

Full Length Research Article

NATURAL FOODS AND FEEDING HABITS OF THE AFRICAN HONEY BEE *Apis mellifera adansonii* Latrille (1804) IN ZARIA, NORTHERN NIGERIA

*MBAH, C. E & AMAO, A. O.

Department of Biological Sciences, Ahmadu Bello University, Zaria
Kaduna State, Nigeria
[*drcebma@yahoo.com](mailto:drcebma@yahoo.com)

ABSTRACT

A total of 28 plant species visited by the honeybee *Apis mellifera adansonii* Latrille were observed and collected from September 2006-January 2008 in Zaria, Nigeria using secateur and plant presses to cut and preserve the specimens. A digital camera was used to photograph the honeybees on plants. The plants were categorized into 15 Families with Leguminosae having 5(18%) of the Families being the largest followed by the Family Asteraceae 4(14%). About 57.1% were annuals while 42.9% were perennials. The discussion is focused on the identification of indigenous plants that produce nectar and pollen with good honey potentials in parts of northern Nigeria. It is recommended that wild plants with good honey production potentials be identified and cultivated to supplement available food sources for increased honey production.

Keywords: natural food, nectar, pollen, african honeybee, *Apis mellifera adansonii*

INTRODUCTION

The honeybee is one of the few insects whose commercial importance lies in being cultivated, not exterminated. This led to intensive investigation of its nutritional needs (Crailsheim, 1990). In the organization of a good food base for honeybees, it is important to know the available food resources and their nectar or pollen properties. Studies of flower visiting by species of honeybees (especially in Nigeria) are still few and far between, and limited in scope, with variable objectives and methodologies (Ramalho, *et al.*, 1990). The production of honey by the African honeybee *Apis mellifera adansonii* Latrille (1804) in Nigeria is relatively moderate and non-seasonal because of varied vegetation pattern resulting in species abundance and diversity with different blooming seasons typical of the tropics (Ewusie, 1980; Agwu & Okeke, 1997).

Lovell (1926) reported about 1500 flowering plants in North America and North of Mexico, out of which only few serve as natural food sources to bees, estimating that approximately 200 plant species within this geographical area deserve to be classified as honey plants.

At Ibadan (South West of Nigeria), the main nectar flow is from July to February, with a peak in January when the largest forest trees such as *Ceiba pentandra*, *Bombax bounopozense*, *Hildigardia barter*, *Berlinia grandifolia*, *Albizia glaberrima* and cotton wood (*Populus deltoides*) are in flower (Mutsears, 1991). Many ornamental trees (e.g. *Syzyium* sp and *Eugenia gambos*) and fruit trees (e.g. *Citrus* spp and *Mangifera indica*) are flowering during this period. The Scandant shrub *Chromoleana odorata* which is abundant in farm fallows is much favoured by bees as flowers at this period. Both *Combretum smeathmanii* and *C. paniculatum* are reported in ethnobotanical literature as honey plants (Mutsears, 1991). In connection with their nectar flow, trees like *Voacanga africana*, *Trichilia monadelpha*, *Milletia thonningii*, *Lonchocarpus sericeus* and several climbers like *Motandra guineensa*, *Mallotus*

oppositipolies and *Entada purseatha* as well as weeds like *Talinum triangulare* are in flower around the same period. Honeybees collect large quantities of pollen from Zea mays. Cassava plant (*Manihot esculenta*) produces some natural food source around November. Generally, the forests and fallow vegetation yield most honey (Mutsears, 1991).

At Ayebe about 50 km south-east of Ibadan, there is richer vegetation cover with an important nectar flow from May to August. The decrease in nectar flow is less protracted and does not result in the bees absconding. At Ilesha about 100 km East of Ibadan still within the forest zone and Baba Ode (Oyo North) about 70 km north-west of Ibadan within the derived savanna, harvesting of honey from bee colonies in the wild usually takes place in May. Important trees in this zone are Shea butter (*Vitellaria paradoxa* syn. *Butyrospermum paradoxum*), *Senna siamea* and locust beans *Parkia biglobossa* syn. *Parkia clappertonia*).

The purpose of this study is to identify natural foods and feeding habits of the African honey bee in Zaria northern Nigeria aimed at ascertaining the plants preferred by honey bees as sources of nectar and pollen and also to provide a catalogue of bee-friendly plants which could be exploited by beekeepers and utilised for environmental conservation.

