



# Potential Nesting Plants of the Dwarf Honeybee, *Apis florea* in the Plains of South Karnataka, India

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## Abstract

The dwarf honeybee, *Apis florea*, exhibits a unique type of nest site selection among honeybee species. These bees build small exposed single combs hanging vertically on the branches or twigs of herbs, shrubs, small trees, piles of dried sticks, etc. Studies were carried out to identify potential nesting plants of *A. florea* colonies in the plains of South Karnataka. The observations revealed that the honeybee nests were found potentially on shrubs (78%) followed by small trees (13%) and herbs (9%). Furthermore, among shrubs, they were found in large numbers on thorny shrubs viz. *lantana* (61.37%) and wild jujube (8.69%). Nevertheless, *A. florea* also selected needle bush and bush plum (5.79% each), Indian cherry (5.34%), cat thorns (4.34%), acacia (4.34%) and lemon (4.34%) for nesting. Studies conclude that thorny shrubs are potential nesting sites of *A. florea* in the plains of South Karnataka, India.

**Keywords:** *Apis florea*; Shrubs; Trees; Nesting plants

## 1 Introduction

Bees and flowering plants have evolved a mutual relationship wherein the former gets food from plants and the latter, the pollination services from bees. Honeybees play a crucial role in maintaining the ecosystem through cross-pollination of both wild and crop plants. *Apis florea*, is a small-sized honeybee compared to other honeybee species. It is naturally distributed in Southeast Asia, India, and the eastern parts of the Middle East. Recently, these bee species have expanded their distribution range to Saudi Arabia<sup>(1)</sup>, Sudan, Egypt, and Ethiopia<sup>(2)</sup>. Surprisingly, it produces a limited amount of honey (500

g/annum).

The nesting pattern of honeybees provides insights into their survival and dispersal strategies<sup>(3,4)</sup>. Selection of a suitable nest site is a pre-requisite for honeybees to reduce the risk of predation, and unfavorable environmental conditions<sup>(5,6)</sup>. During the swarming process scouts of *A. florea* choose appropriate nest sites and use dances to signal their location. As a result of their diligent efforts, the swarm can confidently select the most suitable site for their needs<sup>(7,8)</sup>.

Apparently, *A. florea* nests are single-exposed, hanging vertically on shrubs, piles of dried sticks, house chimneys, hedges, and empty caves<sup>(9,10)</sup>.

Interestingly, these bee species prefer shaded locations for their nests especially to shield their colonies from harsh sunshine, high winds, heavy rains, and other extrinsic factors. Nonetheless, nesting resources are key inputs for their survival and reproduction<sup>(11)</sup>. The study aimed to identify potential nesting plants of *A. florea* in the plains of South Karnataka, India. The outcome of the study is useful in the conservation of *A. florea* by preserving suitable nesting plants.

## 2 Materials and methods

### 2.1 Study area

Studies on nesting plants of *A. florea* were carried out in and around Bengaluru Rural, Tumakuru, and Kolar Districts, Karnataka, India from June 2021 to April 2023. The study area was covered with forest vegetation and agricultural and horticultural flora. Furthermore, the study area was blessed with herbs, shrubs, small trees, piles of dried sticks, and other natural nesting structures.

### 2.2 Identification of nesting plants

Regular field surveys were made to identify the nesting locations of *A. florea* nests in the study area (25km<sup>2</sup>). A Canon EOS 600D, 18 Mega Pixel DSLR camera was used to take pictures of the plants where the nests were found. Each plant species was identified and categorized as herbs, shrubs, trees etc using Gamble’s (1967) standard methods. Herbs are short plants that grow to a height of 2-3 meters in contrast to shrubs which are generally bushy with dense foliage that develops to a height of 3-6 meters, thorny shrubs are scrambling shrubs that usually bear thorns on branches that are prickly and trees have woody stems that grow to the heights of 15 to 30 meters.

## 3 Results

The dwarf honeybee, *A. florea* generally builds single open nests on branches or twigs of shrubs, hedges, small trees, piles of dried sticks, chimneys, etc. They were abundant of a variety of bushy plants ranging from herbs to trees (Figure 1). *A. florea* colonies were found on herbs, shrubs, and small trees in the plains of South Karnataka (Figure 2). Surprisingly, a greater number of colonies was harbored on shrubs. Nevertheless, about 78%, of colonies preferred shrubs followed by trees (13%) and herbs (9%). Furthermore, they were nested on 15 plant species belonging to 12 families in the study region (Table 1). It was observed that the majority of the nesting plants were shrubs and greater number of colonies were observed on lantana (48.8%) followed by wild jujube (7.14%), needle bush (4.76%), bush palm (4.76 %) and coromandel boxwood (4.76%), A minimum number (2.38%) of nests were found on acacia (*Prosopis juliflora*), *Phyllanthus*

(*Phyllanthus novae*), Star jasmine (*Jasminum multiflorum*) and Chinese hibiscus (*Hibiscus rosa sinensis*).

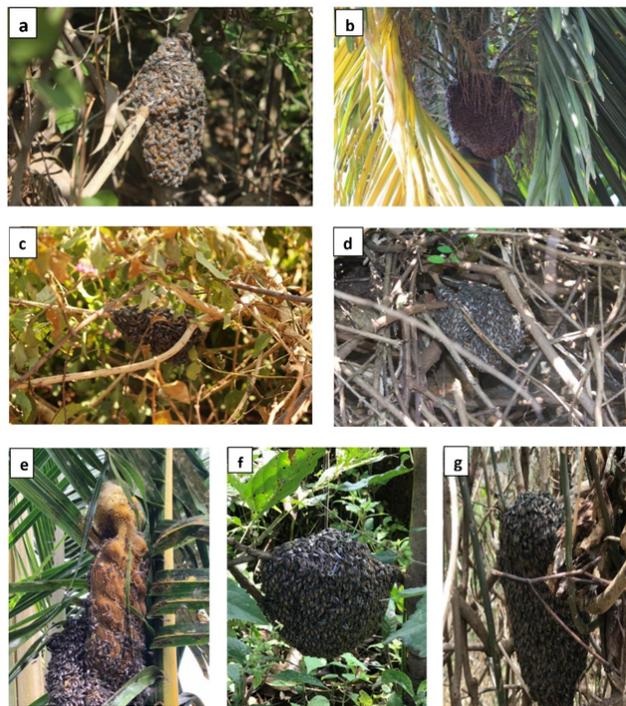


Fig. 1. *A. florea* nests on different nesting plants: (a) (*C*) *Lantana camara*, (b) *Areca catechu*, (d) *Phyllanthus novae*, ( e ) *Cocos nucifera*,(f) *Jatropha curcas* and (g) *Euphorbia grantii*

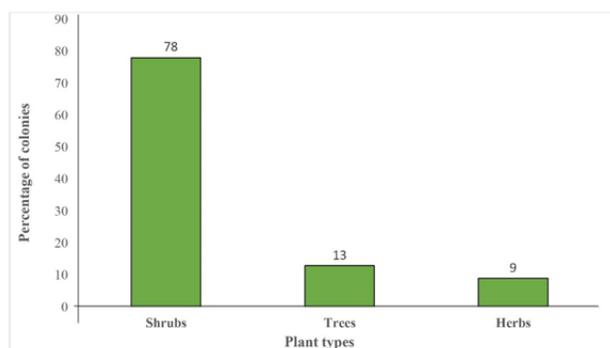


Fig. 2. Distribution of *A. florea* colonies on different nesting plants in the plains of South Karnataka (N=168)

Table 2 shows the nesting pattern of *A. lorea* on thorny shrubs. The observation showed that the highest number (61.37%) colonies were recorded on Lantana (*Lantana camara*), followed by wild jujube (*Ziziphus oenoplia*)(8.69%), Needle bush (*Azima tetracantha*) (5.79%), bush plum (*Carissa spinarum*) (5.79%), Indian cherry (*Ziziphus mauritiana*) (5.34%), 4.34% each on cat thorn, lemon, and acacia

