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Assessment of Forest Elephant (*Loxodonta cyclotis* Matschie, 1900) Diets in Omo Forest Reserve, Southwestern Nigeria

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Abstract
The study assessed forest elephant diets in Omo Forest Reserve, Southwestern Nigeria. A total of 20 transects of 1 km length in each of elephant sanctuary and adjoining farmlands were laid and enumerated. Results showed that elephants in Omo Forest Reserve fed on 43 species of plants belonging to 32 taxonomic families. About 56.45% of all identified food species were consumed during the rainy season, while 43.55% were consumed during the dry season. The elephants were mainly browsers and there was no significant difference in the utilization of plant parts in both rainy and dry seasons ($\chi^2 = 11.09$; df = 7; $P > 0.05$). There was also a weak correlation between abundance of plants and preference by elephants (Pearson correlation value = 0.238; P-Value = 0.107). The findings are relevant for the conservation of the forest elephants and improved management of its shrinking habitat.

Keywords: forest elephant; micro-histological faecal analysis; food preference; food utilization pattern

Introduction
Forest elephants are often regarded as generalist feeders because they consume a wide range of plants to sustain themselves (Stephenson, 2007). Indeed, the African forest elephant is expected to be least selective among herbivores in its dietary range because it is a hindgut fermenter in addition to being a large extant herbivore (Owen-Smith & Chafota, 2012). Past studies in West and Central Africa have shown that forest elephants have a highly varied diet of browse, bark, wood, roots, and fruit (Powell, 1997; Short, 1981; Tchamba & Seme 1993; White, Tutin, & Fernandez, 1993). However, the reduction in food availability due to loss of habitat has become a source of concern for elephant conservation in many parts of Africa as elephants now travel great distances outside their forest habitat in search of food and other resources.

Although elephant populations have decreased, in general, their local density has increased due to habitat loss, thereby causing resource competition among elephants on one hand, and increased human–elephant conflict on the other (Koirala, Raubenheimer, Aryal, Pathak, & Ji, 2016). In Nigeria, forest elephants are found in few sites within the southern part of the country. The elephants are facing severe threats due largely to heavy pressure on the rainforest habitats where they live (Amusa, Omonu, Olabode, & Newton, 2017). Given this precarious situation of the elephants, knowledge of their foraging patterns is important for understanding their habitat requirements and

assessing their habitat condition for effective management.

The number of studies documenting the feeding behaviours of forest elephants in selected ranges in Africa are few (De Boer *et al.*, 2000; Blake, 2002; Campos-Arceiz & Blake, 2011). There is a dearth of empirical studies on the diet of forest elephants in Nigeria. In fact, information on this is rare and largely undocumented for the country. Information on food plant species, the rate of consumption and seasonal preference and composition are important for elephant conservation in terms of habitat management and human–elephant conflict mitigation. In the light of the above, this study seeks to investigate the food species and preferences of the forest elephants in Omo forest reserve, southwestern Nigeria. It is believed that large herbivores such as elephants require extensive home ranges to satisfy their high food demand, and reduction in food availability due to loss of habitat may create challenges for elephant conservation.

Materials and Methods

Study area

Omo forest reserve is located in southwestern Nigeria between Latitudes 6º 35' - 7º 05'N and Longitudes 4º19' - 4º 40'E in the Ijebu East and North Local Government Areas of Ogun State (Figure 1). It covers an area of about 1,305 km^2 forming common boundaries with Osun, Ago-owu and Shasha forest reserves in Osun State and Oluwa forest reserve in Ondo State, all of which also share some common natural endowments. It is a mixed moist, semi-evergreen rainforest in the Congolian sub-unit of the Guinea-Congolian Centre of Endemism or Phytochorion (Ola-Adams, 2014). 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, with November and February being the driest months (Isichei, 1995). Temperature ranges from 32.15^{0}C to 21.40^{0}C and a minimum relative humidity of 76.34 % (Adebisi, 2004).