MATERIALS AND METHODS

Study Area: The study area covered three locations within the Ahmadu Bello University (A.B.U.) Main Campus, namely: The Biological Sciences Botanical Gardens, the A.B.U dam site and

Area 'A' residential staff quarters (along Ibrahim Dabo Crescent). The sites were selected due to availability of flowering plants, water and the presence of visiting bees. Each site was monitored twice a week in the morning and afternoon at 8.00 am and 4.00 pm respectively.

Photographic Data Collection: Two digital cameras were used for data capture in this study, SONY digital Camcorder DCR-TCR355E and SONY Ericsson Camera Phone K750i.

Collection and preservation of plant specimens: The plant specimens were collected using secateur and pocket knife to cut the plants with shoots, leaves and flowers, placed into moistened polythene bags and tagged with field labels. Wooden plant press (45cm × 30cm) was used with newspaper sheets trimmed to about 44cm by 28cm (Womersley, 1981). One plant specimen was placed between two newspaper sheets and another sheet containing no plant specimen was placed after that to absorb moisture. The pressed plants were allowed to dry at room temperature for 24 hrs before the blank newspaper sheets were removed and replaced with fresh ones for a period of seven days. The plant specimens were tagged in the field with labels containing the date of collection, locality, plant habitat and whether plant is shrub, herb or woody. The pressed plants were transferred to cardboard paper, fixed with paper gum and labeled showing date

of collection, name of collector, plant family, genus, species and name of the author.

RESULTS

A total of 28 plant species (honey plants) subsumed under 15 families comprising shrubs, herbs, and trees visited by the honeybee *Apis mellifera adansonii* Latreille were collected and preserved. The predominant species belong to the family Leguminosae 5(18%) closely followed by species from the family Asteraceae 4(14%) while the families Verbanaceae, Portulacaceae, Labiatae, Acanthaceae, Musaceae, Rutaceae, Apocynaceae and Cumbretaceae were each represented by a single species (Table 1). The dominant species in the Family Leguminosae is *Aeschynomene uniflora* (Plate 1). Among the family Asteraceae, *Cosmos sulphurens* is the dominant member (Plate 2).

About 57.1% of the bee-visited plants were annuals while 42.9% were perennials. Six (21.4%) plant species produced only pollen, 2(7.1%) plants produced nectar while 20(71.4%) produced both nectar and pollen (Table 1). Observations during sample collections showed that *Aeschynomene uniflora* was the most frequently visited plant by the honey bee *A. mellifera adansonii* while the least visited was *Sida acuta*. Other plants frequented by the bees include *Luffa aegyptica* (Plate 3), *Tridax procumbens* (Plate 4), *Cosmos sulphurens*, *Vernonia kotschyana* and *Musa sapientum*.

TABLE 1. FAMILIES OF PLANTS VISITED BY THE HONEY BEE APIS MELLIFERA ADANSONII IN ZARIA, NORTHERN NIGERIA.

