



A Review Paper

Bee - Plants of Southeastern Nigeria - A Review

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ABSTRACT

Bee-plants are the plants that are visited by bees. Bee plants have some adaptations that enable them to attract bees. Bees visit plants mainly to collect nectar and pollen which are later converted to honey. These bee-plants could be cultivated in three ways. The beekeepers in any part of southeastern Nigeria therefore, could cultivate the bee plants listed in this work for production of honey which is highly medicinal and has recently been re-introduced as a natural medicine cure for many ailments.

Keywords: bee-plants, beekeeper, nectar, pollen, honey.

INTRODUCTION

Bee-plants are those plants that are visited by bees. They provide nectar and pollen grains which bees visit to collect and these serve as natural food for the bees (Mbah and Amao, 2009). According to Judd *et al.* (1999) the bees convert the nectar they collect into honey. Mbah and Amao (2009) noted that there are numerous plants which serve as important sources of pollen grain and nectar for bees in Southeastern Nigeria.

Furthermore, bee-plants have special modifications to attract bees, and these are known as adaptations. These adaptations lead to mutualism between Hymenoptera (bee and Wasps) and angiosperms (USDA, 2010). This is known as co-evolution and has been taking place since angiosperms first appeared in the fossil record of the Cretaceous period, about 90 million years ago.

Nevertheless, Mbah and Amao (2009) observed that farmers and hunters deliberately set fire to bushes around the village and farm lands

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 hunters and stimulate growth of fresh learners for cattle rearing, it also burn out shrubs and herbs that serve as natural source of food for honey bees. Moreover, Okoye and Agwu (2008) reported an outright felling of some trees in order to extract honey. This is among the major factors negatively impacting on the agro-forestry of an area. However, studies of flower being visited by species of honey bees (especially in Nigeria) are still few and far between, and limited in scope, with variable objectives and methodologies (Ramalho *et al.*, 1990; Mbah and Amao, 2009).

In addition, Mbah and Amao (2009) reported that local beekeepers face problem of determining the foraging recourses for which their bees collect nectar and pollen as well as understanding the blooming pattern of these plants. Moreover, beekeepers need the knowledge of nectar producing plants for reason of harvesting raw honey. The objective of this

study therefore was to ascertain the plants with good honey production potentials in Southeastern Nigeria; which could be exploited by beekeepers and cultivated to supplement available food sources of bees for increased honey production.

ADAPTATIONS OF BEE-PLANTS AND BEES

Adaptations of bee-plants and bees resulted from natural selection and co-evolution (Glover, 2007; Labandiera *et al.*, 2007; Obute, 2010; USDA, 2010). The principal adaptations are colour, nectar and scent (Dutta, 2004). Various studies have shown that most bee-plants produce yellow, blue or white flower (Labandiera *et al.*, 2007; Obute, 2010; USDA, 2010). Bees see red as another shade of grey thus, they are “red – blind” unlike humans. In addition, bee flowers often have nectar guide on their petals. These are spots or lines that point the bees to the interior of the flower where the nectar is located. They also have open forms and are usually sweet scented.

Chemical Components of Pollen and Nectar of Bee-Plants.

Floral nectar which is the exudates secreted by nectaries is widely known as the key reward offered by bee-plants to bees (Galetto and Bernardello, 2004). The total solutes in floral nectar are dominated by sugars which are mainly sucrose, fructose and glucose (Baker and Baker, 1983 a, b; Freeman *et al.*, 1991; Stiles and Freeman, 1992; Galetto and Bernardello, 2004). In addition, other compounds such as amino acids, phenols, lipids and antioxidants are found as well, but mostly in trace quantities.

Moreover, Buffalo *et al.* (2010) recorded that honeybees collect a very complex chemical composition from plants. In addition, they noted that propolis; a sticky dark-coloured material showing a very complex chemical composition that honey bees collected from plants has been reported used in folk medicine since ancient times, due to several biological properties, such

as antimicrobial, anti-inflammatory, antioxidant and immunodulatory activities. Its antitumor action in vivo and in vitro has also been reported, using propolis extracts or its isolated compounds. Milet-Pinheiro and Schindwein (2008) observed that the main chemical components of staminode’s grandular trichome secretion from *Jacaranda oxyphylla*, a bee pollinated plant, were phenolic and terpenoid (essential oils and resins); monoterpenes cineole, pentacyclic triterpenes and steroids. In addition, Almeida-Muradian *et al.* (2004) revealed that the dried pollen pellets had an average of 7.4% moisture, 20% proteins, 6% lipids, 2.2% ash, presence of total carotenoids and absence of vitamin C and beta-carotene.

