

Full Length Research Paper

Diversity complex of plant species spread in Nasarawa State, Nigeria

Kwon-Ndung, E. H., Akomolafe, G. F.*, Goler, E. E., Terna, T. P., Ittah, M.A., Umar, I.D., Okogbaa, J. I., Waya, J. I. and Markus, M.

Department of Botany, Federal University, Lafia, PMB 146, Lafia, Nasarawa State, Nigeria.

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This research was carried out to assess the plant species diversity in Nasarawa State, Nigeria with a view to obtain an accurate database and inventory of the naturally occurring plant species in the state for reference and research purposes. This preliminary report covers a total of nine local government areas in the state. The work involved intensive survey and visits to the sample sites for this exercise. The diversity status of each plant and the distribution across the state were also determined using standard method. A total of number of 244 plant species belonging to 57 plant families were identified out of which the families, *Asteraceae*, *Poaceae*, *Combretaceae*, *Euphorbiaceae*, *Moraceae* and *Papilionaceae* were the most highly distributed across the entire study area. There was great extent of diversity in the distribution of plants across all the areas sampled with the highest in Wamba LGA. The most predominant food crop across the state was *Sorgum* spp. followed by *Sesame indica* and then *Zea mays*. The total percentage occurrence of herbs, shrubs and trees in the study area are 31.19, 16.29 and 47.91%, respectively. This preliminary work has provided a baseline data and reference point for future taxonomical stratagem in Nasarawa State.

Key words: Herbarium, conservation, Nasarawa, plant diversity.

INTRODUCTION

Biological diversity or biodiversity refers to the variability among living organisms from all sources including, terrestrial, marine and other aquatic ecosystems and the ecological complexes of which they are part. It encompasses the variety of all forms of life on earth, which provides the building blocks for human existence and ability to adapt to environmental changes in the future (FEPA, 2003). Biological diversity involves genetic, species and ecosystem diversity. Estimates of the total number of species range from 5 million to 100 million

globally; though less than 1.7 million have actually been described (FEPA, 2003). Species diversity remains central to the evaluation of diversity at other levels, and is a constant point of reference in biodiversity conservation. Conservation is the planned management of natural resources, to retain the natural balance, diversity and evolutionary change in the environment. It is a protective measure taken; to prevent the loss of genetic diversity of a species; to save a species from becoming extinct and to protect an ecosystem from damage so as to promote

*Corresponding author. E-mail: gfakomolafe@yahoo.com.

Table 1, contd.

22	<i>Panicum baumannii</i> K. Schum.		√	√	√	√	√	√	√	√	√	Very abundant
23	<i>Chromolaena odorata</i> (L.) R.M. King	Siam weed	√	√	√	√	√	√	√	√	√	Abundant
24	<i>Mangifera indica</i> Linn.	Mangoe	√	√	√	√	√	√	√	√	√	Abundant
25	<i>Andropogon gayanus</i> (Hochst.) Hack.		√	X	X	X	√	√	√	√	√	Frequent
26	<i>Uacapa togoensis</i> Pax	Togo Uacapa	X	X	X	X	X	√	√	√	√	Occasional
27	<i>Pennisetum pedicellatum</i> Trin.	Desho grass	√	√	√	√	√	√	√	√	√	Very abundant
28	<i>Piliostigma thonningii</i> (Schum.) Milne-Redh.	Camel's foot	√	√	√	√	√	√	√	√	√	Very abundant
29	<i>Parinari curatellifolia</i> Planch. Ex Benth	Cork tree, Hissing tree	√	X	√	√	√	√	√	√	√	Very abundant
30	<i>Musa paradisiaca</i> Linn.	Plantain	√	X	√	√	√	√	√	√	√	Abundant
31	<i>Elaeis guineensis</i> Jacq.	Oil palm tree	√	√	√	√	√	√	√	√	√	Abundant
32	<i>Zingiber officinales</i> Rosc.	Ginger	√	X	X	X	X	√	√	√	√	Frequent
33	<i>Abelmoschus esculentus</i> (L.) Moench.	Okro	√	√	√	X	X	√	√	√	√	Abundant
34	<i>Achyranthes aspera</i> Linn.		√	X	X	√	√	√	X	X	√	Frequent
35	<i>Synedrella nodiflora</i> (L.) Gaertn.		√	X	X	√	X	X	√	X	X	Frequent
36	<i>Ipomoea batatas</i> Linn.	sweet potatoe	X	√	X	√	√	X	X	√	√	Frequent
37	<i>Ipomea involucrata</i> P. Beauv.	potatoe	√	X	√	X	√	√	√	X	√	Frequent
38	<i>Echiopta spp</i>		√	X	X	X	X	√	X	√	√	Frequent
39	<i>Ageratum conyzoides</i> Linn.	Billy goat weed	X	√	X	√	√	√	X	X	√	Frequent
40	<i>Achyranthes atollensis</i> H.St. John.		√	X	X	X	√	√	√	X	√	Frequent
41	<i>Sida acuta</i> Burm. F.	Wire weed	√	√	√	√	√	√	√	√	√	Very abundant
42	<i>Cissampelos mucronata</i> A. Rich		√	X	X	X	√	X	√	X	√	Frequent
43	<i>Vernonia amygdalina</i> Del.		√	X	√	√	√	X	√	X	√	Frequent
44	<i>Ocimum gratissimum</i> Linn.	Scent tree	√	√	√	√	√	√	√	√	√	Abundant
45	<i>Eragrostis cilianensis</i> (All.) Vignolo ex J.	Love grasses	X	√	X	X	X	√	√	√	√	Frequent