S/No.	PLANT NAME	AUTHOR	FAMILY	HABIT	NECTAR/ POLLEN
1.	<i>Acacia ataxacantha</i> Parrot Claw Fodder	De Candole	LEGUMINOSAE	Perennial	P
2.	<i>Acacia auriculaeformis</i> Ear Fodder	A.cum ex Benth.	LEGUMINOSAE	Perennial	P
3.	<i>Aeschynomene uniflora</i> Pitt Weed	E. Mey	LEGUMINOSAE	Annual	n & p
4.	<i>Bauhinia grandifolia</i> Paulatia	D. Dietr.	LEGUMINOSAE	Perennial	n & p
5.	<i>Bidens bipinnata</i> Spanish needle	Linn.	ASTERACEAE	Annual	n & p
6.	<i>Colocynthis citrullus</i> Melon	(L.)Schrad.	CURCUBITACEAE	Annual	n & p
7.	<i>Cosmos sulphurens</i> Cosmos	J. Hutchinson	ASTERACEAE	Annual	P
8.	<i>Crotolaria falcate</i> Red rattle box	Vhl. ex Dc.	LEGUMINOSAE	Annual	n & p
9.	<i>Crotolaria retusa</i> Rattle box	Linn.	LEGUMINOSAE	Annual	n & p
10.	<i>Guiera senegalensis</i> Gall plant	J.F.Gmel	CUMBRETACEAE	Annual	n & p
11.	<i>Hoslundia opposita</i> Senegal Banyun say	Valil	LABIATAE	Annual	n & p
12.	<i>Jacrandia mimosifolia</i> Blue jacaranda	D.Don	MIMOSACEAE	Perennial	P
13.	<i>Leucaena glauca</i> Leucaena Weed	Linn.	MIMOSACEAE	Perennial	P
14.	<i>Luffa aegyptica</i> Luffa guard	Mill.	CURCUBITACEAE	Annual	n & p
15.	<i>Monechma ciliatum</i> Pointed hair weed	(Jaq.)Milne	ACANTHACEAE	Annual	n & p
16.	<i>Musa sapientum</i> Banana	Linn.	MUSACEAE	Perennial	N
17.	<i>Parkia biglobossa</i> Locust bean tree	(Jaq.)Benth.G.Don	MIMOSACEAE	Perennial	n & p
18.	<i>Pithecellobium dulce</i> Spiny fodder tree	Roxb(Benth.)	MIMOSACEAE	Perennial	n & p
19.	<i>Portulaca oleracea</i> Purslane	Linn.	PORTULACAEAE	Annual	n & p
20.	<i>Ruta alba</i> White Alba	Linn.	RUTACEAE	Perennial	n & p
21.	<i>Senna siemea</i> Yellow senna	Lam.	CAESALPINACEAE	Perennial	P
22.	<i>Sida acuta</i> Broom Weed	Burm.F	MALVACEAE	Annual	n & p
23.	<i>Sida corymbosa</i> Broom Weed	R.E.Fries	MALVACEAE	Annual	n & p
24.	<i>Tectona grandis</i> Teak	Linn.	VERBANACEAE	Perennial	P
25.	<i>Thervitia nerrifolia</i> Lucky nut	H.Huber	APOCYNACEAE	Perennial	N
26.	<i>Tridax procumbens</i> Coat botton weed	Linn.	ASTERACEAE	Annual	n & p
27.	<i>Urena lobata</i> Aramina	Linn.	MALVACEAE	Annual	n & p
28.	<i>Vernonia kotschyana</i> Bush bitter leaf	Schr.	ASTERACEAE	Annual	n & p

n = nectar, p = pollen



Plate 1. *Apis mellifera adansonii* Latreille foraging on the flower of the PITH WEED *Aeschynomene uniflora* .E.Mey.



Plate 2. *Apis mellifera adansonii* Latreille gathering pollen from the flower of COSMOS *Cosmos sulphurens* J.Hutchinson



Plate 3. *Apis mellifera adansonii* Latreille collecting nectar from the flower of LUFFA GUARD *Luffa aegyptica* Mill



Plate 4. *Apis mellifera adansonii* Latreille foraging on the flower of COAT BUTTON WEED *Tridax procumbens* L.



Plate 5. *Apis mellifera adansonii* Latreille feeding on the flower of YELLOW SENNA TREE *Senna siamea* Lam



Plate 6. *Apis mellifera adansonii* Latreille gathering on the flower of *Acacia atacaxantha* De Candolle

DISCUSSION

This investigation has identified 28 plant species visited by the honeybee *Apis mellifera adansonii* and used as nectar and pollen resources during the wet and dry seasons in the Zaria Area. The categorisation of these plants into 15 families indicates the diverse nature of the natural food sources of these insects (Ikediobi *et al.*, 1995). Since these plants grow in the wild, with most of them drying up during the dry season between October to April, efforts should be made by beekeepers to cultivate them at a distance of about 1 km radius of the bee hives to ensure that the bees not only gather enough food for honey production but also spend less energy between their food source and the hives.

Out of 40 forage species listed by Omoloye & Akinsola (2006) in Southwest Nigeria, only the plants *Luffa aegyptica* (Cucurbitaceae) and *Tridax procumbens* (Asteraceae) were observed to be visited by *A. m. adansonii* in this study. This is probably because honeybees select and adapt to rewarding forage resources within a vegetation zone where their hive is located. While 5 plant species namely *Bidens pilosa*, *Vernonia sp.*, *Acacia podalyriaefolia*, *Crotalaria lanceolata* and *Leucaena leucocephala* were visited by Africanized honeybee in the Neotropical region (Ramalho *et al.*, 1990), most of the plants recorded in this investigation are distributed in tropical and subtropical regions all over the world (Heywood, 1978; Joly, 1997).