PLANTS FOR YEAR- ROUND FORAGE

Bee- plants can be grown depending on which part of the world the grower lives. Bees visit plants which serve as natural sources of food for them (Mbah and Amao, 2009). These plants provide them with pollen and/or nectar for which they get their nutritional requirements; the nectar provides carbohydrates and the pollen supplies both protein and fats (Mbah and Amao, 2009; Obute, 2010; USDA, 2010).

Moreover, bee populations can be encouraged by improving bee nutrition which will in turn according to Judd *et al.* (1999) be converted into honey. Delaplane *et al.* (2004) reported that bee populations can be improved by planting bee pastures. In addition, there are three types of bee pastures which could be cultivated. Firstly, a single - year productive bee pasture made of annual plants that collectively bloom for most of one forage season. Secondly, a multi - year productive bee pasture made of perennial blooming flowers and some woody vines and bushes. The third one is the permanent productive bee pasture made of permanent trees, bushes and few woody perennials.

However, misuse or over use of pesticides on bee plants result to decline in bee population (Delaplane *et al.*, 2004; Labandiera *et al.*, 2007). This will consequently result in low production of honey. Bee growers are therefore advised not to apply highly toxic pesticides to the plants; never spray a plant that is flowering; look for a product labelled for the target pest with low bee toxicity (that is, a high LD₅₀), and with a short residual time; use granules and solutions which are safer than wettable powders and dusts, apply bee-hazardous pesticides in early evening, since bees only forage in daylight (Delaplane *et al.*, 2004)

Beekeepers need the knowledge of bee-plants for proper plant selection and planting. Flowering plants that are good source of pollen and nectar in the Southeastern Nigeria have been listed in Tables I and 2. Planting of these bee-plants according to Delaplane *et al.* (2004) could be done in three ways: the single-year productive bee pasture which employs the annual bee-plants (Table I) is probably the best for short-term purpose. Secondly, the multi-year productive bee pastures which employs perennial bee plants (Table I), is versatile because perennial bee-plants have diverse flowering dates and are easily replaced. However, this pasture requires more work and advance planning, but give the grower optimum control of succession bloom. Finally, the permanent productive bee pastures have permanent trees therefore planting can last more than 30 years. This could probably make plant selection a critical task. Nonetheless, trees provide the most likely dependable source of pollens and nectars and could be the best pasture if large bee populations are the important goals.

CONCLUSION AND RECOMMENDATION

The beekeepers in any part of the Southeastern Nigeria could cultivate the bee plants (Table 1 and 2) identified in this work in their bee farm. To guarantee year-round availability of nectar, annuals (Table1) would be cultivated as

supplements to the perennials (Table 1 and 2). These will ensure continuous availability of nectar flow and honey production during rainy and dry season periods. In addition, proper use of pesticides on bee-plants is a crucial factor, because if not properly used would lead to decline in bee population which would consequently reduce the quantity of honey.