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* (Ojo, 2004). Most of the forest are disturbed with a substantial part converted to monoculture plantations of the fast-growing exotic *Gmelina arborea* tree. The Nigerian government in 1946 established a 460 ha Strict Nature Reserve (SNR) within the reserve. It was upgraded to a Biosphere Reserve (BR) in 1977 by UNESCO owing to its richness in biological diversity (Obioho, 2005; Amusa, 2014). It is an IUCN category IV reserve. It was, therefore, expected to be a managed nature reserve/wildlife sanctuary with several objectives that are aimed at protecting biodiversity but permitting human use where this is compatible with forest conservation. Nevertheless, the ecological integrity of the reserve is threatened by increasing migrant farmers and high rate of logging operations among other anthropogenic activities. In spite of this, the forest still harbours one of the last remaining populations of elephant, chimpanzee and white throated monkeys in the southwestern part of Nigeria (Ikemeh, 2013). Interventions from the government and various conservation agencies (Nigeria Conservation Foundation, Paington Zoo, UK and Pro-Natura International Nigeria) in order to mitigate threats to the rich biodiversity of the reserve have become inevitable. Part of these interventions involved establishing a wildlife sanctuary covering an area of about 37,500ha ≈ 29% of the forest reserve. The wildlife sanctuary is made up of elephant (30,000ha ≈ 23%) and chimpanzee (7,500ha ≈ 6%) areas or camps. However, the management of the areas has been quite fortuitous owing to ineffective institutionalization and poor law enforcement to halt most of the anthropogenic activities affecting biodiversity conservation.

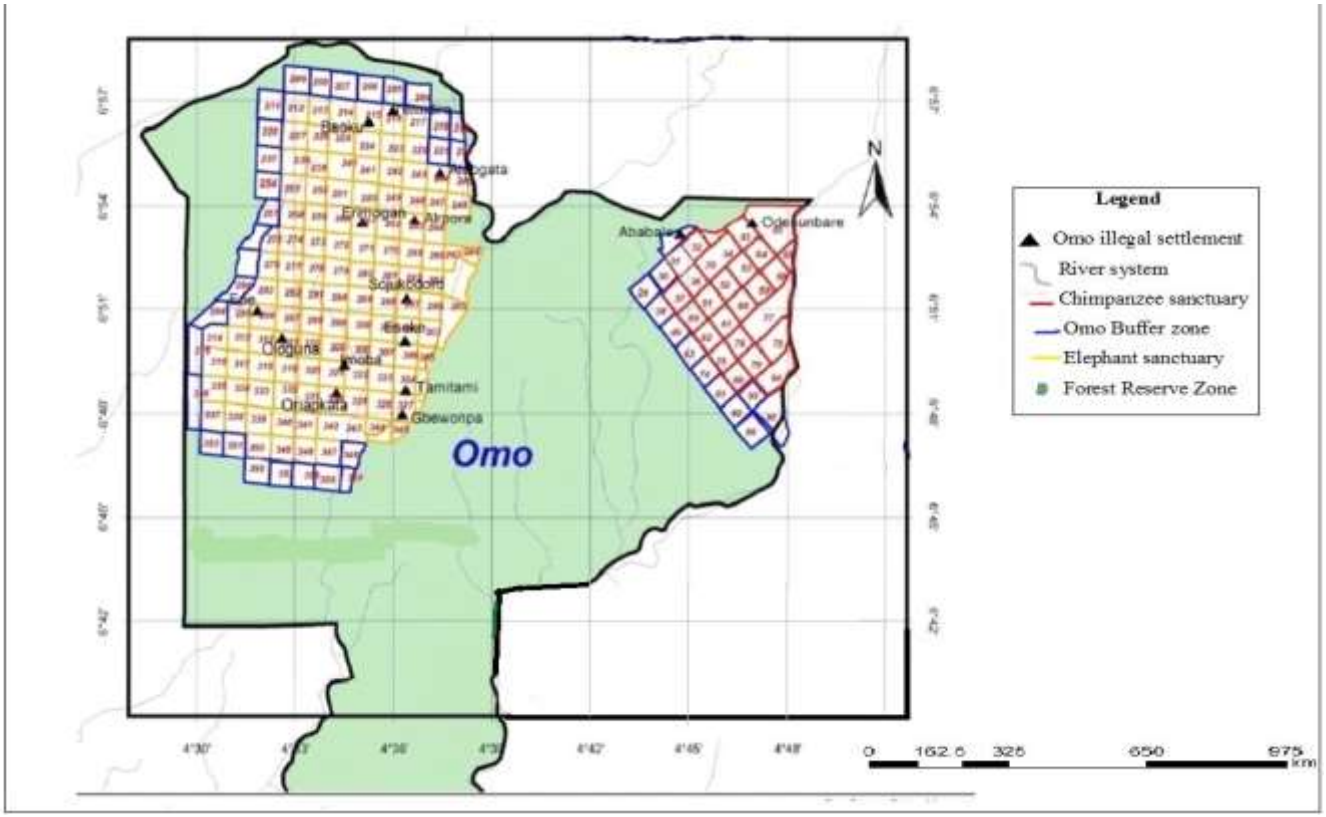

Figure 1: Map of Omo forest reserve (Left-hand corner grid lines show the elephant sanctuary)
Source: NCF and Field Survey, 2018.

