International Journal of Botany Studies
ISSN: 2455-541X
Impact Factor: RJIF 5.12
www.botanyjournals.com
Volume 3; Issue 2; March 2018; Page No. 129-132

Diversity of nectariferous and polleniferous honeybee flora found in Chittur Taluk of Palakkad district India for commercial apiculture

V Priya[1], Abiya Raichal A[2]
[1] Assistant Professor, Department of Botany, PSG College of Arts and Science, Coimbatore, Tamil Nadu, India
[2] PG student, Department of Botany, PSG College of Arts and Science, Coimbatore, Tamil Nadu, India

Abstract
Bees convert nectar into honey by adding of an enzyme which breaks down the complex sugars into simple sugars. The honeybees and plant are correlated to each other. According to Einstein, without bees humans will die in four years. So honeybees are very important for plants and humans. They are benefited in plants for nectar and pollen as food in return we are getting double benefit by honey and cross pollination. Cross pollination is main process for production of crops, honey also play vital role in society for therapeutic, medicinal and beauty treatments. Flowers are the main stay of bee's life. The bees are depended on flowering plants for food in the form of pollen and nectar. The present work was performed to study the diversity of nectariferous and polleniferous honeybee flora found in Chitturthaluk of Palakkad to prosper commercial apiculture. The bee flora were visited and noticed for the presence of honeybees. The results have shown that 52 plant species were useful to honeybees, I have segregated the 52 plant species into three groups they are as follows agricultural crops, ornamental plants and wild plants. Out of which 20 were agricultural crops, 21 were ornamental plants and 11 were wild plants. The study area is typical cultivation area most of the cultivation is *Musa* species. The cultivation will go on for the whole year, in that cultivation crops most cultivating crop is *Musa* speciesand it have good nectar content based on the availability and flowering duration of bee flora.

Keywords: bee flora, flora types, commercial apiculture

1. Introduction
Honey bees and plants have a special relationship, so they both benefited to each other. Flowering plants provide food for honey bees; in return, bees provide pollination for many plants, enabling them to reproduce. Honey bees visit flowers to collect nectar and pollen for food. Pollen is necessary to bees because it is their only natural source of protein. Without pollen, colonies would be unable to reproduce new bees and would eventually die. Honey bees play a vital role in the environment by pollinating both wild flowers and many agricultural crops as they forage for nectar and pollen, in addition to producing honey and beeswax. The essential and valuable activities of bees depend upon beekeepers maintaining a healthy population of honey bees, because like other insects and livestock, honey bees are subject to many diseases and pests (Gupta, 2014) [11]. Honey bees are the most economically valuable pollinators of agricultural crops worldwide (Free, 1993) [8]. One third of the total human diet is dependent on plants pollinated by insects; predominately honey bees (McGregor, 1976) [13]. Yet, honey bee populations are in jeopardy as evidenced by the dramatic loss of approximately 33% of overwintered colonies each year since 2007 (VanEngelsdorp, 2010) [25]. Honey bee visits thousands of flowers in order to collect nectar and pollen. While doing this they pollinate these flowers, thereby helping to increase fruit and seed-setting both in wild and cultivated plants. The implication of this is that honey bees contribute immensely to the maintenance of ecosystems and agricultural production while they produce important products such as honey. Five species of honey bees are found all over the world namely, *Apisflorea*, *A. cerana*, *A. dorsata*, *A. mellifera*and *Trigonairidipennis.* However *A. cerana* and *A. mellifera* are reared in hives in India for commercial apiculture (Singh, 2007) [18]. Flowers are the mainstay of the bee's life. From flowers, they obtain pollen, the protein rich food used mostly to feed the brood and nectar, the carbohydrate fuel for their flight, foraging, hive activity and for rearing brood. The abundance of bee flora and their continuous availability is one of the major pre-requisites for successful beekeeping. This enables the beekeepers to exploit these sources to the maximum utilization by the bees. Every region has its floral dearth period of short or long duration and it is essential to manage the honey bees and bee hives in the dearth period. As during this period, there is lack of availability of nectar and pollen in flora required for quantitative and qualitative production of honey. To overcome this problem, it is important to find out the suitable bee flora available in the locality to propagate and manage the plant species with a option of abundant nectar and pollen to overcome the problem during the dearth period for commercial apiculture (Behera *et al.,* 2014) [1].

2. Materials and Methods
a. Diversity - Study sites
The present survey was conducted to study the diversity of polleniferous and nectariferous honeybee flora to encourage apiculture in the area of Chitturthaluk of Palakkad District. The District lies between 10°15' to 11°15' latitude in the

North and 76° and 77° longitude in the East. Palakkad forms a natural gap in the Western Ghats and thus connects the west coast with Deccan plateau.

