



Foraging Activity of Dwarf Honey Bee (*Apis Florea*) On Bloom of *Ocimum Basilicum* L.

Jasvir Singh Dalio, Lecturer In Biology

G.G.S.S.S. Budhlada-151502 (Punjab)

Correspondence to: Jasvir Singh Dalio

Received 12 February, 2018; Accepted 27 February, 2018 © The author(s) 2018. Published with open access at www.questjournals.org

ABSTRACT: Researchers should pay special attention to various aspects regarding conservation of bee fauna, including critical investigation into honey bee flora. Identification and propagation of suitable bee flora may help to maintain wild honeybees especially dwarf honey bee which is important pollinator of almost all the flowering crops. The present study showed that *Ocimum basilicum* L. was an excellent flora for *Apis florea*, which is under nutritional stress in various ecosystems. The herb provided nectar and pollen during periods of floral scarcity. The foragers of the bee species under investigation visited abundantly to the bloom of experimental plant. Propagation of the identified plant will help to conserve wild bee fauna which is facing nutritional deficiency due to wrong agricultural practices, removal of trees, and shrinking of natural habitats

Key Words: *Ocimum basilicum*, *Apis florea*, bee flora and foraging behaviour.

I. INTRODUCTION

The value of honeybees as pollinators of agricultural crops is greater than their value as honey and other hive product producers. Large number of plants are either dependent upon, or benefited by the bee pollination. *Apis florea* is a vital pollinator for various plant species and its pollination services are quite useful in every type of natural and manmade ecosystems. Honey produced by this *Apis* species is considered to have special medicinal value. Bees are such micro manipulators by which man can harvest floral resources which are otherwise unobtainable[1]. The bees and plants have co-evolved and are interdependent[2][3][4]. Honeybees require carbohydrates, proteins, fat, minerals, vitamins and water for their survival and growth as well as development of colony[5]. All these nutrients are obtained from pollen and nectar. Foraging is a continuous process throughout the year where bee flora is available. There is fluctuation in availability of floral resources (pollen and nectar) in different months of year[6]. Rich and diverse bee flora is constantly declining under Punjab conditions due to destruction of natural habitats and non sustainable agricultural practices. Wild bees like *A. florea* are under nutritional stress. There is an urgent need to do research on various aspects of honey bee conservation more especially investigations into honeybee flora. However blooming of plants is a continuous process throughout the year, but major flora is present only during certain periods. So it becomes necessary to search, identify and propagate flora of bee interest. More studies should be conducted on key bee foraging plants available during different seasons. Research work to assess the status of the potential honeybee plants is the need of hour. Behavioural pattern of bees in selection of preferences for certain floral resources as food provider must be observed to evaluate the sources of nectar and pollen.

Diversified bee flora supports the honey bee populations throughout the year [7]. So survival of honeybees is related to the abundance of bee plants. Richness of bee flora in a given area, including botanical and palynological aspects provides information on floral and surviving potential of bee fauna[8]. Status of plant as bee flora depends on many factors like intensity of bee visitation, whether it provides pollen or nectar or both, quantity and quality of floral rewards as well as season of blooming. Sufficient bee flora in a particular area is necessary to maintain bee colonies[9]. Sweet Basal (*Ocimum basilicum* L.) is unusual among the many culinary herbs, which belong to order Lamiales, family lamiaceae and genus *Ocimum*, provides good forage to *A. florea*, during period of floral scarcity. The plant is also called royal herb or king of herbs. This annual herb is 2 -3 feet high, usually woody at base. The flowers are tiny, white purple in colour, arranged in flattened whorls that encircle the stem, one whorl above the another, borne in simple terminal racemes. It is highly fragrant and have wonderful aroma.

The main aim of the study was to reveal foraging behaviour of *Apis florea* on the bloom of *O. basilicum*. L. to assess its status as bee flora. The expected outcome may enhance the knowledge regarding bee flora and honeybee management technology.