Data Collection and Analysis

Given the high rate of migration of elephants from the reserve, it was inconceivable to observe directly elephant feeding behaviour and food selection in both the elephant sanctuary and farmlands. Therefore, data collection relied on opportunistic observations of feeding signs, fresh elephant trails, and dung analysis. Opportunistic observations involved notes on all feeding sign observed which could be positively attributed to elephants. Elephant tusk marks or obvious signs of leaf stripping using the trunk also allowed positive identification. The trails taken by elephants were also followed and all the plants and their parts showing signs of being fed upon by elephants were recorded in transect surveys. In addition, samples of elephant dung encountered during the field survey were analysed in situ and ex situ. In situ, each dung encountered was broken up with small sticks and the contents examined for fibre, leaf, wood/bark, and fruit remains. All identifiable remains were recorded to species level. The micro-plant fragments were further collected for ex situ assessment through micro-histological faecal analysis (Sparks & Malechek, 1968). In this regard, specimens of all plant species, which appeared to be eaten by elephants from the feeding signs observations were collected from all sites. These specimens were sun-dried and used for the preparation of reference slides. The collected faecal samples were temporarily preserved in 5% formalin solution. The preparation of the faecal samples followed the same protocol used for preparing the reference material after which fragments in the dung samples was identified by comparison with fragments and drawings made from the reference slides. Identification was based on epidermal characteristics (Koirala *et al.*, 2016; Davis, 2003; Johnson *et al.*, 1983).

For each identified food species, elephant feeding sign was scored according to the intensity of consumption made on it. The definition of scores for bark followed the procedure of Koirala *et al.* (2016). Furthermore, food preferences of elephants were determined based on frequency of utilization of plants through repeated transects survey during rainy and dry season. A total of 20 transects of 1 km length in each of elephant sanctuary and adjoining farmlands were laid and enumerated in order to compare the availability of food plants within and outside the sanctuary areas. Data on

frequency, density and basal area of food plants were collected.

Total feeding score for each food plant was calculated by multiplying the frequency of each plant species showing feeding signs with total feeding sign score of that species. Total feeding score of each species was then multiplied by 100 and divided by the total feeding score of all species to calculate an index equivalent to utilisation percent. This was used to calculate preference index for each species. Furthermore, the importance value index (IVI) of a plant species in each habitat (elephant sanctuary and farmlands) was calculated by adding the relative frequency, density and basal area for trees (Koirala *et al.*, 2016). The preference index (PI) was also calculated following the method of Fritz *et al.* (1996):

$$\text{Preference Index (PI)} = \frac{\text{Utilization percentage}}{\text{Percentage availability in the environment}}$$

The Chi-square test was used to test for differences in feeding preferences between plant parts and seasons. Pearson correlation was used to determine the correlation between forage availability and preference.

Results

Elephant Food Species in Omo Forest Reserve

Elephants in Omo forest reserve fed on 43 species of plants belonging to 32 taxonomic families (Figure 2). Eight of these plant species were encountered in farmland within the project area (Table 1). Of these number, only four species were cultivated while three species were found in both farmland and elephant sanctuary. Thirty-eight plant species that served as elephant food in the area were found exclusively in the elephant sanctuary (Table 2). Plant species in the families Apocynaceae, Aracaceae, Ebenaceae, Fabaceae, Meliaceae, Moraceae, Piperaceae, Sterculiaceae represent about 44.19% of total plants consumed by the elephants.

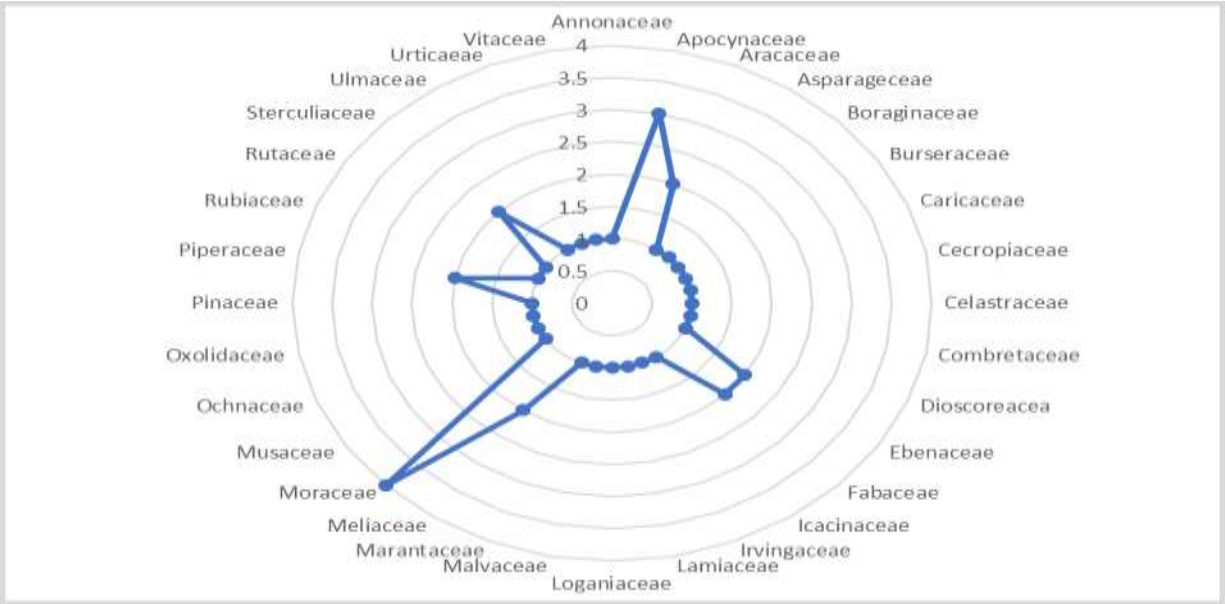

Figure 2: Distribution of elephant food plant by taxonomic family in the project area
*The points and values at the rings show cluster and similarity among plant families encountered.

Table 1: Plant species utilized as food by elephants in farmland within the project area

S/N	Family	Scientific name	Parts utilized	Status
1	Aracaceae	*Elaeis guineensis*, Jacq.	Fruit	Cultivated and Wild
2	Araceae	*Xanthosoma mafaffa*, Schott.	Corms	Wild
3	Asparageceae	*Dracaena mannii*, Baker.	Leaves	Wild
4	Caricaceae	*Carica papaya*, L.	Fruit	Cultivated
5	Moraceae	*Ficus exasperata*, Vahl.	Bark	Wild
6	Musaceae	*Musa paradisiaca*, L.	Fruit	Cultivated
7	Piperaceae	*Piper guineense*, Schumach.	Leaves	Wild
8	Sterculiaceae	*Theobroma cacao*, L.	Pod and seeds	Cultivated

Table 2: Plant species utilized as food by elephants in elephant sanctuary within the project area

S/N	Family	Scientific name	Parts utilized	Status
1	Annonaceae	*Cleistopholis patens* (Benth.) Engl. & Diels	Bark	Wild
2	Apocynaceae	*Alstonia boonei* De Wild.	Leaves	Wild
3	Apocynaceae	*Voacanga africana* Stapf.	Bark	Wild
4	Apocynaceae	*Rauvolfia vomitoria* Afzel.	Leaves	Wild
5	Aracaceae	*Elaeis guineensis*, Jacq	Fruit	Cultivated and Wild
6	Aracaceae	*Xanthosoma mafaffa*, Schott.	Corms	Wild
7	Asparageceae	*Dracaena mannii*, Baker	Leaves	Wild
8	Boraginaceae	*Cordia millenii* Bak.	Bark	Wild
9	Burseraceae	*Canarium schweinfurthii* Engl.	Bark	Wild
10	Cecropiaceae	*Musanga smithii* R.Br.	Leaves	Wild
11	Celastraceae	*Salacia madagascariensis* Lam. DC.	Bark	Wild
12	Combretaceae	*Terminalia ivorensis* A. Chev.	Fruits	Wild
13	Dioscoreacea	*Dioscorea spp.*	Tuber	Wild
14	Ebenaceae	*Diospyros dendo*Wew.ex Hiern.	Bark and Leaves	Wild
15	Ebenaceae	*Diospyros sp.*	Bark and Leaves	Wild
16	Fabaceae	*Baphia nitida* Lodd.	Fruits and Seeds	Wild
17	Fabaceae	*Brachystegia nigerica* Hoyle & A.P.D. Jones	Fruits and Seeds	Wild
18	Icacinaceae	*Icacina tricantha* Oliv.	Tuber	Wild
19	Irvingaceae	*Irvingia gabonensis* (Aubry-Lecomte ex O'Rarke) Baill.	Fruits and Seeds	Wild
20	Lamiaceae	*Gmelina arborea* Roxb.	Bark and Seeds	Wild
21	Loganiaceae	*Anthocleista vogeli* Planch.	Leaves	Wild
22	Malvaceae	*Ceiba pentandra* (L.) Gaertn.	Bark and Leaves	Wild
23	Marantaceae	*Thaumatococcus danielli* (Benn,) Benth.	Leaves	Wild
24	Meliaceae	*Khaya ivorensis* A. Chev.	Fruits	Wild
25	Meliaceae	*Entadrophragma utile* Sipo (Dawe & Sprague) Sprague	Bark	Wild
26	Moraceae	*Ficus exasperata* Vahl	Bark	Wild
27	Moraceae	*Ficus sp.*	Bark	Wild
28	Moraceae	*Ficus mucuso* Welw. ex Filcaho	Bark	Wild
29	Moraceae	*Ficus ingens* Miq.	Bark	Wild
30	Ochnaceae	*Lophira alata* Banks ex Gaertn.	Leaves	Wild
31	Olacaceae	*Strombosia pustulata* Oliv.	Leaves	Wild
32	Oxolidaceae	*Oxalis corniculata* L.	Fruit	Wild
33	Pinaceae	*Pinus spp.*	Bark	Wild
34	Piperaceae	*Piper guineense* Schumach.	Leaves	Wild
35	Rubiaceae	*Nauclea diderrichii* (De Wild.& T.Durand) Merrill	Bark and Seeds	Wild
36	Rutaceae	*Zanthoxylum zanthoxyloides* (Lam.) Zepern. & Timbler	Bark	Wild
37	Sterculiaceae	*Cola gigantea* A. Chev.	Bark	Wild
38	Tiliaceae	*Desplatsia sp.*		Wild
39	Ulmaceae	*Celtis zenkeri* Engl.	Leaves and Bark	Wild
40	Urticaeae	*Musanga smithii* R.Br.	Leaves	Wild
41	Vitaceae	*Cissus spp.*	Bark	Wild