Rainfall coming under the monsoon climate regime, the district receives 2397mm of rainfall on an average. Though the south west monsoon set in the last week of May or early June, 70% of the annual rainfall is obtained from last week of June to mid-September.

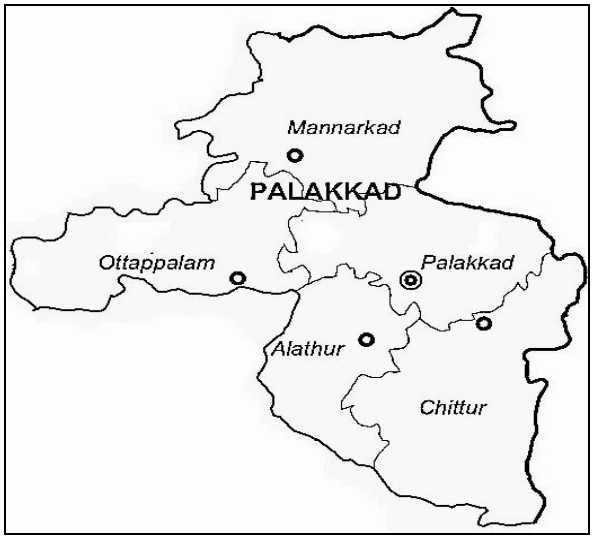

Fig 1

The district has a tropical climate with an oppressive hot season and plentiful and fairly assured seasonal rainfall. March to May is the hot months of the year with March the hottest month when the sun is just above the head. There are three different soil profiles are observed in different parts of district. In Chitturthaluk deep gravely clay soil of laterite origin is seen.

b. Identification of bee flora

The identification of bee flora in the region was mainly by observing regularly. The flower species were identified as a bee plant only after visual conformation and collection of food by honey bees (Sivaram, 1995; Naim and Phadke, 1976) [20, 14]. The observation on nectar and pollen source was based on activities performed by honeybees on different flowers. Honeybees with their activity of extending their proboscis into the flowers are considered as nectar source and bees carrying pollen on their hind legs were determined as pollen source. Honeybees with their activity of extending their proboscis into the flowers and also collecting pollen on their hind legs were determined as nectar and pollen yielding plants (Bista, 2001) [2]. Such plants were identified using the books in situ. If the plants were recorded as bee foraging species at particular site and later encountered in subsequent survey on the other sites; it was only scored for presence. The observations were recorded for three seasons. A complete chronological record of flowering periods of the plants species was made during the surveys. The data recorded in field's notebooks was compiled into annual floral calendar and also used to prepare honey flow and dearth period (WaykarBhalchandra, 2014) [26].

c. Flower traits that may attract bees

Honeybees can distinguish colour, shape and symmetry. They have good photoreceptor organs -compound eyes located beside both side of the lateral head. Each compound eye consists of few thousand of ommatidia (Snodgrass, 1925; Suwannapong and Wongsiri, 1999) [21, 23]. Flower colour-bright white, yellow, blue or UV, honeybees perceive a fairly broad colour range, they strongly differentiate six major categories of colour: yellow, blue-green, blue, violet, ultraviolet, and also a colour known as "bee purple", a mixture of yellow and ultraviolet (Chapman, 1998; Giurfa, 1991; Giurfa *et al*., 1996a) [4, 9, 10].

Shape of the flower should beshallow; it should have a landing platform, tubular, single flower top. Nectar guides the bees into the plantusuallynectar will be fresh, mild and have a pleasant smell. Pollen is often sticky and scented.

3. Results and Discussion

The study area was typical plains and cultivation area. In this study, honeybee visits a massive number of plant species which includes herbs, shrubs, climbers and trees. It could be segregated into three types they are ornamental, agricultural and wild plants.

Table 1: Agricultural plants

SI. No	Common name	Botanical name	Family
1	Curry leaves	*Murayyakoenigii*	Rutaceae
2	Bitter gourd	*Mormodicacharantia*	Cucurbitaceae
3	Bottle gourd	*Lagaenaria vulgaris*	Cucurbitaceae
4	Ivy gourd	*Coccineaindica*	Cucurbitaceae
5	Squash	*Cucurbita maxima*	Cucurbitaceae
6	Pumpkin	*Cucurbitapepo*	Cucurbitaceae
7	Cucumber	*Cucumissativus*	Cucurbitaceae
8	Musk melon	*Cucumismelo*	Cucurbitaceae
9	Drumstick	*Moringaoleifera*	Moringaceae
10	Sesame	*Sesamumindicum*	Pedaliaceae
11	Onion	*Allium cepa*	Lilliaceae
12	Pomegranate	*Punicagranatum*	Punicaceae
13	Lemon	*Citrus limon*	Rutaceae
14	Brinjal	*Solanummelongena*	Solanaceae
15	Coconut	*Cocusnucifera*	palmae
16	Banana	*Musa paradisiaca*	Musaceae
17	Papaya	*Carica papaya*	Caricaceae
18	Tamarind	*Tamarindusindica*	Caesalpiniaceae
19	Peanut	*Arachishypogaea*	Fabaceae
20	Zizipus	*Zizipusjujuba*	Rhamnaceae