Table 1. Contd.

68	<i>Terminalia avicennoides</i> Guill and Perr.		√	X	√	√	√	√	X	X	√	Frequent
69	<i>Trichilia emetica</i> (Forsskal) Vahl.		X	X	X	√	X	√	√	√	√	Occasional
70	<i>Calopogonium mucunoides</i> (Bentham) Hem.	Calopo	√	√	√	√	√	√	√	√	√	Frequent
71	<i>Brachiaria jubata</i> Stapf.		√	X	X	√	√	X	√	√	√	Occasional
72	<i>Justicia schimperi</i> (Hochst.) Dandy.		X	X	√	√	X	√	√	X	√	Occasional
73	<i>Panicum maximum</i> Jacq.	Forage grass	√	√	√	√	√	√	√	√	√	Frequent
74	<i>Rottboellia cochinchinensis</i> (Lour.) Clayton	Itch grass	X	X	√	√	√	√	√	√	√	Frequent
75	<i>Cleistopholis patens</i> (Benth.) Engl. and Diels.	none	X	X	X	√	X	X	X	X	√	Occasional
76	<i>Ficus carica</i> Linn.		X	X	X	X	√	√	X	√	√	Occasional
77	<i>Alchornea cordifolia</i> (Schum. and Thonn.) Mull.	Christmas bush	√	√	√	√	√	√	√	√	√	Frequent
78	<i>Erythrophleum suaveolens</i> Guill. and Perr.	Red water tree	√	X	X	√	X	X	X	√	√	Occasional
79	<i>Hyperthenea rufa</i> (Nees) Stapf.	Zebra grass, Hausa: Chiyawan zana	X	√	√	√	√	√	√	√	√	Frequent
80	<i>Dioscorea alata</i> Linn.	Cultivated water yam	√	X	√	√	√	X	X	√	√	Occasional
81	<i>Aspilia africana</i> Perris.	Haemorrhag e plant	√	X	√	√	X	√	√	√	√	Frequent
82	<i>Tamarindus indica</i> Linn.	Tamarind, Indian date	X	X	√	√	√	X	√	X	√	Occasional
83	<i>Desmodium velutinum</i> (Willd.) DC.		√	X	√	X	√	√	X	√	√	Occasional
84	<i>Dachrostachys cinerea</i> (Linn.) Wight and Arn.		√	X	√	√	√	√	√	√	√	Frequent
85	<i>Urena lobata</i> Linn.	Ramarama	√	√	√	√	√	√	√	√	√	Very abundant
86	<i>Borreria radiata</i> DC.		X	X	X	X	√	√	√	X	√	Occasional
87	<i>Combretum molle</i> R.Br. ex G. Don.		X	X	X	X	√	√	X	√	√	Occasional
88	<i>Combretu collinum</i> (SIDA) Storrs AEG.		X	X	X	√	√	√	X	√	√	Occasional

Table 1. Contd.

89	<i>Entada africana</i> Guill.	Entada, Monkey's sandal	√	√	X	X	X	√	√	X	√	Frequent
90	<i>Indigofera pulchra</i> Willd.		√	X	√	√	√	X	X	X	√	Frequent
91	<i>Syzygium guineense</i> Willd.		X	√	X	√	√	√	√	√	√	Frequent
92	<i>Waltheria americana</i> Linn.		√	X	√	√	√	√	X	X	√	Frequent
93	<i>Phyllanthus muellerianus</i> Schum. and Thonn.	Hausa: Dandami	√	X	√	X	X	√	X	√	√	Frequent
94	<i>Crotalaria ledermannii</i> Baker F.		√	X	X	√	√	X	√	√	√	Occasional
95	<i>Tephrosia candida</i> (Roxb.) DC.		√	X	√	√	√	X	√	X	√	Frequent
96	<i>Mucuna sloanei</i> Fawc. and Rendle	Horse eye bean	√	X	√	√	√	√	X	X	√	Frequent
97	<i>Emilia praetermissa</i> Milne- Redh		X	X	X	X	X	X	X	X	√	Rare
98	<i>Cissus petiolata</i> Hook. F.		√	X	√	X	√	√	X	√	√	Frequent
99	<i>Hyptis suaveolens</i> (L.) Poit.	Bush tea- bush	√	√	√	√	√	√	√	√	√	Very abundant
100	<i>Cassia tora</i> L.	Foetid cassia	√	√	√	√	X	√	√	√	√	Frequent
101	<i>Costus afer</i> Ker. Gawl.	Common ginger lily	√	X	√	√	X	√	X	√	√	Occasional
102	<i>Zea mays</i> L.	Maize	√	√	√	√	√	√	√	√	√	Frequent
103	<i>Vitex doniana</i> Sw.	Black plum	√	X	X	√	√	√	X	√	√	Frequent
104	<i>Isobertinia doka</i> Craib and Stapf.		√	X	X	√	√	√	X	√	√	Frequent
105	<i>Adenodolichos paniculata</i> (Hua) Hutch.		X	√	√	√	√	X	X	X	√	Occasional
106	<i>Daniella oliveri</i> (Rolfe) Hutch.	African Copuba balsam	√	X	√	√	√	√	√	√	√	Frequent
107	<i>Nelsonia canescens</i> (Lam.) Spreng	Blue pussyleaf	√	X	√	X	X	X	X	X	√	Occasional
108	<i>Hyperrhenia hirta</i> (Linn.) Stapf		√	X	√	√	√	√	√	√	√	Frequent
109	<i>Mimosa pigra</i> Linn.		√	X	√	X	√	X	√	√	√	Occasional
110	<i>Paullinia pinnata</i> Linn.		X	X	√	X	X	X	X	√	√	Occasional
111	<i>Vigna unguiculata</i> (L.) Walp.	Cowpea, bean	√	√	√	√	X	√	√	√	√	Frequent

Table 1, Contd.

112	<i>Newbouldia laevis</i> (P. Beauv.) Seem.	Fertility plant, tree of life	√	X	√	√	√	√	√	√	√	Frequent
113	<i>Oryza sativa</i> Linn.	Rice	√	X	√	√	√	√	√	√	√	Abundant
114	<i>Adansonia digitata</i> Linn.	Baobab	X	X	√	√	√	√	X	X	√	Occasional
115	<i>Euphorbia hirta</i> Linn.	Asthma plant, hairy spurge	√	X	√	X	√	√	√	X	√	Occasional
116	<i>Cassia sieberiana</i> DC.		√	√	√	√	√	√	√	√	√	Abundant
117	<i>Gardenia erubescens</i> Stapf and Hutch.		√	X	√	√	√	X	√	X	√	Frequent
118	<i>Sterculia setigera</i> Delile.		X	√	√	√	X	√	√	√	√	Occasional
119	<i>Byrsocarpus coccineus</i> Schum. and Thonn.		√	X	√	√	X	√	√	√	√	Frequent
120	<i>Tephrosia bracteolata</i> Guill. and Perr.		√	X	√	X	√	√	X	√	√	Frequent
121	<i>Ipomoea involucreta</i> P. Beauv.		√	X	√	X	√	√	X	√	√	Frequent
122	<i>Cochlospermum tinctorium</i> Perr.		√	X	√	√	√	√	√	√	√	Frequent
123	<i>Dialium guineense</i> Willd.	Black or Velvet Lamarind	√	√	√	√	X	√	√	√	√	Frequent
124	<i>Allophyllus africanus</i> P. Beauv.		√	X	√	√	X	√	√	X	√	Frequent
125	<i>Anchomanes difformis</i> (Blume) Engl.	Aroids	√	X	√	√	X	√	X	√	√	Occasional
126	<i>Bidens pilosa</i> Linn.	Black jack, Bur marigold	√	X	√	X	√	√	X	√	√	Occasional
127	<i>Smilax kraussiana</i> Meisn.	West African sarsaparilla	√	X	√	√	√	√	X	√	√	Occasional
128	<i>Desmodium canadense</i> (Linn.) DC.		√	√	√	X	√	X	√	√	√	Frequent
129	<i>Landolphia owariensis</i> P. Beauv.	White rubber vine	√	X	√	√	√	√	√	X	√	Frequent
130	<i>Cissus doeringii</i> Gilg and Brandt.		√	X	√	√	√	√	X	√	√	Frequent
131	<i>Borassius aethiopicum</i> Mart.	Fan palm	√	X	√	√	X	√	X	√	√	Occasional
132	<i>Ficus exasperata</i> Vahl	Sand paper tree	√	X	√	X	X	√	X	√	√	Occasional

Table 1,Contd

158	<i>Ficus capensis</i> Thunb.		√	X	√	√	X	√	√	√	√	Frequent
159	<i>Boswellia dalzielii</i> Hutch.	Frankincens e tree	√	X	√	√	X	√	√	√	√	Frequent
160	<i>Lannea kerstingii</i> Engl. and Krause.		√	X	√	√	X	√	X	√	√	Occasional
161	<i>Monechma ciliatum</i> (Jacq.) Mil.		√	X	√	√	X	√	√	√	√	Frequent
162	<i>Trema orientalis</i> (Linn.) Blume.		√	X	√	√	X	√	X	X	√	Occasional
163	<i>Euphorbia poissonii</i> Fax.	Tiv - Icheu	√	√	√	√	√	X	√	√	√	Frequent
164	<i>Sida cordifolia</i> L.		√	√	√	√	√	√	√	√	√	Very abundant
165	<i>Gynandropsis gynandra</i> (L.) Briq.	Cat whiskers	√	X	√	√	X	√	X	√	√	Frequent
166	<i>Petrocarpus erinaceus</i> Poir.	African Kino	√	√	√	√	X	√	X	√	√	Frequent
167	<i>Setaria pallidifusca</i> Stapf and Hubb.		X	X	√	√	X	√	X	X	√	Occasional
168	<i>Dactyloctenium aegyptium</i> (Linn.) Willd.	Egyptian grass	√	X	√	√	√	X	√	√	√	Frequent
169	<i>Celosia argentea</i> Linn.		√	√	√	√	√	√	√	√	√	Abundant
170	<i>Brachiaria decumbens</i> Stapf.		X	X	√	√	√	X	X	√	√	Occasional
171	<i>Azadiractha indica</i> A. Juss.	Neem tree	√	√	√	√	√	√	√	√	√	Very abundant
172	<i>Eragrostis gangetica</i> (Roxb.) Steud.		√	√	√	√	√	√	√	√	√	Abundant
173	<i>Citrullus vulgaris</i> Schrad.	Melon, Agusi	√	X	√	√	√	√	X	√	√	Frequent
174	<i>Hygrophila spinosa</i> T. Ander.		√	X	√	√	X	√	X	√	√	Frequent
175	<i>Desmodium salicifolium</i> (Poir.) DC.		X	X	√	√	√	√	X	√	√	Frequent
176	<i>Panicum antidotale</i> Retz.		√	√	√	√	√	√	√	√	X	Abundant
177	<i>Amaranthus spinosus</i> Linn.	Pricky amaranth	√	X	√	√	√	√	√	√	√	Frequent
178	<i>Sansevieria liberica</i> Ger. and Labr.		√	X	√	√	√	√	√	√	√	Abundant
179	<i>Lycopersicon esculentum</i> Mill.	Tomatoo	X	√	X	√	X	√	√	X	√	Occasional
180	<i>Pennisetum typhoides</i> (Burm. F.) Stapf.	Millet	√	√	√	X	X	√	√	X	X	Occasional

Table 1, Contd.

181	<i>Physalis angulata</i> Linn.	Tiv - Tampue	√	√	√	X	X	√	√	X	√	Occasional
182	<i>Eclipta alba</i> (L.) Hassk.		√	√	√	X	X	√	√	X	X	Occasional
183	<i>Boerhavia diffusa</i> Linn.		√	√	√	X	X	√	√	X	X	Occasional
184	<i>Cassia occidentalis</i> Linn.	Negro coffee	√	√	√	X	X	√	√	X	√	Frequent
185	<i>Cynodon dactylon</i> (Linn.) Pers.	Carpet grass	X	√	√	X	X	√	√	X	√	Frequent
186	<i>Luffa cylindrical</i> Linn.	Smooth loafah	X	√	√	X	X	√	√	X	√	Occasional
187	<i>Ocimum basilicum</i> Linn.		X	√	√	X	X	√	√	X	X	Occasional
188	<i>Momordica charantia</i> Linn.	African cucumber, balsam peer	X	√	√	X	X	√	X	X	√	Occasional
189	<i>Mitragyna inermis</i> Linn.		√	√	√	X	X	√	X	X	√	Occasional
190	<i>Khaya seneganiensis</i> (Desr.) Juss.	Dry zone mahogany	√	√	√	X	X	√	√	X	√	Frequent
191	<i>Trianthema portulacastrum</i> Linn.		X	√	√	X	X	√	X	X	√	Occasional
192	<i>Combretum platypterus</i> Szys.		√	√	√	X	X	√	X	X	√	Frequent
193	<i>Eucalyptus globulus</i> Labill.	Eucalyptus leaf	√	√	√	√	X	√	√	X	√	Abundant
194	<i>Burkea africana</i> Hook.		√	√	√	X	X	√	√	X	X	Frequent
195	<i>Striga hermonthica</i> (Del.) Benth.	Purple witchweed	X	√	√	√	X	√	√	√	√	Frequent
196	<i>Sesamum indicum</i> Linn.	Beni seed	X	√	√	√	X	√	√	√	√	Frequent
197	<i>Ricinus communis</i> Linn.	Castor oil plant	X	√	√	√	X	√	√	X	√	Frequent
198	<i>Hibiscus sabdariffa</i> Linn.	Red roselle, Zobo	√	√	√	√	X	√	√	√	√	Abundant
199	<i>Calotropis procera</i> (L.) Dryand.	Giant milkweed, Sodom apple	√	√	√	√	√	√	√	√	√	Abundant
200	<i>Commelina benghalensis</i> Linn.		X	√	X	√	X	√	X	√	√	Occasional
201	<i>Boerhavia repens</i> Linn.	Hog weed	X	√	X	√	X	√	X	√	X	Occasional
202	<i>Acanthospermum hispidum</i> (DC.) Kuntze.	Star bur	√	√	X	√	X	√	X	√	√	Frequent

Table 1,Contd.

203	<i>Indigofera hirsuta</i> Linn.		X	√	X	√	X	√	X	√	√	Occasional
204	<i>Altenanthera sessilis</i> (Linn.) R. Br.		√	√	√	√	X	√	X	√	√	Frequent
205	<i>Corchorus tridens</i> Mut.	Bush okra	X	√	X	√	X	√	X	√	√	Occasional
206	<i>Ficus thonningi</i> Blume		√	√	√	√	X	√	√	√	√	Abundant
207	<i>Dracaena smithii</i> (Baker) Hook.		X	√	X	√	X	√	X	√	√	Occasional
208	<i>Tridax procumbens</i> Linn.		√	√	√	√	X	√	X	√	√	Frequent
209	<i>Ficus trichopoda</i> Baker	Tiv – Po	√	√	√	√	√	X	X	√	√	Frequent
210	<i>Berlinia grandifolia</i> (Vahl) Hutch.	Berlinia tree	√	√	√	√	√	X	X	√	√	Abundant
211	<i>Senna alata</i> (Linn.) Roxb.	Ringworm bush	X	√	X	√	X	√	X	√	X	Occasional
212	<i>Crotalaria juncea</i> Linn.		X	√	X	√	X	√	X	√	X	Occasional
213	<i>Terminalia glaucescens</i> Planch.		√	X	√	√	X	√	√	√	√	Frequent
214	<i>Andropogon verticillatus</i> Schum.		√	X	√	√	√	√	√	√	√	Frequent
215	<i>Ficus polita</i> Vahl		√	√	√	√	√	X	√	√	√	Abundant
216	<i>Bambusa vulgaris</i> Schrad	Bamboo	X	X	X	√	X	√	X	√	X	Occasional
217	<i>Plumeria rubra</i> Linn.	Red frangipani	X	√	X	√	X	X	X	√	X	Occasional
218	<i>Datura stramonium</i> Linn.	Jimson weed	X	X	X	√	X	√	X	√	X	Occasional
219	<i>Lagenaria siceraria</i> (Molina) Standl.	Calabash tree	X	√	X	X	X	√	X	√	X	Occasional
220	<i>Gossypium barbadense</i> Linn.	Cotton	X	√	X	X	X	√	X	√	X	Occasional
221	<i>Terminalia catappa</i> Linn.	Almond tree	√	√	X	X	X	√	X	√	X	Occasional
222	<i>Spondias monbin</i> Linn.	Hog plum	X	X	X	X	X	√	X	√	X	Occasional
223	<i>Delonix regia</i> (Hook.) Raf.	Flame of forest	X	X	X	X	X	√	√	√	X	Occasional
224	<i>Indigofera arrecta</i> Hoch.		X	X	X	X	X	√	X	√	X	Occasional
225	<i>Jatropha gossypifolia</i> Linn.		√	X	√	√	√	√	√	√	X	Abundant
226	<i>Sesbania sesban</i> (Linn.) Merr.		√	X	X	X	X	√	X	√	√	Frequent
227	<i>Albizia lebbbeck</i> (Linn.) Benth.	Shade tree	√	X	X	X	X	√	X	√	X	Occasional

Table 1, Contd.

228	<i>Desmodium gangeticum</i> Linn.		√	X	X	√	X	√	X	√	√	Occasional
229	<i>Balanites aegyptiaca</i> (Linn.) Del.	Soap berry tree	√	X	√	√	X	√	X	√	√	Frequent
230	<i>Setaria barbata</i> (Lam.) Kunth.		√	X	X	√	√	√	X	√	√	Occasional
236	<i>Phyllanthus amarus</i> Schum. and Thonn.		X	X	X	X	√	X	X	X	X	Rare
231	<i>Ceiba pentandra</i> (Linn.) Gaertn.	Silk cotton	√	X	X	√	√	√	X	√	X	Occasional
232	<i>Digitaria horizontalis</i> Willd.		√	X	X	√	√	X	X	√	X	Occasional
233	<i>Euphorbia heterophylla</i> Linn.		√	X	X	√	√	X	X	√	X	Occasional
234	<i>Portulaca oleracea</i> Linn.	Portulaca	X	X	X	√	√	√	X	√	X	Occasional
235	<i>Desmodium uncinatum</i> (Jacq.) DC.		√	X	√	√	√	√	X	√	X	Frequent
236	<i>Ipomoea aquatica</i> Forssk.		√	X	√	√	√	√	X	√	√	Frequent
237	<i>Ziziphus mucronata</i> Willd.		X	X	X	X	√	X	X	√	X	Occasional
238	<i>Terminalia superba</i> Engl. and Diels.		X	√	√	√	√	√	X	√	√	Abundant
239	<i>Stylosanthes mucronata</i> Willd.		X	√	√	√	√	√	X	√	√	Abundant
240	<i>Anthocleista djalonensis</i> A. Chev.		X	X	X	√	√	√	X	√	X	Occasional
241	<i>Borreria verticillata</i> (Linn.) Mey.		√	X	X	√	√	√	X	√	X	Occasional
242	<i>Cassia siamea</i> Lam.		√	X	√	√	√	√	√	√	√	Frequent
243	<i>Moringa oleifera</i> Lam.	Moringa	√	√	√	√	√	√	√	√	√	Abundant
244	<i>Carica papaya</i> Linn.	Pawpaw	√	√	√	√	√	√	√	√	√	Abundant

√ Means present, X means absent.

Species abundance

The relative abundance of the identified botanicals within 2 km radius from each of the sampling centers were determined according to Bongers et al. (1988) and Kayode (1999) as: Less than 5 individuals as rare, 5 to 10 as occasional, 11 to 30 as frequent, 31 to 100 as abundant and over 100 individuals as very abundant.

RESULTS

A total number of 244 plant species of different families were identified. There was great diversity in the distribution of plants across all the local governments sampled. However, the highest plant diversity in terms of different species was recorded

in Wamba local government area (Table 1).

Three plants have been identified as rare species namely *Emilia praetermissa*, *Tecoma stans* and *Phyllanthus amarus*. The total percentage occurrence of herbs, shrubs and trees in the 9 local governments are 31.19, 16.29 and 47.91%, respectively (Table 2). A total of 57 plant families

Table 2. Percentage distribution of the life forms of plants in Nasarawa State.

Habit	Local Government Areas								
	Akwanga	Awe	Keffi	Kokona	Nasarawa	Nasarawa eggon	Obi	Toto	Wamba
Percentage of herbs, climbers and grasses	25.71%	36.36%	16.67%	39.39%	31.25%	47.62%	44.44%	29.27%	45.98%
Percentage of shrubs	18.57%	18.18%	33.33%	9.09%	6.25%	4.76%	22.22%	14.63%	19.54%
Percentage of trees	55.71%	45.45%	50%	51.52%	62.5%	47.62%	27.78%	56.09%	34.48%

Table 3. Percentage occurrence of plant families.

S/N	Name of family	Percentage in local government areas									Overall percentage
		Akwanga	Awe	Keffi	Kokona	Nasarawa	Nasarawa eggon	Obi	Toto	Wamba	
1	Acanthaceae	0	0	0	0	0	3.33%	0	0	0.94%	0.47%
2	Agavaceae	0	5%	0	0	0	0	0	0	0	0.56%
3	Anonaceae	2.5%	0	0	2.32%	2.85%	0	4%	3.03%	2.83%	1.95%
4	Ampelidaceae	0	0	0	0	0	0	0	0	1.89%	0.21%
5	Asteraceae	7.5%	10%	9.5%	2.32%	2.85%	3.33%	4%	3.03%	6.6%	5.46%
6	Apocynaceae	2.5%	0	0	4.65%	2.85%	0	0	3.03%	1.89%	1.66%
7	Araceae	2.5%	0	0	2.32%	2.85%	3.33%	4%	3.03%	0.94%	2.11%
8	Araliaceae	0	0	0	0	0	3.33%	0	0	0	0.37%
9	Arecaceae	7.5%	0	0	0	0	0	0	0	0.94%	0.94%
10	Asclepiadaceae	0	0	0	0	0	0	4%	0	0.94%	0.55%
11	Amaranthaceae	0	5%	0	2.32%	0	3.33%	0	0	1.89%	1.39%
12	Anacardiaceae	2.5%	0	0	4.65%	5.71%	3.33%	4%	6.06%	0.94%	3.02%
13	Balanitaceae	0	0	0	0	2.85%	0	0	0	0	0.32%
14	Bignoniaceae	0	0	4.8%	4.65%	0	0	0	0	0.94%	1.15%
15	Bombacaceae	0	0	0	0	2.85%	0	0	3.03%	0.94%	0.76%
16	Burseraceae	0	0	0	0	0	3.33%	0	0	0	0.37%
17	Caesalpiniaceae	7.5%	10%	4.8%	2.32%	2.85%	0	4%	9.09%	6.6%	5.24%
18	Capparidaceae	0	0	0	0	0	3.33%	0	0	0	0.37%
19	Cochlospermaceae	2.5%	0	0	0	0	0	0	0	0	0.28%
20	Combretaceae	0	0	4.8%	2.32%	2.85%	3.33%	4%	6.06%	1.89%	2.81%
21	Commelinaceae	0	0	0	2.32%	0	0	4%	0	0	0.7%
22	Connaraceae	2.5%	0	0	0	0	0	0	0	0.94%	0.38%
23	Convolvulaceae	2.5%	0	14.3%	4.65%	2.85%	3.33%	4%	3.03%	2.83%	4.17%
24	Cucurbitaceae	0	15%	4.8%	4.65%	2.85%	3.33%	0	3.03%	0	3.74%

Table 3, contd.

25	Cyperaceae	0	0	9.5%	6.98%	2.85%	6.67%	4%	3.03%	0.94%	3.77%
26	Dioscoreaceae	0	0	0	2.32%	2.85%	3.33%	4%	0	3.77%	1.81%
27	Euphorbiaceae	2.5%	0	4.8%	2.32%	8.57%	3.33%	4%	3.03%	5%	3.73%
28	Fabaceae	5%	5%	4.8%	2.32%	2.85%	3.33%	4%	3.03%	3.77%	3.79%
	Hymenocardiaceae	0	0	0	0	0	0	0	0	2.83%	0.31%
29	Lamiaceae	0	5%	0	0	0	0	0	0	1.89%	0.77%
30	Liliaceae	0	0	0	2.32%	0	0	0	0	0	0.26%
31	Loganiaceae	0	0	4.8%	0	0	0	0	0	0	0.53%
32	Loranthaceae	0	0	0	0	0	0	0	0	0.94%	0.1%
33	Malvaceae	7.5%	0	4.8%	4.65%	2.85%	10%	4%	6.06%	1.89%	4.64%
34	Meliaceae	2.5%	10%	0	2.32%	0	0	0	3.03%	0	1.98%
35	Menispermaceae	0	0	0	0	0	0	0	0	0.94%	0.1%
36	Mimosaceae	2.5%	0	4.8%	2.32%	2.85%	3.33%	4%	3.03%	2.83%	2.85%
37	Moraceae	2.5%	0	4.8%	2.32%	5.71%	3.33%	0	12.1%	1.89%	3.63%
38	Myrtaceae	0	0	0	2.32%	0	3.33%	4%	6.06%	1.89%	1.96%
39	Musaceae	0	0	0	4.65%	2.85%	3.33%	0	0	0.94%	1.31%
40	Nyctaginaceae	2.5%	0	0	0	0	0	8%	0	0.94%	1.27%
41	Ochnaceae	0	0	0	0	0	0	0	0	0.94%	0.1%
42	Papilionaceae	7.5%	0	4.8%	6.98%	2.85%	3.33%	4%	3.03%	8.49%	4.55%
43	Pedaliaceae	0	0	0	0	0	0	4%	0	0.94%	0.55%
44	Poaceae	7.5%	20%	9.5%	9.3%	5.71%	10%	4%	6.06%	14.2%	9.59%
45	Portulacaceae	0	0	0	0	2.85%	0	0	0	0	0.32%
46	Rhamnaceae	0	0	0	0	2.85%	0	0	0	0	0.32%
47	Rubiaceae	2.5%	0	0	0	0	0	0	0	3.77%	0.69%
48	Rutaceae	2.5%	0	0	2.32%	2.85%	3.33%	4%	0	0.94%	1.77%
49	Sapotaceae	2.5%	0	0	0	0	0	0	0	0.94%	0.38%
50	Sapindaceae	0	0	0	0	0	0	0	0	0.94%	0.1%
51	Smilacaceae	2.5%	0	0	0	0	0	0	0	0	0.28%
52	Solanaceae	2.5%	10%	4.8%	2.32%	5.71%	3.33%	4%	3.03%	0.94%	4.07%
53	Sterculiaceae	2.5%	0	0	2.32%	2.85%	0	0	0	0.94%	0.96%
54	Tiliaceae	2.5%	5%	0	0	0	0	4%	0	0.94%	1.38%
55	Verbanaceae	5%	0	0	0	5.71%	3.33%	4%	6.06%	1.89%	2.89%
56	Vitaceae	0	0	0	2.32%	0	0	0	0	0	0.26%
57	Zingiberaceae	0	0	0	0	0	0	0	0	1.89%	0.21%

Table 4. The predominant food crops in all the local governments.