An important observation made during this study is the attitude of farmers and hunters to deliberately set fires to bushes around the villages and farmlands especially during the dry season and at the beginning of the food planting season. This practice though meant to drive small animals out of hiding for the hunters and stimulate growth of fresh leaves for cattle rearers, it also burns out shrubs and herbs (especially those near drying up water sources) that serve as natural sources of food for honey bees. This is probably one of the reasons why bees in affected areas swarm out in search of shelter where they have guaranteed food and water. Such bush fires may also destroy bee hives on tree branches and undermine the next build-up period in the honeybee calendar.

Aeschynomene uniflora (Plate 1), *Cosmos sulphurens* (Plate 2) and *Luffa aegyptica* (Plate 3) can serve multiple purposes – they can be used for landscaping to beautify the environment while serving as a natural food source for the bees and medicinal plants for man. The observation that the bees frequent the Leguminosae more than other wild plant families could be because most of them are perennial plants and provide substantial quantity of nectar and pollen all year round. The family Musaceae, though perennial, provides only nectar during fruiting periods for the bees. The problem faced by the local beekeeper is the determination of the foraging resources for which his bees collect nectar and pollen as well as understanding of the blooming pattern of these plants (Lovell, 1926).

The beekeeper in Zaria and other parts of northern Nigeria could cultivate the perennial plants identified in this work (Table 1) in his bee farm to augment the wild grown ones as a first major step

towards the provision of food source for honeybees with the annuals cultivated as supplement (Plates 5 and 6) to guarantee year-round availability and fill the food gap which maybe created when the perennials are not flowering. This will ensure continuous nectar flow and honey production during the rainy and dry season periods.

ACKNOWLEDGEMENT

Our sincere gratitude to Mallam M. Musa and U.S Gallah who assisted with the identification of the plant specimens and Imaikop Harry who assisted during plant collection.

REFERENCES

- Agwu, C. O. C. & Okeke, G. I. (1997). Pollen Analytical and Thin Layer Chromatography of Honey in Nigeria. *Journal of Botany* 5: 85-95
- Crailsheim, K. (1990). The Protein balance of the honeybee worker. *Apidologie*, 21:417-429.
- Ewusie, Y. I. (1980). *Tropical Biology for 'O' level and School Certificate*. Ibadan. African University Press.
- Heywood, V. H. (1978). *The Flowering Plants of the World*. Oxford University Press Oxford.
- Ikediobi, C. O., Obi, V. C. & Achoba, I. A. (1985). Beekeeping and honey production in Nigeria. *Nigerian Field*, 50:59-70.
- Joly, A. B. (1977). *Botânica-Introducao a Taxonomia Vegetal*. Cia Editoria Nacional, Sao Paulo.
- Latrielle, O. (1804) Subspecies of *Apis mellifera* in Nigeria. www.wikipedia.org/subspecies_of_apismellifera. Accessed 20/1/08
- Lovell, J. H. (1926). *Honey plants of North America* A.I.Root Co, Medina Ohio.
- Mutsaers, M. (1991) Bees in their Natural environment in Southwestern Nigeria. *The Nigerian Field* 56: 3-18.
- Omoloye, A. A. & Akinsola, P. A. (2006). Foraging sources and effects of selected plant characters and weather variables on the visitation intensity of Honeybee, *Apis mellifera adansonii* (Hymenoptera: Apidae) in the Southwest, Nigeria. *Journal of Apicultural Science*, 50 (1):39-48.
- Ramalho, M., Kleinert-Giovannini, A. & Imperatriz-Fonseca, V. L. (1990). Important bee plants for stingless bees (*Melipona* and *Trigonini*) and Africanized honeybees (*Apis mellifera*) in neotropical habitats: a review. *Apidologie*, 21:469-488.
- Womersley, J. S. (1981). A manual of plant collecting and herbarium development. Food and Agriculture Organization of the United Nations.