Table 2: Ornamental plants

SI. No	Common name	Botanical name	Family
1	Jewelweed	*Impatiens balsania*	Balsaminaceae
2	Shoe flower	*Hibuscusrosasinensis*	Malvaceae
3	Shoe flower	*Hibuscusschizopetalous*	Malvaceae
4	Shoe flower	*Hibuscusmicranthus*	Malvaceae
5	Shoe flower	*Hibuscuscannabinus*	Malvaceae
6	Jasmine	*Jasminumofficinale*	oleaceae
7	Jungle flame	*Ixoracoccinea*	Rubiaceae
8	Hummingbird bush	*Hamelia patens*	Rubiaceae
9	Catharanthusroseus	*Vincarosea*	Apocynaceae
10	Golden trumpet	*Allamandacathartica*	Apocynaceae
11	Thorn apple	*Datura alba*	Solanaceae
12	Golden dew drop	*Durantaplumieri*	Verbenaceae
13	Sunflower	*Helianthus annus*	Compositae
14	Canna lilly	*Canna indica*	Cannaceae
15	Rangoon creeper	*Quisqualisindica*	Combretaceae
16	Aster	*Aster amallus*	Asteraceae
17	Zinnia	*Zinnia elegans*	Asteraceae
18	Edward rose	*Rosa*	Rosaceae
19	Cosmos	*Cosmos caudatus*	Asteraceae
20	Marigold	*Tageteserecta*	Asteraceae
21	Dahlia	*Dahlia pinnata*	Asteraceae

Table 3: Wild Plants

Sl. No	Common name	Botanical name	Family
1	Fireweed	*Chamaenerion angustifolium*	Onagraceae
2	Tridax daisy	*Tridaxprocumbens*	Compositae
3	Malabar nut	*Adhatodavasica*	Acanthaceae
4	Alexandrian senna	*Cassia angustifolia*	Fabaceae
5	Golden shower tree	*Cassia fistula*	Fabaceae
6	Basil	*Ocimumbasilicum*	Lamiaceae
7	Thumbai	*Leucasaspera*	Lamiaceae
8	Lantana	*Lantana camara*	Verbenaceae
9	Vitex	*Vitexnegundo*	Verbenaceae
10	Mimosa	*Mimosa pudica*	Mimoceae
11	Mimosa	*Mimosa diplotrica*	Mimoceae

The result showed that 52 plant species were useful to honeybees, out of 52 plant species 21 were ornamental plants, 20 were agricultural crops and 11 were wild plants. These plants are well distributed and commonly found in study area. The above identified plants have both nectar and pollen yielding plants. Much less is known in India, one of the major honey producing countries of the world, on the off-season, specially the monsoon period, nectar/forage resources of honey bees, a big lacuna with wider implications not just on honey production, but also on crop production (Oldroyd and Nanork, 2009) [15]. Honey bees require proteins (amino acids), carbohydrates (sugars), lipids (fatty acids, sterols), vitamins, minerals (salts), and water, and these nutrients must be in the diet in a definite qualitative and quantitative ratio for optimum nutrition (Standifer, 1980) [22]. The bee colony efficiency, development as well as production of honey, beeswax and other bee products depends on quality and quantity of pollen and nectar obtained from bee forage plants (Keller, 2005; Brodschneider, 2010) [3]. These food sources provide the nutritional requirements to the bee colony. The nectar acts as source of honey and provides heat and energy for bees and pollen provides the protein, vitamins, fatty substance and other nutrients to bees (Fluri, 1987; Crailsheim, 1992; Crailsheim, 1992) [7, 6]. Therefore, a direct consequence of nutritional deficiency (pollen shortage) is a decrease in the colony population (Standifer, 1980) [22]. It was observed that the bee-flora consists of mostly ornamentals, timber, medicinal, fruits, vegetables and other commercially important plants like spices, pulses, cereals, oil seed/yielding, fibre and fodder crops (WaykarBhalchadra*et al*., 2014) [26]. These flowering plants of an area have good value as bee pasture to maintain bee colonies. So, honeybees visiting these plants have extensive honey production and colony multiplication.

4. Conclusion

The present number of bee floral species in the area suggests that, the study area is undoubtedly suitable for apiculture. It was observed that, due to bee activity farmers are benefitted tremendously because of the ample presence of bee foraging plants in the vicinity of their farms. In the season of summer and rainy attention of bees are necessary for man-made food. All the three types of plants are very much useful to honeybees. Mainly agricultural crops and ornamental plants are more common in study area.