Elephant Foraging Patterns

The utilisation pattern of food species by elephants in the project area suggests that 56.45% of all identified food species were consumed during the rainy season, while 43.55% were consumed during the dry season (Tables 3 and 4). The elephants were mainly browsers. But there was no significant difference in the utilization of plant parts by elephants in both rainy and dry seasons (χ^2 = 11.09; df = 7; P >

0.05). The bark, foliage (leaves and twigs), fruit and seeds of browsed trees were selected for consumption (Figure 3). During the dry season, 44.83% bark, 37.93% leaves, 13.79% fruit and seeds were consumed, while others such as corms and tubers constituted 3.45%. Similar pattern was observed for the rainy season, where 48.72% bark, 28.21% leaves, 20.51% fruit and seeds were consumed, while others such as corms and tubers constituted 2.56%. It was also noted that elephants occasionally fed in the farmland only during the dry season.

Table 3: Plant species utilized as food by elephants during dry season within the project area

S/N	Family	Scientific name	Parts utilized	Status
1	Apocynaceae	*Alstonia boonei* De Wild.	Leaves	Wild
2	Apocynaceae	*Voacanga africana* Stapf.	Bark	Wild
3	Apocynaceae	*Rauvolfia vomitoria* Afzel.	Leaves	Wild
4	Aracaceae	*Elaeis guineensis*, Jacq	Fruit	Cultivated and Wild
5	Aracaceae	*Xanthosoma mafaffa*, Schott.	Corms	Wild
6	Asparageceae	*Dracaena mannii*, Baker	Leaves	Wild
7	Caricaceae	*Carica papaya*, L.	Fruit	Cultivated
8	Celastraceae	*Salacia madagascariensis* Lam. DC.	Bark	Wild
9	Ebenaceae	*Diospyros dendo*Wew.ex Hiern.	Bark and Leaves	Wild
10	Lamiaceae	*Gmelina arborea* Roxb.	Bark and Seeds	Wild
11	Loganiaceae	*Anthocleista vogeli* Planch.	Leaves	Wild
12	Malvaceae	*Ceiba pentandra* (L.) Gaertn.	Bark and Leaves	Wild
13	Marantaceae	*Thaumatococcus danielli* (Benn) Benth.	Leaves	Wild
14	Moraceae	*Ficus exasperata* Vahl	Bark	Wild
15	Moraceae	*Ficus sp.*	Bark	Wild
16	Moraceae	*Ficus mucuso* Welw. ex Filcaho	Bark	Wild
17	Moraceae	*Ficus ingens* Miq.	Bark	Wild
18	Musaceae	*Musa paradisiaca*, L.	Fruit	Cultivated
19	Olacaceae	*Strombosia pustulata* Oliv.	Leaves	Wild
20	Piperaceae	*Piper guineense* Schumach.	Leaves	Wild
21	Rubiaceae	*Nauclea diderrichii* (De Wild.& T.Durand) Merrill	Bark and Seeds	Wild
22	Rutaceae	*Zanthoxylum zanthoxyloides* (Lam.) Zepern. &Timbler	Bark	Wild
23	Sterculiaceae	*Theobroma cacao*, L.	Pod and seeds	Cultivated
24	Tiliaceae	*Desplatsia sp.*		Wild
25	Ulmaceae	*Celtis zenkeri* Engl.	Leaves and Bark	Wild
26	Urticaeae	*Musanga smithii* R.Br.	Leaves	Wild
27	Vitaceae	*Cissus spp.*	Bark	Wild

Table 4: Plant species utilized as food by elephants during rainy season within the project area

S/N	Family	Scientific name	Parts utilized	Status
1	Annonaceae	*Cleistopholis patens* (Benth.) Engl. & Diels	Bark	Wild
2	Apocynaceae	*Alstonia boonei* De Wild.	Leaves	Wild
3	Apocynaceae	*Voacanga africana* Stapf.	Bark	Wild
4	Apocynaceae	*Rauvolfia vomitoria* Afzel.	Leaves	Wild
5	Boraginaceae	*Cordia millenii* Bak.	Bark	Wild
6	Burseraceae	*Canarium schweinfurthii* Engl.	Bark	Wild
7	Celastraceae	*Salacia madagascariensis* Lam. DC.	Bark	Wild
8	Combretaceae	*Terminalia ivorensis* A. Chev.	Fruits	Wild
9	Ebenaceae	*Diospyros dendo*Wew.ex Hiern.	Bark and Leaves	Wild
10	Ebenaceae	*Diospyros sp.*	Bark and Leaves	Wild
11	Fabaceae	*Baphia nitida* Lodd.	Fruits and Seeds	Wild
12	Fabaceae	*Brachystegia nigerica* Hoyle & A.P.D. Jones	Fruits and Seeds	Wild
13	Icacinaceae	*Icacina tricantha* Oliv.	Tuber	Wild
14	Irvingaceae	*Irvingia gabonensis* (Aubry-Lecomte ex O'Rarke) Baill.	Fruits and Seeds	Wild
15	Lamiaceae	*Gmelina arborea* Roxb.	Bark and Seeds	Wild
16	Loganiaceae	*Anthocleista vogeli* Planch.	Leaves	Wild
17	Malvaceae	*Ceiba pentandra* (L.) Gaertn.	Bark and Leaves	Wild
18	Marantaceae	*Thaumatococcus danielli* (Benn) Benth.	Leaves	Wild
19	Meliaceae	*Khaya ivorensis* A. Chev.	Fruits	Wild
20	Meliaceae	*Entadrophragma utile* Sipo (Dawe & Sprague) Sprague	Bark	Wild
21	Moraceae	*Ficus exasperata* Vahl	Bark	Wild
22	Moraceae	*Ficus sp.*	Bark	Wild
23	Moraceae	*Ficus mucuso* Welw. ex Filcaho	Bark	Wild
24	Moraceae	*Ficus ingens* Miq.	Bark	Wild
25	Ochnaceae	*Lophira alata* Banks ex Gaertn.	Leaves	Wild
26	Olacaceae	*Strombosia pustulata* Oliv.	Leaves	Wild
27	Oxolidaceae	*Oxalis corniculata* L.	Fruit	Wild
28	Pinaceae	*Pinus spp.*	Bark	Wild
29	Rubiaceae	*Nauclea diderrichii* (De Wild.& T.Durand) Merrill	Bark and Seeds	Wild
30	Rutaceae	*Zanthoxylum zanthoxyloides* (Lam.) Zepern. &Timbler	Bark	Wild
31	Sterculiaceae	*Cola gigantea* A. Chev.	Bark	Wild
32	Tiliaceae	*Desplatsia sp.*		Wild
33	Ulmaceae	*Celtis zenkeri* Engl.	Leaves and Bark	Wild
34	Urticaeae	*Musanga smithii* R.Br.	Leaves	Wild
35	Vitaceae	*Cissus spp.*	Bark	Wild

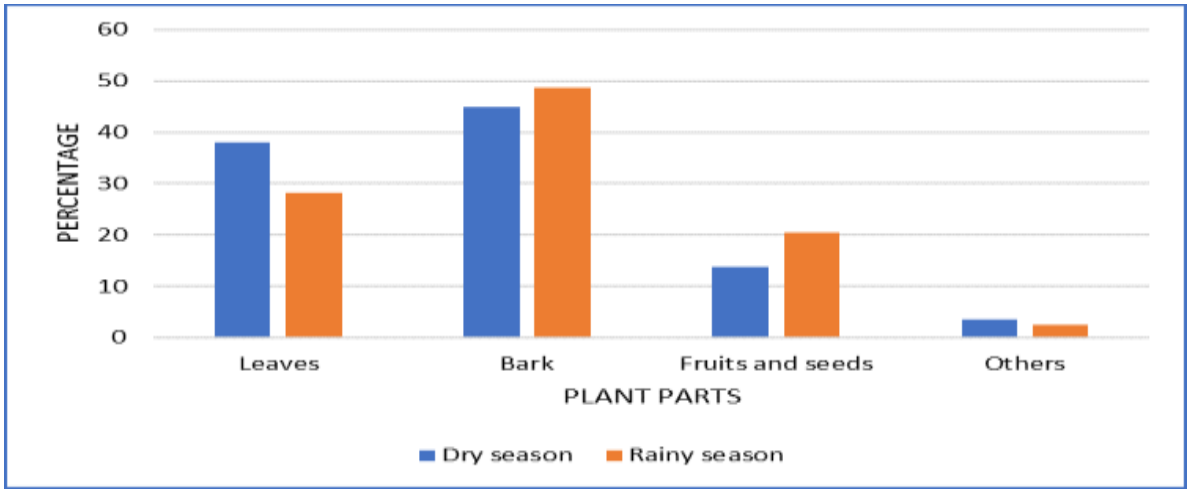

Figure 3: Frequency distribution of plant parts utilized by elephant in dry and rainy seasons

Food Availability and Species Preferences by Elephant in OFR

The elephants showed a high preference index (PI) score for 17 out of the 43 utilized plant species (Figure 4). These include: *Alstonia boonei, Brachystegia nigerica, Ceiba pentandra, Celtis zenkeri, Cleistopholis patens, Cissus spp., Desplathia sp., Dracaena mannii, Elaeis guineensis, Ficus ingens, Ficus mucuso, Khaya ivorensis, Musanga smithii, Nauclea diderrichii, Rauvolfia vomitoria, Thaumatococcus danielli,* and *Zanthoxyllum zanthozyloides*. In addition to these species, the elephants also showed a strong preference for *Cacarica papaya, Theobroma cacao,* and *Musa paradisiaca* in the farmland. However, there is a weak correlation between abundance of plants and preference by elephants (Pearson correlation value = 0.238; P-Value = 0.107).

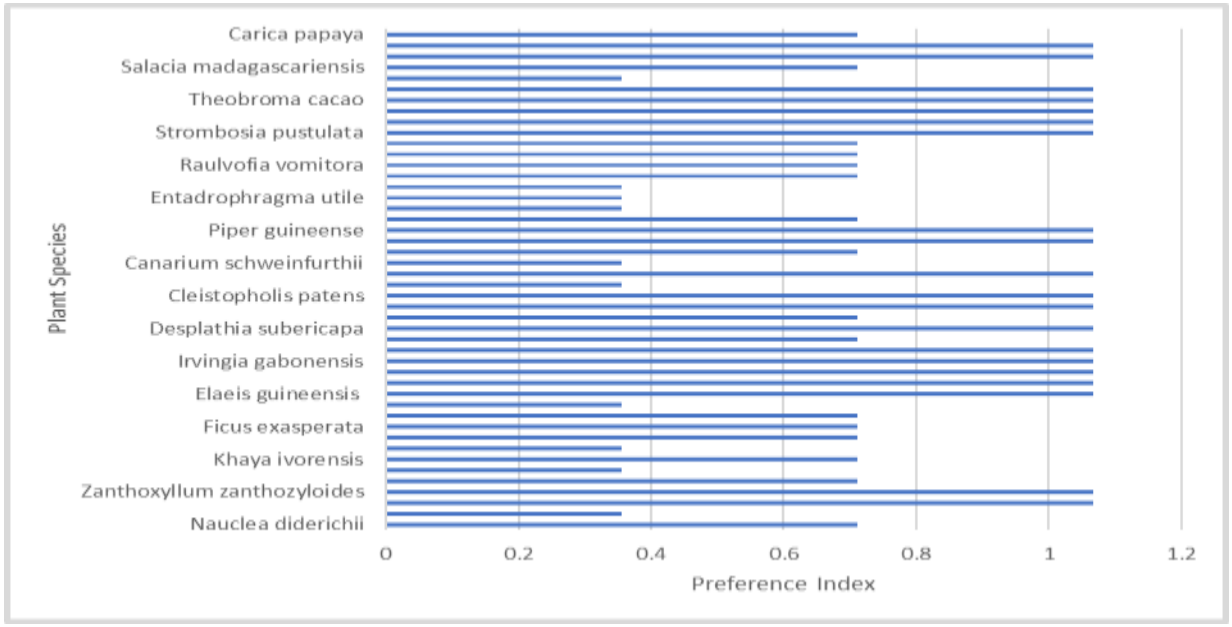

Figure 4: Preference indices (PI) for selected plant species in the project area

Discussion

Elephant Food Species in Omo Forest Reserve

The present work on elephant diets in Omo forest reserve recorded 43 plant species within 32 families that were foraged upon by the forest elephants. Species including: *Irvingia gabonensis, Ficus sp., Musanga cecropioides, Strombosia sp., Desplatsia sp.* are common plants identified in this study and that of Danquah and Oppong (2014). In a similar study,

Blake (2002) working in the Ndoki Forest of northern Congo, reported over 100 species from 73 families as elephants' diet. De Boer *et al.* (2000) identified at least 95 species from dung contents alone, in a more diverse vegetation mosaic of mangrove, woodland, forest, and grassland in Mozambique. Tchamba and Seme (1993) listed only 39 species eaten by forest elephants in the Santchou reserve, Cameroon, 17 of which were fruit. In the Lopé forest reserve, Gabon, forest elephants ate at least 304 food items from 230 plant species in 52 families (White et al., 1993). In Kibale Forest, Uganda, (Wing & Buss, 1970) reported over 200 woody plant species utilised by elephants. In the Bia forest, Ghana, Short (1981) recorded 170 species of food plant, 135 of which were browse species and 35 species were fruits identified from dung. Merz (1981) recorded 44 fruit species in elephant diet in the Tai forest, Ivory Coast. The wide range of results between studies may be due to differences in the number and diversity of plant species available in each of the study areas.

Elephant Foraging Patterns

In this study, it has been shown that browse flora were predominant in elephant's diet for both rainy and dry season in Omo forest reserve. Bark and leaves accounted for over 75% of plant parts consumed by the elephants. This is inspite of the fact that elephants are generally regarded as mixed feeders (Sukumar, 1989). In the Ndoki Forest, bark made up 25% of feeding events while Short (1981) found that bark was relatively infrequently selected by elephants in Ghana, which accounted for just 3% of feeding events and was limited to few species. Nevertheless, our finding is partly in tune with the submission of Campos-Arceiz and Blake (2011) that the African forest elephant is mostly a browser and frugivore rather than the grazing and browsing habit exhibited by the savanna elephant. In actual fact, there is paucity of grass species in the study area.

Food Availability and Species Preferences by Elephant in OFR

There is a weak correlation between availability of plants and preference by elephants in this study. This suggests a strong food selection by the elephants, thereby indicating specific preferences (Raubenheimer, 2011). This is further corroborated by the fact that there was no significant difference in the types of food plants available to the elephants in both rainy and dry seasons. The most important food species to the forest elephants are leaves of *Alstonia boonei, Dracaena mannii, Musanga smithii, Rauvolfia vomitoria, Thaumatococcus danielli,* fruits and seeds of *Brachystegia nigerica, Elaeis guineensis,* bark and leaves of *Ceiba pentandra, Ficus mucuso, Celtis zenkeri,* bark of *Cleistopholis patens, Cissus spp., Desplathia sp., Ficus ingens,* fruits of *Khaya ivorensis,* bark and seeds of *Nauclea diderrichii,* and *Zanthoxyllum zanthozyloides*. This agrees partly with the findings of Danquah and Oppong (2014). The elephants also showed a strong preference for fruits of *Cacarica papaya, Theobroma cacao,* and *Musa paradisiaca.* The implications of the feeding patterns for crop-raiding activities by elephants in surrounding farmlands is minimal. However, the diversity of elephant food and their preferences in different seasons also show that the elephants in Omo forest reserve have a high tendency to increase their home range so as to satisfy their food demand.

Conclusion

This current work provides baseline information about different types of natural food available in Omo forest reserve, and their relative importance in the diets of elephants in the area. Although the number of elephant food species in this study is less diverse when compared with other works on forest elephant within the West African sub-region, yet the information is important for realising successful outcomes for the conservation of the forest elephants and improved management for the long-term protection of this endangered species and its shrinking habitat. It is important to create a conducive environment for the elephants by recreating their habitat through management effort on some of the identified plant species.

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