**Table 1. Distribution pattern of *A. florea* nests on shrubs in the plains of South Karnataka. (N=168)**

Sl. No.	Scientific name	Common name	Family	% Colonies present
1	<i>Azima tetraacantha</i>	Needle bush	Salvadoraceae	4.76
2	<i>Carissa carandas</i>	Bengal currant	Apocynaceae	3.57
3	<i>Canthium coromandalicum</i>	Coromandel boxwood	Rubiaceae	4.76
4	<i>Carissa spinarum</i>	Bush plum	Apocynaceae	4.76
5	<i>Citrus limon</i>	Lemon	Rutaceae	2.41
6	<i>Hibiscus rosa sinensis</i>	Chinese hibiscus	Malvaceae	2.38
7	<i>Jasminum multiflorum</i>	Star jasmine	Oleaceae	2.38
8	<i>Jatropha curcas</i>	Barbados nut	Euphorbiaceae	3.57
9	<i>Lantana camara</i>	Lantana	Verbenaceae	48.8
10	<i>Phyllanthus novae</i>	Phyllanthus	Phyllanthaceae	2.38
11	<i>Prosopis juliflora</i>	Acacia	Fabaceae	2.38
12	<i>Punica granatum</i>	Pomegranate	Lythraceae	3.57
13	<i>Scutia myrtina</i>	Cat thorn	Rhamnaceae	3.57
14	<i>Ziziphus mauritiana</i>	Indian cherry	Rhamnaceae	3.57
15	<i>Ziziphus oenoplia</i>	Wild jujube	Rhamnaceae	7.14

**Table 2. Distribution pattern of *A. florea* nests on thorny shrubs in the plains of South Karnataka. (N=168)**

Sl. No.	Scientific name	Common name	Family	% Colonies present
1	<i>Azima tetraacantha</i>	Needle bush	Salvadoraceae	5.79
2	<i>Carissa spinarum</i>	Bush plum	Apocynaceae	5.79
3	<i>Citrus limon</i>	Lemon	Rutaceae	4.34
4	<i>Lantana camara</i>	Lantana	Verbenaceae	61.37
5	<i>Prosopis juliflora</i>	Acacia	Fabaceae	4.34
6	<i>Scutia myrtina</i>	Cat thorn	Rhamnaceae	4.34
7	<i>Ziziphus oenoplia</i>	Wild jujube	Rhamnaceae	8.69
8	<i>Ziziphus mauritiana</i>	Indian cherry	Rhamnaceae	5.34

## 4 Discussion

*A. florea* colonies construct combs on branches of shrubs and small trees, hedges, house chimneys, empty caves, and even piles of dried sticks in the plains of South Karnataka. Despite the availability of a diversity of nesting structures, they were found in large numbers on shrubs. The shrubs which are generally bushy attract *A. florea* for nesting by providing suitable nesting twigs and an adequate amount of shade during the day time. The preference for these species may be due to their robust branches and dense foliage, which could protect the colony from natural enemies and adverse environmental conditions. Our findings are in agreement with the observations of Kumar and Kumar<sup>(12)</sup> who found a greater number of *A. florea* colonies on shrubs. The favored nest sites have one surface of the comb exposed to direct sunlight for several hours a day<sup>(13)</sup>.

Among the shrubs, *A. florea* potentially selected thorny shrubs in greater numbers. Furthermore, its nests were

predominant on a thorny shrub, the lantana, commonly known as wild sage. *Lantana camara* is a low, erect, or sub-scandent woody perennial shrub with stout recurved prickles and a strong odour of black currants. Nesting in low, dense branches and thorny shrubs may help defend the colony from predators and conserve energy during foraging<sup>(14)</sup>. The selection of thorny shrubs for nesting in greater numbers would be due to the protection of colonies from pests and predators. This is likely a advantageous, given that *A. florea* typically forages on small flowers and weeds, particularly those with low nectar content. Apparently, our study proves that lantana is a potential nesting plant of *A. florea* in the plains of South Karnataka, India.

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