

Nesting attributes of dwarf bee, *Apis florea* Fabricius in Himachal Pradesh

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ABSTRACT

Honeybees are known to pollinate almost all crops of agricultural importance. Different species of honeybees are available throughout the world. *Apis florea* is among one of them which is found wild in nature and pollinates both wild and cultivated flora. In India other species viz *A mellifera* and *A cerana* are widely studied and distributed while in case of *A florea* very little knowledge is available. Hence present studies were conducted for locating nesting places of this pollinator. Four districts viz Solan, Sirmour, Kangra and Una of Himachal Pradesh were selected to search for the nesting sites. *A florea* colonies were found in Nalagarh and Paonta areas while no *A florea* activity was recorded in Una and Kangra. Most of the nests of *A florea* were located at a minimum distance of 30 m apart from each other. They were found in bushes of *duranta*, *cariosa*, *lantana* and in the piles of firewood. The biggest nest was 27.0 x 17.0 cm with 23.0 cm base while smallest was 14.0 x 10.0 cm with 13.0 cm base. The nests were 40-100 cm above the ground. The colonies were found throughout the year in this region and swarming was recorded during February-March. Farmer awareness camps were also arranged for the conservation of this pollinator.

Keywords: *Apis florea*; nesting places; survey; nesting parameters; pollinator

INTRODUCTION

Pollination is one of the important ecological processes on earth that conserves the biodiversity of flora which in turns conserves fauna diversity. Mainly insects are responsible for pollination and bees especially honeybees have very important place as managed pollinators throughout the globe. In India four species of honeybees viz *Apis mellifera*, *A cerana*, *A dorsata* and *A florea* are available. Out of these *A mellifera* and *A cerana* are domesticated ones while *A dorsata* and *A florea* are found in the wild (Deowanish et al 2001). Latter two species are migratory in nature and return back to the older nests if the distance is less than 200 m (Pirk et al 2011).

Many studies have been made on all the honeybee species except *A florea* in our country (Narayanaswamy and Basarajavappa 2013). It is found to forage on agriculturally important crops such as *Brassica*, cucurbits, maize etc (Deowanish et al 2001). Keeping in view the importance of this honeybee species in the pollination of crops present studies were conducted to establish their nesting habitat zones and

initialization of conservation strategies of *A florea* in Himachal Pradesh.

METHODOLOGY

Present studies were conducted during 2012-2014 in Himachal Pradesh which lies in the northwestern part of India at 29°22' to 33°12' N latitude and 75°45' to 79°04' E longitude with altitude ranging from 350 to 6975 m amsl. Four districts viz Solan, Sirmour, Kangra and Una were selected to search for the nesting sites of *A florea*. In 2011-12 preliminary survey studies were initiated in Solan district especially the areas which were located in the foothills while in 2012-13 surveys were extended to suitable pockets of Solan, Sirmour, Kangra and Una districts.

In 2013-14 awareness camps were organized in different areas where *A florea* nests were located. The different parameters recorded while establishing the nests were: length and width of nests, minimum and maximum distance between the nests, place of nesting, altitude and longitude of nests, orientation of nests, flora associated with nesting sites, frequency of

nest building, host plants and colour of the comb. GPS system was used to know the coordinates of the nesting sites.

RESULTS and DISCUSSION

During 2011-12 survey studies to locate the nests of *A florea* were conducted only in Solan district. In this district *A florea* colonies were found in Nalagarh area which is in the foothills of the state. This area is located adjoining to Punjab and is suitable habitat for this bee species. The nests were found only in remote parts of this area. The area is undisturbed and having bee flora throughout the year but has dominating plantation of *Acacia catechu* which flowers during June-July. The other bee flora was mustard, maize, *Cannabis*, parthenium, eucalyptus, soapnut, toon, cucurbits, grasses etc. Beekeepers of this district migrated their *A mellifera* colonies during June-August to avail the flow of *Acacia*. Most of the nests of *A florea* were located at a minimum distance of 30 m apart in bushes of *duranta*, *cariosa*, *lantana* and in the piles of firewood. These habitats are considered to be well protected locations to be away from robbers, enemies and adverse climatic conditions. The biggest nest was 27.0 x 17.0 cm with 23.0 cm base while smallest was 14.0 x 10.0 cm with 13.0 cm base. The nests were 40-100 cm above the ground. The colonies were found throughout the year in this region and swarming was recorded during Feb-March.

