Ogbo       9       20       8.3       66       43       0.11         53       Abrus precatorius       Ojuologbo       6       31       7.5       56       43.5       0.17         54       Musanga cecropioides       Aga       3       50       6       40       45       0.33         55       Zingiber officinale       Ata-ile (Ginger)       3       50       6       40       45       0.33         56       Gossweilerodendron bal-       Acba       3       50       6       40       45       0.33	48						26		0.33
50         Dialium guineense         Omoyin         6         31         7         46         38.5         0.17           51         Morinda lucida         Oruwo         9         20         7.7         59         39.5         0.11           52         Parquetina nigrescen         Ogbo         9         20         8.3         66         43         0.11           53         Abrus precatorius         Ojuologbo         6         31         7.5         56         43.5         0.17           54         Musanga cecropioides         Aga         3         50         6         40         45         0.33           55         Zingiber officinale         Ata-ile (Ginger)         3         50         6         40         45         0.33           56         Gossweilerodendron bal-         Acba         3         50         6         40         45         0.33		Afzelia Africana							
51         Morinda lucida         Oruwo         9         20         7.7         59         39.5         0.11           52         Parquetina nigrescen         Ogbo         9         20         8.3         66         43         0.11           53         Abrus precatorius         Ojuologbo         6         31         7.5         56         43.5         0.17           54         Musanga cecropioides         Aga         3         50         6         40         45         0.33           55         Zingiber officinale         Ata-ile (Ginger)         3         50         6         40         45         0.33           56         Gossweilerodendron bal-         Aoba         3         50         6         40         45         0.33	50			6			46	38.5	
52         Parquetina nigrescen         Ogbo         9         20         8.3         66         43         0.11           53         Abrus precatorius         Ojuologbo         6         31         7.5         56         43.5         0.17           54         Musanga cecropioides         Aga         3         50         6         40         45         0.33           55         Zingiber officinale         Ata-ile (Ginger)         3         50         6         40         45         0.33           56         Gossweilerodendron bal-         Acha         3         50         6         40         45         0.33			~						
53         Abrus precatorius         Ojuologbo         6         31         7.5         56         43.5         0.17           54         Musanga cecropioides         Aga         3         50         6         40         45         0.33           55         Zingiber officinale         Ata-ile (Ginger)         3         50         6         40         45         0.33           56         Gossweilerodendron bal-         Acha         3         50         6         40         45         0.33									
54Musanga cecropioidesAga350640450.3355Zingiber officinaleAta-ile (Ginger)350640450.3356Gossweilerodendron bal- Gossweilerodendron bal-Acha350640450.33		•	0						
55Zingiber officinaleAta-ile (Ginger)350640450.3356Gossweilerodendron bal- A oha350640450.33			, ,						
56 Gossweilerodendron bal-									
56 Agha $3$ $50$ $6$ $40$ $45$ $0.33$							-		
	56	samiferum	Agba	3	50	6	40	45	0.33

 Table 2.
 Ranking and prioritization of NTFPs in J4 Omo Forest Reserve

57	Cnetis ferruginea	Gboyin-gboyin	3	50	6	40	45	0.33
58	Newbouldia laevis	Akoko	6	31	8	60	45.5	0.17
59	Culcasia saxatilis	Agunmona	6	31	8	60	45.5	0.17
60	Mondia whitei	Isigun	6	31	8	60	45.5	0.17
61	Gongronema latifolium	Iteji	9	20	9.3	72	46	0.22
62	Terminalia ivorensis	Afara dudu	3	50	7	46	48	0.33
63	Hunteria umbellata	Eerin	3	50	7	46	48	0.33
64	Cordia millenii	Omo	3	50	7	46	48	0.33
65	Ficus exasperata	Ipin	3	50	7	46	48	0.33
66	Pativera alliaceae	Awogba	3	50	7	46	48 💧	0.33
67	Ageratum conyzoides	Imi esu	6	31	8.5	67	49	0.17
68	Lophira alata	Pahan	6	31	8.5	67	49	0.17
69	Dichapetalum pallidum	Marigbo	6	31	10	73	52	0.17
70	Boerhavia diffusa	Etiponnla	3	50	8	60	55	0.33
71	Sansevieria trifasciata	Oja ikoko	3	50	8	60	55	0.33
72	Erigeron floribundus	Olowojeja	3	50	8	60	55	0.33
73	Kigelia africana	Pandoro	3	50	9	69	69.5	0.33
74	Rauvolfia vomitoria	Asofeyeje	3	50	10	73	69.5	0.33
75	Euphorbia hirta.	Tomide	3	50	10	73	69.5	0.33