5. References

1. Behera LK, Mehta AA, Sinha SK. Suitable bee flora availability for commercial apiculture during dearth period in the heavy rainfall zone of South Gujarat, Research Journal of Chemical and Environmental Sciences Res J Chem. Environ. Sci. 2014; 2(6):65-68.
2. Bista S, Shivakoti CP. Honey bee flora at Kabre, Dolakha District. Nepal, Agriculture Research Journal. 2000-2001; 4(5):18-25.
3. Brodschneider R, Crailsheim K. Nutrition and health in honey bees. Apidologie. 2010; 41:278-294.
4. Chapman RF. The Insects: Structure and Function. New

York: Cambridge University Press, 1998.
5. Crailsheim K, Schneider LHW, Hrassnigg N, Bühlmann G, Brosch U, Gmeinbauer R, *et al*. Pollen consumption and utilization in worker honeybees (Apismelliferacarnica): dependence on individual age and function.Journal of insect Physiology. 1992; 38(6):409-419.
6. Crailsheim K. The Flow of Jelly within a Honeybee Colony. J Comp Physiol B. 1992; 162:681-689.
7. Fluri P, Bogdanov S. Age dependence of fat body protein in summer and winter bees (Apismellifera). In Eder, J; Rembold, H. (eds) Chemistry and biology of social insects. Verlag J Peperny; Munic, Germany, 1987, 170-171.
8. Free JB. Insect Pollination of Crops. Free London: Academic Press Frisch, K. von. The dance language and orientation of bees. Harvard University Press, Cambridge, Mass, 1993-1967.
9. Giurfa M. Colour generalization and choice behaviour of the honeybee, Apismellifera L. Journal of Insect Physiology. 1991; 37:41-44.
10. Giurfa M, Eichmann B, Menzel R. Symmetry perception in insect. Nature. 1996; 382:458-461.
11. Gupta RK. Taxonomy and distribution of different honeybee species. In Beekeeping for Poverty Alleviation and Livelihood Security. Springer, Dordrecht, 2014, 63-103.
12. Keller I, Fluri P, Imdorf A. Pollen nutrition and colony development in honey bees: part II. Bee World. 2005; 86(1):310.
13. McGregor SE. Insect pollination of cultivated crop plants. US. Dep. Agric. Handb. 496. ARS-USDA, Washington, DC, 1976.
14. Naim N, Phadke RP. Bee flora and seasonal activity of Apisceranaindica at Pusa (Bihar). India Bee Journal. 1976; 38(1-4):13-19.
15. Oldroyd BP, Nanork P. Conservation of Apis honeybees. Apidologie. 2009; 40:296-312.
16. Sahli HF, Conner JK. Visitation, effectiveness and efficiency of 15 genera of visitors to wild radish, Raphanusraphanistrum (Brassicaceae). American Journal of Botany. 2007; 94:203-209.
17. Shrestha K. Dictionary of Nepalese plant names.Mandala Book Point, Kathmandu, Nepal, 1998.
18. Singh D. Apiculture in India. Curr. Sci. 2007; 92(10):1335-1336.
19. Sivaram V. Honey bee flora and beekeeping in Karnataka State, India. Proceedings of the 37th International Apicultural Congress, Apimondia, Durban, South Africa, 2001, 28.
20. Sivaram V. Bee flora, honey flow and beekeeping in the plains of Karnataka. Doctoral thesis, Bangalore University, Bangalore, India, 1995.
21. Snodgrass RE. Anatomy and physiology of the honeybee, McGraw-Hill Book Company, New York, 1925.
22. Standifer LN. Honey bee nutrition and supplemental feeding. Beekeeping in the United States Agriculture Handbook. 1980; 335:39-45.
23. Suwannapong G, Wongsiri S. Ultrastructure of the compound eyes of the giant honeybee queens, Apisdorsata Fabricius, Journal STREC. 1793-1999; 7(1-2):60-68.
24. Thakur M. Bees as Pollinators – Biodiversity and Conservation. International Research Journal of Agricultural Science and Soil Science 2012; 2(1):1-7.
25. VanEngelsdorp D, Hayes J, Underwood R, Pettis JS. A survey of honey bee colony losses in the United States, fall to spring 2009. Journal of Apicultural Research. 2009-2010; 49(1):7-14.
26. WaykarBhalchandra, Baviskar RK, Nikam TB. Diversity of nectariferous and polleniferous bee flora at Anjaneri and Dugarwadi hills of Western Ghats of Nasik district (M. S.) India, Journal of Entomology and Zoology Studies. 2014; 2(4):244-249.