Similarly in 2012-13 *A florea* nesting survey was conducted in suitable pockets of Solan (Nalagarh belt), Sirmour (Paonta valley), Kangra and Una districts

of Himachal Pradesh. These areas lie in the foothills of Himachal Pradesh adjoining to the plains of Punjab, Uttarakhand and Haryana. *A florea* colonies were found in Nalagarh and Paonta areas and average data recorded are presented in Table 1. During this period no *A florea* activity was recorded in Una and Kangra. The nesting locations were at an altitude of 381-526 m, 21°31.676'-31°11.727' N and 76°38.955'-76°48.068' E.

During 2013-14 five one day awareness camps were organized in different areas of Nalagarh during different months of the year to create awareness among farmers/beekeepers about conservation of *A florea*. In these camps beekeepers and farmers were made aware regarding the conservation, importance and management of *A florea*. Interaction with the farmers disclosed that many of them were not knowing that this species had important role in pollination of various crops and production of valuable honey.

Earlier Thapa (2001) has reported *A florea* colonies on the twigs of small trees or dense bushes and scrubby vegetation in farming areas under tropical conditions. While nesting *A florea* critically sees the available foraging sources (viz nectar and pollen plants), water sources and safe places which are free from predators and enemies (Basavarajappa 2010). Moreover it shows high degree of mobility; migrates to various places in search of good forage, shelter, protection and favorable microclimate (Deowanish et al 2001). However the forage abundance was not uniform along with fluctuating weather during different months under urban ecosystem (Basavarajappa 2010). Perhaps all these fluctuating factors might have

Table 1. Information collected on *A florea* colonies

Parameter	Average data
Period of migration	Round the year
Density of the nest/unit area	Minimum distance between 2 nests: 4-300 m
Length of the comb	15.0 to 30.0 cm
Width of the comb	7.0 to 25.0 cm
Height of the nest from the ground	0.5 to 18.0 feet (terrestrial to arboreal nesting)
Thickness of base/support	3.8 to 12.0 cm
Name of the plant species	<i>Brassica</i> , <i>Eucalyptus</i> , <i>Toona ciliata</i> , <i>Dalbergia sissoo</i> , <i>Syzigium</i> sp, <i>Acacia catechu</i> , <i>Cannabis</i> sp etc
Nearest water source to the colonies and distance	Taps, water tanks and hand pumps at 30-100 m
Arrival and departure week of the colony	Round the year
Host plants within the foraging range	Parthenium, cucurbits, cannabis, <i>Acacia</i> , <i>Zea mays</i>
Colour of the comb	Yellow
Size of the honey crest	8.8-25.0 x 3.0-3.4 cm
Resin ring width	5.0-6.4 cm

influenced the uneven distribution of colonies during different months (Table 1) in Himachal Pradesh. Similar types of observations were reported by Duangphakdee et al (2009) in Nepal and other tropical ecosystems. *A florea* selects peripheral regions on the plant branches (Basavarajappa 2010), builds variously-shaped and small-sized combs that differ slightly from the combs of other *Apis* species. During colony construction it usually attaches the comb crest to small-sized twigs or branches. Perhaps to avail existing resources, avoid human associated disturbances, have effective flight path, get required sunlight and other environmental factors *A florea* might have accustomed to construct different shape colonies at its nesting niche. Generally the normal colonies were big in size. Its nesting location is unique not easily accessible to animals including mankind that could help avoid animals including human interferences and vehicular traffic. Accordingly *A florea* builds its colony at interior side that is away from the road. It avails various plant species including human built structures for nesting under shady places on the twigs/branches. Shady places help protect the colony members from bright light, strong winds and inclement weather conditions.

Wongsiri et al (1997) have reported *A florea* colonies at lowlands of Asia. Preferring lower elevations for nesting it exhibits a unique behaviour that is very common during different months. But higher elevations are found as part of the defense strategy in other *Apis* species (Basavarajappa 2010). Selecting lower elevation for nesting may likely to use minimum energy while attending various colony activities. Thus observations of the present studies agree with the earlier reports of Roubik (2006) and Manjunath and Basavarajappa (2008).

CONCLUSION

A florea is an important honeybee species having a potential of managed pollinator of crops. This species is widely established in Nalagarh area of Solan district and Paonta valley of Sirmour district while in Una and Kangra districts there was no activity of this pollinator. However *A florea* colonies were found in the villages surrounded by forest where the pesticide sprays were negligible. The

colonies were generally found near the water sources in the villages and these areas had *A mellifera* colonies only for short period of the year. Hence present studies will help in ascertaining the natural habitat of this pollinator for further studies.

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