# 3. Results

## 3.1. Checklist of NTFPs

Respondents mentioned a total of seventy five non-timber forest product species distributed in forty three families in the study area (Table 1). The dominants families were Rubiaceae, Apocynaceae, Asclepiadaceae, Asteraceae, Caesalpiniaceae and Zingiberaceae. Products were extracted from trees, shrubs, herbs, fungi and lianas. Local end-uses include food and food supplements, snacks/sweets, soup/soup ingredients/spices, beverages (consumptive plants), packaging leaves, chew-sticks, washing items, construction materials, medicine, traditional rites, and animal feed and care. The most frequently mentioned uses of plants were medicine (n=42; 50.00%), consumptive (n=30; 35.71%), house construction (n=3; 3.57%), traditional rites (n=3; 3.57%) and animal feed and care (n=3; 3.57%). Other uses of listed NTFPs include use as chew-stick (n=2; 2.38%), packaging leaves (n=2; 2.38%), and item for washing and bathing (n=1; 1.19%) (Figure 2).

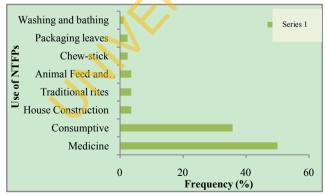


Figure 2. Uses of NTFPs and Frequency in Sampled Communities

#### 3.2. Ranking and Prioritization of NTFPs

Using the Assigned-Value method developed by Adeola *et al.*,[14] and described in the data analysis section, Apon (*Irvingia gabonensis*), Asala (*Tetracarpidium conophorum*),

Pako (Masssularia acuminata), Awopa/Yaani (Annickia *chloranta*) and Ivere (*Piper guineense*) ranked as the five top priority species (Table 2). Applying the Use-Value index; Isin (Blighia sapida), Igi ota (Ocimum basilicum), Afon (Treculia africana), Igi ata (Zanthoxylum zanthoxyloides) and Ayuu (Allium sativum) were the five top priority species. Conversely, on the Use-Value index Apon ranked 71st, Asala 63rd, Pako 72nd, Awopa/Yaani 64th and Iyere 70th. On the other hand, Isin (*Blighia sapida*) ranked 30th, Igi ota (Ocimum basilicum) 47th, Afon (Treculia africana) 11th, Igi ata (Zanthoxylum zanthoxyloides) 12th and Ayuu (Allium sativum) 26th when applying the Assigned-Value method. A general comparison of the two indices shows a fairly positive correlation ( $\rho = 0.59$ ; P< 0.01) between them. When the correlations were further analyzed considering the values obtained for each technique versus the number of times a given species was mentioned, there was a strong negative correlation for the two, being greater for the Use-Value technique ( $\rho = -0.95$ ; P< 0.01) than Assigned-Value method  $(\rho = -0.65; P < 0.01)$ . In other words, there is a general inverse relationship between the number of times a given species was mentioned and its value/ranking in both techniques.

# 4. Discussion

The results of the two quantitative techniques have shown a fairly positive correlation ( $\rho = 0.59$ ; P< 0.01) between the two, suggesting a cautious interchangeable use of the techniques for the same end. According to Philips *et al.*,[23], the Use-Value reflects the importance of a species to the respondent objectively. However, Use-Value places more emphasis on species that have many uses, even if these uses are only known to a few people[22; 24]. The number of uses is therefore the principal factor in this technique. Nonetheless, the technique may indicate how knowledge about a certain plant is distributed in a community[24]. Our findings suggest that the Use-Value, more often than not, gives a higher ranking to species that are more widely used for subsistence or consumptive value. This is contrary to the submission of Philips et al., [23] that Use-Value could be used simultaneously for evaluating species with direct subsistence and commercial value. On the other hand, however, the Assigned-Value gives priority to species that have more commercial value being the major consideration of its inventors. The importance of a plant may therefore, not derives from the different ways it is used. Conversely, the local importance of NTFPs would need to take into account various combinations of objectives such as the species role in subsistence, commercial and socio-cultural activities. While Albuquerque *et al.* [22] have rejected the association of the Use-Value with questions of conservation (i.e. the most important species will suffer the greatest harvesting pressure), the Assigned-Value may support the view that species with high commercial value often face increased exploitation. From the foregoing, it seems both the Use-Value and the Assigned-Value does not capture the same aspect of traditional ecological knowledge of a species. Thus, in evaluating forest types for relative importance and use, the end objectives of such evaluation must be critically examined in the light of the interest of the different respondents' group.

# 5. Conclusions

The use of quantitative techniques has received increasing attention in ethnobotanical studies. Identifying NTFP species with the potential for sustainable and profitable extraction in a managed system may however, not lend easily to quantitative approaches found in the ethnobotanical literatures. Quantitative techniques used in Ethnobotany often reflect cultural value systems than conservation concern or priority of species for socio-economic development. Therefore, determining NTFPs with top priority concern will require the development of criteria for species selection such as economic importance, level of use, species habit and population status. Unlike the setting of approach by experts in ethnobotanical studies, thus, determining the local importance of NTFPs must necessarily be based on participatory resource appraisal.

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