Table 1: Annual and perennial bee-plants in Southeastern Nigeria

S/N	Botanical Names	Family Names	Common Names	Habit
1.	<i>Cajanus cajan</i> (L.) Millsp.	Papilionaceae	Pigeon pea	Annual
2.	<i>Caspicum annum</i> L.	Solanaceae	Chilli pepper	Annual
3.	<i>Chromoleana odorata</i> (L.) R.M.	Asteraceae	Siam weed	Perennial
4.	<i>Citrullus lanatus</i> (Thunb.) Matsum. & Nakai	Cucurbitaceae	Water melon	Annual
5.	<i>Citrullus vulgaris</i> Schrad.	Cucurbitaceae	Melon	Annual
6.	<i>Crotolaria retusa</i> L.	Leguminosae	Rattle box	Annual
7.	<i>Combretum paniculatum</i> Vent.	Combretaceae	Burning bush	Perennial
8.	<i>C. smeathmannii</i> G. Don	Combretaceae	-	Perennial
9.	<i>Cucumis sativus</i> L.	Cucurbitaceae	Cucumber	Annual
10.	<i>Cucurbita maxima</i> Duch.	Cucurbitaceae	Fluted pumpkin	Annual
11.	<i>Glycine soja</i> Sieb. & Zucc.	Papilionaceae	Soya bean	Annual
12.	<i>Gossypium barbadense</i> L.	Malvaceae	Cotton	Annual
13.	<i>Helianthus annuus</i> L.	Asteraceae	Sunflower	Annual
14.	<i>Ipomoea purpurea</i> (L.) Roth	Convolvulaceae	Morning glory	Annual
15.	<i>Leucaena glauca</i> (L.) Benth	Mimosaceae	Leucaena weed	Annual
16.	<i>Luffa aegyptiaca</i> Mill.	Cucurbitaceae	Luffa guard	Annual
17.	<i>Lycopersicon esculentum</i> Mill.	Solanaceae	Tomato	Annual
18.	<i>Manihot esculenta</i> Crantz	Euphorbiaceae	Cassava	Perennial
19.	<i>Musa sapientum</i> L.	Musaceae	Bannana	Perennial
20.	<i>Portulaca oleracea</i> L.	Portulacaceae	Purslane	Annual
21.	<i>Senna siamea</i> Lam.	Caesalpinaceae	Yellow senna	Perennial
22.	<i>Sida corymbosa</i> R.E. Fries	Malvaceae	Broom weed	Annual
23.	<i>Solanum melongena</i> Linn.	Solanaceae	Egg plant	Annual
24.	<i>Talinum triangulare</i> (Jacq.) Willd.	Portulacaceae	Water leaf	Annual
25.	<i>Tithonia diversifolia</i> (Hemsl.) A. Gray	Asteraceae	Mexican sunflower	Annual
26.	<i>Tridax procumbens</i> Linn.	Asteraceae	Coat botton weed	Annual
27.	<i>Urena lobata</i> L.	Malvaceae	Aramina	Annual
28.	<i>Vernonia kotschyana</i> Sch. Bip. ex Walp	Asteraceae	Bush bitter leaf	Annual
29.	<i>Zea mays</i> L.	Poaceae	Maize	Annual

Sources: (Mutsears, 1991; Delaplane *et al.*, 2004; Labandiera *et al.*, 2007; Mbah and Amao, 2009; Obute, 2010)

Table 2: Tree species of bee-plants in Southeastern Nigeria

S/N	Botanical Names	Family Names
1.	<i>Albizia glaberrima</i> Schumach. & Thonn.	Mimosaceae
2.	<i>Berlinia grandifolia</i> Hutch. & Dalz.	Caesalpiniaceae
3.	<i>Bombax bnonopozense</i> P. Beauv.	Bombacaceae
4.	<i>Brachystegia eurycome</i> Harms.	Caesalpiniaceae
5.	<i>Ceiba pentandra</i> (L.) Gaertner	Bombacaceae
6.	<i>Citrus aurantifolia</i> (Christm.) Swingle	Rutaceae
7.	<i>C. grandis</i> Osbeck	Rutaceae
8.	<i>C. limon</i> (L.) Burm. f.	Rutaceae
9.	<i>C. paradisi</i> Macf.	Rutaceae
10.	<i>C. reticulata</i> Blanco	Rutaceae
11.	<i>C. sinensis</i> (L.) Osbeck	Rutaceae
12.	<i>Dialium guineense</i> Willd.	Caesalpiniaceae
13.	<i>Elaise guineensis</i> Jacq.	Arecaceae
14.	<i>Entada pursaetha</i> DC.	Fabaceae
15.	<i>Erythrophleum guineense</i> G. Don	Caesalpiniaceae
16.	<i>Mangifera indica</i> Linn.	Anacardiaceae
17.	<i>Hildegardia barteri</i> (Mast.) Kosterm.	Sterculiaceae
18.	<i>Irvingia gabonensis</i> O'Rorke	Irvingiaceae
19.	<i>Lonchocarpus sericeus</i> (Poir.) H. B. & K.	Fabaceae
20.	<i>Mallotus oppositifolius</i> (Geisel.) Mull. Arg.	Euphorbiaceae
21.	<i>Milletia thomingii</i> Baker.	Fabaceae
22.	<i>Parkia biglobosa</i> Jacq.	Mimosaceae
23.	<i>Persea americana</i> Mill.	Lauraceae
24.	<i>Raphia hookeri</i> Mann & Wendland	Arecaceae
25.	<i>Strychnos spinosa</i> Lam.	Loganiaceae
26.	<i>Syzygium rowlandii</i> Sprague	Myrtaceae
27.	<i>Tectona grandis</i> L.	Verbenaceae
28.	<i>Trichilia monadelpha</i> (Thonn.) J.J. De Wilde	Moraceae
29.	<i>Voacanga africana</i> Stapf	Apocynaceae
30.	Young <i>Melicia excelsa</i> (Welw.) C.C. Berg	Moraceae

Sources: (Mutsears, 1991; Omoloye and Akinsola, 2006; Okoye and Agwu, 2008; Mbah and Amao, 2009).

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