II. MATERIALS AND METHODS

The study was conducted in August and September during 2016 on *O. basilicum* plants grown in the kitchen garden under Punjab conditions. A colony of *Apis florea*(Fig.1) was present naturally within experimental area. Number of bees of *A. florea* present per unit area of bloom per unit time was noted with the help of meter rod and stop clock at various fix hours of day. Number of flowers visited per minute was also recorded. Foraging for various types of rewards, (pollen or nectar or both) was also noted. Blooming period of the plant under investigation was also noted throughout the year. Time of commencement and cessation for foraging activity of *A. florea* was also noticed. Foragers with pollen loads were considered pollen gatherers while those without pollen loads as nectar collectors. Photography was also done. Data collected were consolidated, analysed statistically and results were calculated.

III. RESULTS AND DISCUSSION

Results of experiments revealed that *A. florea* commenced its foraging activity on *O. basilicum* L. at about 730 hours while its cessation time was 1730 hours. Average abundance of bees on sweet basal bloom was 12(Standard Error 2.03)bees/m²/min. Maximum abundance (24±3.2 bees/m²/min.) was recorded at about 945 hours, while minimum number of bees/m²/min.was 4±1.02 at 1700 hours. More abundance of bees on bloom may be due to strong attraction to the bloom, rich rewards (pollen and nectar) and higher density of flowers. Foraging frequency was 10. 2±2.02 flowers/min. Both type of foragers, pollen(Fig.2) as well as nectar(Fig.3) were observed on the bloom. *A. florea* showed special attraction to bloom of plant under experiment (Fig.4). It appeared that *A. florea* got attracted towards bloom due to sweet fragrance.

Hours of day also played significant role in variation of abundance of bees foraging on bloom directly or indirectly(Fig.5). It may be due to time related physiology of plant, innate characteristics of bees and adjustment of bee species with environmental conditions. Foraging rate or foraging frequency depended upon number of factors including instinctive foraging behaviour of insect, floral structure [10] [11] , type of floral rewards, density of flowers and environmental factors. Similar type of results were given by many researchers[12] [13] on various crops.

IV. CONCLUSION

It may be concluded from results that sweet basil was an excellent bee flora for *A. florea* as it provided nectar and pollen throughout the year (except during April , May and December), when floral scarcity was prevailing. Herb under experiment is also useful for human consumption (provides nutrients, minerals and vitamins). Due to unsustainable agriculture wild bees are in nutritional stress, so growing of *O. basilicum*. L in kitchen gardens, parks, farm-houses, schools, religious places is recommended. The study will help to prevent loss of dwarf honey bees due to nutrition stress. It will also provide guidelines to improve floral calendar and conservation of wild honeybees especially *A. florea*.



Figure 1. *Apis florea* comb in its natural habitat.



Figure 2. *Apis florea* pollen forager on *O. Basilicum L.* bloom



Figure 3. *Apis florea* nectar gatherer on *O. Basilicum L.* bloom.



Figure 4. *Apis florea* forager on *O. Basilicum L.* bloom.

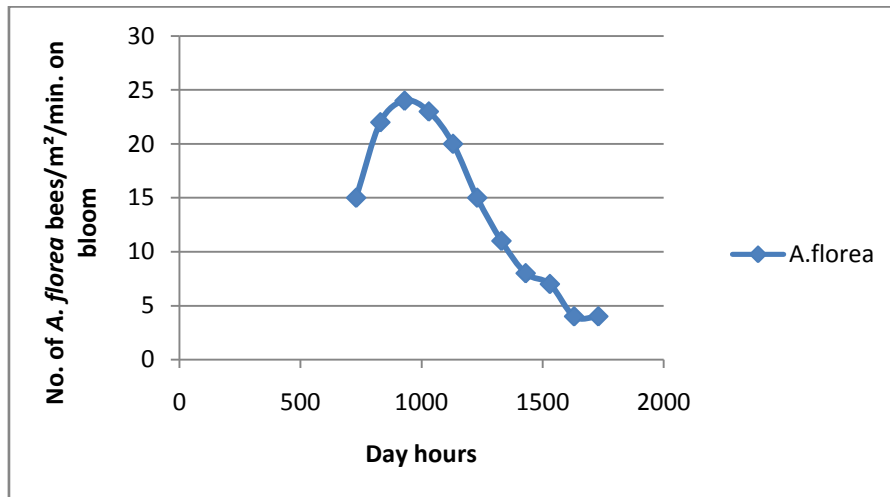


Figure 5. Abundance of *Apis florea* bees on *O. Basilicum* L. bloom at different day hours.

REFERENCES

- [1]. P.G. