

A Checklist of Nectariferous and Polleniferous Plants of African Honeybees (*Apis mellifera adansonii* L.) in Awka, Nigeria

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Abstract

The study on a checklist of nectariferous and polleniferous plants of African honeybees (*Apis mellifera adansonii*) was carried out in Awka between May, 2014 and April, 2015. The survey of the plants in the study area was done twice a week in all the locations during the study period. The plants were collected and identified. The plant species attractive to the honeybees were categorized into: nectar, pollen and nectar and pollen plants. A total of 69 nectariferous and polleniferous plant species categorized into 31 families with Asteraceae 11 (16%) being the highly visited followed by the families: Euphorbiaceae 6 (9%) and Malvaceae/Verbenaceae 5 (7%). *Harungana madagascariensis*, *Plastostoma africanum*, *Pegoletia senegalensis*, *Spigelia anthelmia*, *Panicum maximum* and *Stachytarpheta jamaicensis* are being reported for the first time as plants visited by honeybees in Awka region. The flowering periods of the plants differed seasonally, with more flowering in the rainy season. The extensive cultivation and propagation, and conservation of these important honeybees plant species in the study area were suggested to improve honey production in Awka.

Key words: Nectar, Pollen, Plant families, *Apis mellifera adansonii*, Awka

INTRODUCTION

The predominant honeybees species in Africa is the African honeybees (*Apis mellifera adansonii*) which is well adapted to the African ecological conditions (Abdullahi *et al.*, 2011) and gathers its own food throughout the year (Adjare, 1990). Plants are essential to the African honeybees' life. The production of honey depends on an abundant supply of nectar and pollen producing plants within easy flight range of the bee colony. African honeybees (*Apis mellifera adansonii*) are one of the most important pollinators of angiosperms (Waykar *et al.*, 2014; Akunne, 2015). They visit diverse flowers of plant species, foraging for nectar and pollen (Abel and Banjo, 2012) and while doing that they pollinate the flowers (Akunne, 2015),

thereby helping to increase fruit and seed-setting both in wild and cultivated plants (Dukku, 2013).

Nectar forms the basis of honey, the energy rich (carbohydrate) food that honeybees need to sustain the life of the colony while pollen provides the protein, vitamins and other nutrients required for the developing larva. The honeybees transform the nectar into honey by adding enzymes, changing the sugars into a simpler form, reducing the water content and storing the crop so that it will keep and does not have to be consumed immediately (Adjare, 1990). Thus transformation and storage of nectar and pollens allow them to survive across a wide range of habitats and climatic conditions (Rahman, 2006).

Studies in various ecological zones in Nigeria have revealed a great availability of nectariferous and polleniferous

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plants of honeybees in the country. In the Sudan Savanna zone of northeastern Nigeria, Abdullahi *et al.* (2011) and Dukku (2013), identified a total of 103 and 61 plant species respectively, foraged by the Africa honeybees. Dukku (2013) revealed the members of family Fabaceae to be predominant. In guinea savanna, Zaria, Mbah and Amao (2009) identified 28 flowering plant species visited by African honeybees with the family Leguminosae being the largest followed by Asteraceae. In the South-western Nigeria, Ayansola and Davies (2012) reported 49 plant species belonging to different families. Nnamani and Uguru (2012) identified 56 honey plants belonging to 32 families, in South-South region of Nigeria.

There is dearth of information on nectariferous and polleniferous plants resources of African honeybees in Awka, southeast, Nigeria. Therefore, this serves as the rationale for this study. The objectives of this study are to identify the nectariferous and polleniferous plants of the honeybees in Awka, with a view to determine flowering period and abundance of the plants which could be exploited by beekeepers.

MATERIALS AND METHODS

Study area

The study was carried out in Nnamdi Azikwe University Awka. Awka lies within coordinates 6°12'_N and 7°04'_E (Onyido *et al.*, 2011). The six locations selected from the campus include: Apiary section and Fisheries Hatcheries unit of the Department of Zoology, Emelda Hostel, Unizik Primary School, Library and Faculty of Engineering areas, within the Nnamdi Azikiwe University permanent site Awka, and a parcel of land (farmland) in Enu-Ifite Awka. Apiary section and Fisheries Hatcheries unit, Department of Zoology is within E: 291046.427, N: 691554.263, the Emelda Hostel area (E: 291022.614, N: 691788.42), Unizik Primary School area (E: 291205.177, N: 692006.701), Library area (E: 291550.459, N: 691042.293), Faculty of Engineering area (E: 291665.533, N: 691006.

571), Enu-Ifite (E: 289886.858, N: 691207.854).

The Apiary section and Fisheries Hatcheries unit of the Department of Zoology comprise of cultivated areas having crops such as maize (*Zea mays*) and cassava (*Manihot esculenta*) and forest areas. Emelda hostel area was a cultivated landscape comprising of water leaves mainly. The Unizik Primary School area was a natural environment with a stream flowing through it. Library and Enu-Ifite areas were cultivated while Faculty of Engineering area has both cultivated and forest areas.

Collection and identification of nectariferous and polleniferous plants

The collection of the nectariferous and polleniferous plants for African Honeybees was done on each location twice a week between 8am-10am in the morning and 4~6pm in the evening, during the study periods. Before collection, plants with foraging honeybees were photographed with a digital camera of model Panasonic DMC-LZ 7. Only plants with honeybees found foraging on the flowers were collected and identified *in situ* using keys provided in Mann *et al.* (2013). Plants that could not be identified *in situ* were collected using a sharp kitchen knife; making sure that portion/twig of the plant with its botanical features like leaves and flowers were cut and placed in a wetted polythene bag, and immediately sent to Department of Botany herbarium, Nnamdi Azikiwe University, Awka for proper identification by a taxonomist. Those that could not be identified were placed horizontally in between two newspaper sheets to absorb moisture and placed in a plant file bag and sent to Department of Botany herbarium, University of Uyo, Uyo within 24 hours with information on the name of collector, place of collection and date of collection were provided, for identification by a taxonomist. The observations of the foraging behaviour of the honeybees on the flowers of such plants were done by observing for a period of 10 minutes and has been reported in literature (Abdullahi *et al.*, 2011; Wayar *et al.*, 2014). The observation on nectar and pollen source was based on activities performed by the honeybees on different flowers.

Table 1. A Checklist of nectariferous and polleniferous plants of *Apis mellifera adansonii* in Awka Anambra State, Nigeria

Family	Common name	Plant species scientific name	Type	Plant product	
Asteraceae	Haemorrhage weed	<i>Aspilia africana</i>	H	N	P
Asteraceae	White flowered haemorrhage	<i>Aspilia bussei</i>	H	N	P
Asteraceae	Cobblers pegs	<i>Bidens pilosa</i>	H	N	P
Asteraceae	Siam weed	<i>Chromolaena odorata</i>	S	N	P
Asteraceae	Yellow tassel flower	<i>Emilia coccinea</i>	H	N	P
Asteraceae	Goat weed	<i>Ageratum conyzoides</i>	H	N	P
Asteraceae	-	<i>Pegolettia senegalensis</i>	H	N	P
Asteraceae	Coat buttons	<i>Tridax procumbens</i>	H	N	P
Asteraceae	Iron weed	<i>Vernonia ambigua</i>	H	N	P
Asteraceae	Bitter leaf	<i>V.amygdalina</i>	S	N	P
Asteraceae	Little iron weed	<i>V.cinerea</i>	H	N	P
Acanthaceae	Chinese violet	<i>Asystasia gangetica</i>	H	N	P
Anacardiaceae	Mango	<i>Mangifera indica</i>	T	N	P
Annonaceae	African pepper	<i>Xylopia aethiopica</i>	T	N	P
Caesalpiniaceae	Japanese	<i>Chamaecrista mimosoides</i>	S	N	P
Caesalpiniaceae	Negro coffee	<i>Senna occidentalis</i>	S	N	P
Amaranthaceae	Globe amaranth	<i>Gomphrena globosa</i>	H	N	P
Amaranthaceae	Purple princess	<i>Cyathula prostrata</i>	H	N	P
Caricaceae	Pawpaw	<i>Carica papaya</i>	T	N	P
Clusiaceae	Harungana	<i>Harungana madagascariensis</i>	T	N	P
Capparidaceae	Chicken weed	<i>Cleome viscosa</i>	H	N	P
Commelinaceae	Spreading day flower	<i>Commelina diffusa</i>	H	N	-
Comelinaceae	Wandering jaw	<i>C. benghalensis</i>	H	N	-
Cucurbitaceae	Melon	<i>Citrullus vulgaris</i>	H	N	P
Cucurbitaceae	Sponge plant	<i>Luffa cylindrica</i>	H	N	P
Cucurbitaceae	Fluted pumpkin	<i>Cucurbita maxima</i>	H	N	P
Combretaceae	Bush willows	<i>Combretum sp</i>	S	N	-
Euphorbiaceae	Croton	<i>Croton hirtus</i>	S	-	-
Euphorbiaceae	Japanese poinsettia	<i>Euphorbia heterophylla</i>	H	N	P
Euphorbiaceae	Euphorbia	<i>Phyllanthus discoidens</i>	T	N	-
Euphorbiaceae	Cassava	<i>Manihot esculenta</i>	H	N	-
Euphorbiaceae	Mallotus	<i>Mallotus subulatus</i>	S	N	P
Euphorbiaceae	Castor oil	<i>Ricinus communis</i>	S	N	P
Fabaceae	Giant sensitive plant	<i>Mimosa invisa</i>	S	N	P
Fabaceae	Schrankia	<i>Schrankia leptocarpa</i>	S	N	P
Melastomataceae	Melastomastra	<i>Melastomastrum capitatum</i>	H	N	P
Malvaceae	Triumfetta bur	<i>Triumfetta rhomboidea</i>	S	N	P
Malvaceae	Sida	<i>Sida garckeana</i>	S	N	P
Malvaceae	Broomweed	<i>S. acuta</i>	H	N	P
Malvaceae	Hibiscus bur	<i>Urena lobata</i>	H	N	P
Malvaceae	Bur weed	<i>Triumfetta cordifolia</i>	S	N	P
Musaceae	Banana	<i>Musa sapientum</i>	H	N	-
Rubiaceae	Guinea peach	<i>Sarcocephalus latifolius</i>	S	N	P
Rubiaceae	Brimstone tree	<i>Morinda lucida</i>	T	-	P
Rubiaceae	Small square weed	<i>Mitracarpus villosus</i>	H	N	P
Lamiaceae	Pignut	<i>Hyptis suaveolens</i>	H	N	P
Lamiaceae	Dalziel	<i>Plastostoma africanum</i>	H	N	P
Verbenaceae	Teak	<i>Tectona grandis</i>	T	-	P
Rutaceae	Orange	<i>Citrus sinensis</i>	T	N	P
Longaniaceae	Worm bush	<i>Spigelia anthelmia</i>	H	N	P
Onagraceae	Water primrose	<i>Ludwigia decurrens</i>	H	N	-
Onagraceae	Water primrose	<i>L. abyssinica</i>	H	N	-

Table 2. Continued

Plant name	Flowering period											
	Rainy season					Dry season						
	May	June	Jul	Aug	Sep	Oct	Nov	Dec	Jan	Feb	Mar	Apr
<i>Combretum spp.</i>	-	+	+	+	+	-	-	-	-	-	-	-
<i>Croton hirtus</i>	-	-	+	+	+	+	+	-	-	-	-	-
<i>Euphorbia heterophylla</i>	+	+	+	+	+	+	+	+	-	-	+	+
<i>Phyllanthus discoidens</i>	-	+	+	+	+	-	-	-	-	-	-	-
<i>Manihot esculenta</i>	-	-	+	+	+	+	+	-	-	-	-	-
<i>Mallotus subulatus</i>			+	+	+	+	+	-	-	-	-	-
<i>Ricinus communis</i>	-	-	-	+	+	+	+	+	-	-	-	-
<i>Mimosa invisa</i>	-	-	-	+	+	-	-	-	-	-	-	-
<i>Schrankia leptocarpa</i>	-	+	+	+	+	+	+	+	-	-	-	-
<i>Melastomastrum capitatum</i>	-	+	+	+	+	+	+	-	-	-	-	-
<i>Triumfetta rhomboidea</i>	-	-	-	+	+	+	+	-	-	-	-	-
<i>Sida garckeana</i>	-	+	+	+	+	-	-	+	+	+	+	+
<i>S. acuta</i>	-	+	+	+	+	-	-	-	-	-	-	-
<i>Urena lobata</i>	-	-	-	+	+	+	+	+	+	+	+	-
<i>Triumfetta cordifolia</i>	-	-	-	-	+	+	+	+	+	+	+	-
<i>Musa sapientum</i>	-	+	+	+	+	-	-	-	-	-	-	-
<i>Sarcocephalus latifolius</i>	-	+	+	+	-	-	-	-	-	-	-	-
<i>Morinda lucida</i>	-	-	+	+	-	-	-	-	-	+	+	-
<i>Mitracarpus villosus</i>	-	+	+	+	+	+	-	-	-	-	-	-
<i>Hyptis suaveolens</i>	-	-	-	+	+	+	+	+	+	+	-	-
<i>Plastostoma africanum</i>	-	-	-	+	+	+	+	-	-	-	+	+
<i>Tectona grandis</i>	-	+	+	+	-	-	-	-	-	-	-	-
<i>Citrus sinensis</i>	-	-	+	+	+	-	-	-	-	+	+	-
<i>Spigelia anthelmia</i>	-	+	+	+	+	+	+	-	-	-	-	-
<i>Ludwigia decurrens</i>	-	-	+	+	+	+	+	+	+	-	-	+
<i>L. abyssinica</i>	-	-	+	+	+	+	+	+	+	-	-	+
<i>Talinum triangulare</i>	-	+	+	+	+	-	-	-	-	+	+	+
<i>Physalis angulata</i>	-	+	+	+	+	+	+	-	-	-	-	-
<i>Schwenkia americana</i>	-	+	+	+	+	-	-	-	+	+	+	+
<i>Solanum torvum</i>	-	+	+	+	+	+	+	+	+	+	+	+
<i>Zea mays</i>	+	+	-	+	+	+	-	-	-	-	-	-
<i>Panicum maximum</i>	-	+	+	+	-	-	-	-	-	-	-	-
<i>Clappertonia ficifolia</i>	-	+	+	+	+	+	+	+	-	-	-	-
<i>Stachytarpheta cayennensis</i>	-	+	+	+	+	+	+	-	-	-	-	-
<i>S. jamaicensis</i>	-	+	+	+	+	-	-	-	-	-	-	-
<i>Lantana camara</i>	-	+	+	+	+	+	+	-	-	-	-	-
<i>Laportea aestuans</i>	-	-	+	+	+	+	-	-	-	-	-	-
<i>Terminalia glaucoscens</i>	-	-	-	+	+	+	-	-	-	-	-	-
<i>Waltheria indica</i>	-	-	-	+	+	+	+	+	-	-	-	-
<i>Psidium guajava</i>	-	-	-	-	-	-	-	+	+	+	-	-

Keys: + = blossom months; - = not blossom months.

The honeybees with their activity of extending their proboscis into the flowers were considered as nectar source plant species and the bees carrying pollen on their hind legs were recorded as pollen source plants. Honeybees with their activity of extending their proboscis into the flowers

and also collecting pollen on their hind legs were considered as nectar and pollen yielding plants (Bista and Shivakoti, 2001; Waykar *et al.*, 2014). Flowering periods of the plants species were determined during the surveys.

Table 3. The Total number and Relative Abundance of the Nectariferous and Polleniferous Plants in Awka in the Rainy and Dry Season

Plant Species	Rainy season		Dry season	
	Total number	Relative abundance (%)	Total number	Relative abundance (%)
<i>Aspilia africana</i>	1589	9.70	1464	15.15
<i>Harungana madagascariensis</i>	23	0.14	0	0.00
<i>Tridax procumbens</i>	2878	17.57	1670	17.28
<i>Stachytarpheta cayennensis</i>	320	1.95	0	0.00
<i>S. jamaicensis</i>	91	0.56	0	0.00
<i>Sida garckeana</i>	348	2.12	158	1.63
<i>S. acuta</i>	162	0.99	0	0.00
<i>Spigelia anthelmia</i>	447	2.73	0	0.00
<i>Emilia coccinea</i>	139	0.85	107	1.11
<i>Ageratum conyzoides</i>	250	1.53	67	0.69
<i>Plastostoma africanum</i>	286	1.75	112	1.16
<i>Pegoletia senegalensis</i>	4372	26.69	3164	32.73
<i>Gomphrena globosa</i>	141	0.86	0	0.00
<i>Sarcocephalus latifolius</i>	8	0.05	0	0.00
<i>Vernonia cinerea</i>	479	2.92	252	2.61
<i>V. ambigua</i>	868	5.30	1257	13.00
<i>V. amygdalina</i>	0	0.00	54	0.56
<i>Mitracarpus villosus</i>	66	0.40	0	0.00
<i>Melastomastrum capitatum</i>	82	0.50	0	0.00
<i>Zea mays</i>	535	3.27	0	0.00
<i>Senna occidentalis</i>	2	0.01	0	0.00
<i>Schwenkia Americana</i>	119	0.73	68	0.70
<i>Triumfetta cordifolia</i>	128	0.78	61	0.63
<i>Urena lobata</i>	123	0.75	74	0.77
<i>Cyathula prostrata</i>	106	0.65	0	0.00
<i>Manihot esculenta</i>	100	0.61	0	0.00
<i>Musa sapientum</i>	5	0.03	1	0.01
<i>Talinum triangulare</i>	165	1.01	25	0.26
<i>Croton hirtus</i>	240	1.46	0	0.00
<i>Physalis angulata</i>	11	0.07	0	0.00
<i>Chamaecrista mimosoidea</i>	153	0.93	0	0.00
<i>Clappertonia ficifolia</i>	156	0.95	27	0.28
<i>Triumfetta rhomboidea</i>	28	0.17	5	0.05
<i>Euphorbia heterophylla</i>	254	1.55	172	1.78
<i>Schrankia leptocarpa</i>	1080	6.59	456	4.72
<i>Ludwigia decurrens</i>	24	0.15	10	0.10
<i>L. abyssinica</i>	19	0.12	8	0.08
<i>Aspilia bussei</i>	62	0.38	0	0.00
<i>Waltheria indica</i>	10	0.06	0	0.00
<i>Chromolaena odorata</i>	0	0.00	409	4.23
<i>Commelina diffusa</i>	80	0.49	0	0.00
<i>C. benghalensis</i>	41	0.25	0	0.00
<i>Panicum maximum</i>	5	0.03	0	0.00
<i>Xylopiya aethiopia</i>	62	0.38	14	0.14
<i>Ricinus communis</i>	4	0.02	2	0.02
<i>Bidens pilosa</i>	49	0.30	0	0.00
<i>Asystasia gangetica</i>	104	0.63	0	0.00
<i>Solanum torvum</i>	13	0.08	9	0.09
<i>Psidium guajava</i>	7	0.04	5	0.05
<i>Cleome viscosa</i>	20	0.12	0	0.00

Table 3. Continued

Plant Species	Rainy season		Dry season	
	Total number	Relative abundance (%)	Total number	Relative abundance (%)
<i>Combretum sp</i>	27	0.16	0	0.00
<i>Citrus sinensis</i>	3	0.02	3	0.03
<i>Lantana camara</i>	36	0.22	8	0.08
<i>Laportea aestuans</i>	25	0.15	0	0.00
<i>Morinda lucida</i>	1	0.01	0	0.00
<i>Luffa cylindrical</i>	21	0.13	0	0.00
<i>Mallotus subulatus</i>	3	0.02	2	0.02
<i>Cucurbita maxima</i>	11	0.07	0	0.00
<i>Phyllanthus discoidens</i>	2	0.01	2	0.02
Total	16383	100	9666	100

Determination of abundance of nectariferous and polleniferous plant in the study area

The quadrants and transect method as explained by (Teklay, 2011) was used to determine the abundance of the nectariferous and polleniferous plants in the surveyed areas. The quadrants were laid at random after the study site was stratified. The distance between transects was also taken. Then the remaining quadrants were laid at equal intervals along transects. The number of plant species within quadrant were taken and recorded.

Calculation of relative abundance

The relative abundance of each of the identified nectariferous and polleniferous plant species foraged by the African honeybees during the study period across the locations was calculated using the formula below:

$$\text{Relative Abundance} = \frac{\text{Number of individual plant species}}{\text{Total number of plant species in Awka}} \times 100$$

Statistical analysis

The data on seasonal relative abundance of plant species was further subjected to T-test of significance using SPSS Computer Package (version 20) at 5% significant level.

RESULTS

A total of 69 species of nectariferous and polleniferous plant species, grouped into 31 families were identified to

be visited and foraged by *Apis mellifera adansonii* in the study areas (Table 1). Asteraceae was found the most abundant with highest number of nectariferous and polleniferous plant species 11(16%) such as *Aspilia africana*, *Pegolettia senegalensis* and *Chromolaena odorata*. Euphorbiaceae 6(9%) was the second family with high number of the nectariferous and polleniferous plant species such as *Manihot esculenta*. While the families Malvaceae and Vebenaceae, 5(7%) were the third. The plants are categorized into Herb 40(57%) being the highest plant type, Shrubs 21(31%) and trees 8(12%). Of the 69 plants identified 27(39%) of the plant species were grouped as highly visited, 31(45%) as moderately visited and 11(16%) as least visited by the honeybees. 11(16%) of the total plant species were observed to be nectar producers only, 6(9%) pollen and 50(72%) nectar and pollen both (Table 1). Table 2 represents the flowering periods of the plant species in Awka, while Table 3 represent the total number and relative abundance of the individual plant species in Awka, during the rainy and dry seasons. Table 3 revealed that the total number of plants visited by honeybees was highest during the rainy season (16383) than the dry season (9666). The plant with the highest relative abundance in both rainy and dry seasons was *Pegolettia senegalensis* (26.69 and 37.23 respectively). However, there was significant difference between relative abundance of nectariferous and polleniferous plants of *Apis mellifera adansonii* in rainy and dry season ($P < 0.05$).

DISCUSSION

Sixty-nine (69) nectariferous and polleniferous plant species grouped into 31 families were identified in Awka southeast Nigeria. Nectar and pollen producing plant species such as *Aspilia africana*, *Ageratum conyzoides*, *Mangifera indica*, *Tectona grandis*, *Tridax procumbens*, *Vernonia amygdalina*, *Zea mays*, *Carica papaya*, *Manihot esculenta*, *Luffa cylindrical*, *Musa sapientum*, *Sida acuta*, *Urena lobata*, *Citrus sinensis*, *Chromolaena odorata*, *Talinum triangulare*, *Cucurbita maxima*, *Chamaecristis mimosoides*, *Cleome viscosa*, *Crotalaria retusa*, *Physalis angulata*, *Psidium guajava*, *Ricinus communis*, *Sarcocephallus latifolius*, *Solanum torvum*, *Triumfetta cordifolia*, *Ludwigia decurrens*, *Senna occidentalis*, *Wateria indica* and *Combretm* sp, were also reported in the Sudan Savannah, guinea savannah and tropical rainforest of southwest and south-south of the vegetative zones of Nigeria (Omoloye and Akinsola, 2006; Mbah and Amao, 2009; Ebenezer and Olugbenga, 2010; Abdullahi *et al.*, 2011; Abel and Banjo, 2012; Nnamani and Uguru, 2012; Dukku, 2013). This study therefore confirms that these plants previously reported are visited by honeybees. Other remaining plant species such as *Aspilia bussei*, *Bidens pilosa*, *Emilia coccinea*, *Pegolettia senegalensis*, *Vernonia ambigua*, *V. cinerea*, *Harungana madagascariensis*, *Commelia diffusa*, *Euphorbia heterophylla*, *Mallotus subulatus*, *Sida garckeana*, *Mitracarpus villosus*, *Spigelia anthelmia*, *Ludwigia abyssinica*, *Lantan camara* and *Verbena hastata*, identified in this study are reported for the first time in Awka as major nectariferous and polleniferous plants for the African honeybees. The family Asteraceae had the highest number of species across the study areas. This observation is in contrast to the findings of Mbah and Amao (2009) in Northwest, Nnamdi and Uguru (2011) in South-south and Dukku (2013) in North-east of Nigeria, who reported that Leguminosae, Euphorbiaceae and Fabaceae as the most abundant, respectively. This finding however, agrees with Debissa (2006) and Teskly (2011).

A chronological record of the flowering periods of all the

plant species surveyed across the study areas in Awka showed that the flowering periods of herbaceous and shrub plants are closely ranged, however, most of the herbaceous plants have their flowering period in the raining season alone with some having their flowering period throughout the year. Herbaceous plants such as *Pegolettia senegalensis*, *Aspilia africana*, and *Tridax procumbens* which were recorded as major flower sources in the study areas flowered throughout the year and this supports the report of Dukku (2013) who noted that the blooming of some honeybees plant species overlaps the wet and dry seasons, thus providing forage throughout the year.

The attitude of farmers and herdsman who deliberately clear and set on fire bushes in the sampled locations during the dry season and at the beginning of planting season should be highly discouraged. This practice burns out herbs and shrubs that serve as source of nectar and pollen for the honeybees. Moreso, use of chemicals especially herbicides around the areas should be stopped. However, since most of these plants dry out during the dry season between November and February, effort should be geared toward cultivating them.

In conclusion, it is suggested that further studies should be carried out on surveying the nectariferous and polleniferous plants of African honeybees in the communities surrounding Awka, in view of identifying more forage plants of honeybees in other parts of southeast Nigeria.

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