S/N	Local Government Area	Predominant Food Crop
1	Akwanga	<i>Sorghum bicolor</i>
2	Awe	<i>Sorghum bicolor</i>
3	Keffi	<i>Sorghum bicolor</i>
4	Kokona	<i>Sorghum bicolor</i>
5	Nasarawa	<i>Sorghum bicolor</i>
6	Nasarawa Eggon	<i>Curcubita</i> spp. and <i>Sorghum</i>
7	Obi	<i>Sorghum bicolor</i>
8	Toto	<i>Sorghum bicolor</i> and <i>Sesame indica</i> .
9	Wamba	<i>Musa sapientum</i> and <i>Zea mays</i>

were identified out of which the families Asteraceae, Poaceae, Combretaceae, Euphorbiaceae, Moraceae and Papilionaceae were the most highly distributed across the entire 9 local government areas (Table 3). Poaceae family has the highest overall percentage distribution across the entire nine local government areas. The predominant food crops in all the local governments are *Musa sapientum*, *Zea mays*, *Sorghum bicolor*, *Curcubita* spp. and *Sesame indica* (Table 4). Trees have the highest percentage occurrence and spread across the entire areas sampled in the state. Awe local government area has the lesser diversity of plant species.

DISCUSSION

The lower percentage distribution recorded in some of the identified plant families could be attributed to some of the factors affecting indigenous biodiversity in Nigeria. The destruction of natural habitats as observed by Imeht and Adebobola (2001) continues in Nigeria at a rapid rate in which about 65 of 560 species of trees are now faced with extinction, while many others are at different stages of risk; thereby, leading to the depletion of the country's biodiversity. Awe local government area which recorded the lowest diversity of plant species is suspected to be due to the effects of intensive salt mining activities in the area. However, the outcome of this research agrees with the report of Kutama et al. (2015) that Nigeria is so much blessed with almost uncountable number of plant species.

The massive rate of deforestation is a direct cause of biodiversity loss (Borokini et al., 2010) and Nigeria has been declared to have the highest rate of deforestation of primary forests in the world (FAO, 2005). Also, Eneobong (1997), reported that the rapid reducing rate of Africa's forests and bioresources is linked with civil war, conversion of land for agriculture, wild fires, poor management of available land, uncontrolled search for food, fuel wood, medicine, construction timber, over-grazing by cattle, displacement and loss of landraces, lower yielding varieties, pests and diseases, pollution

(e.g. acid rain) and incomplete knowledge of the biology of many plants, especially the propagation genetics aspect and adaptability of many forest plants.

Furthermore, Nasarawa state has been described as an agrarian state with large percentage of the masses engaged in farming of crops such as sorghum, sesame, cassava and agro-allied activities (Abu et al., 2012). Farming and cultivation of food crops have dominated some of the local governments in the state such as Obi, Kokona, Akwanga, Nasarawa and Keffi leading to loss of some plants species.

This is similar to the report of Aliyu et al. (2013) on the impact of deforestation on the socio-economic activities of Akwanga, Nasarawa State that the area has been seriously affected negatively by erosion, bush-burning and fire-wood fetching activities. According to Uyoh et al. (2003), there has to be a balance between the uses of bioresources and their conservation thereby preserving an ecosystem, which although altered would still be rich in bioresources and at the same time would provide food and other needs as well as perform vital environmental functions on a long term basis.

The highest plant diversity distribution observed in Wamba Local Government Area could be attributed to lesser disturbances of the natural ecosystem. In addition, there is a large area of protected land by government in this local government. In line with the mandate of some governmental agencies and NGOs like Nigerian conservation foundation (NCF), the National Resources Council (NARECO) in collaboration with the United Nations Environmental Programme (UNEP) and the World Wide Fund (WWF) engaged in protecting and preserving the country's biodiversity, this research has provided a baseline account of the preponderance diversity status of some of the plants in Nasarawa State. Three plants *Emilia praetermissa*, *Tecoma stans* and *Phyllanthus amarus* were identified as rare species and deliberate conservation strategies need to be adopted appropriately to avoid total genetic erosion or extinction.

Of these valuable species. In addition, the loss of biodiversity due to deforestation should be minimized when it is necessary to utilize natural vegetation in order

to create industrial development (Akinnibosun and Omatsola, 2011). This preliminary work has provided a baseline data and reference point for future taxonomical and biosystematics stratagem in Nasarawa State. It is thereby recommended that priority must be placed on creating protected areas across all the local government areas that will prevent indiscriminate exploitation of plant resources in Nasarawa State. Also, the use and implementation of the Environmental Impact Assessment (EIA) before embarking on any construction projects in the state must be encouraged.

Conflict of interest

The authors have not declared any conflict of interest

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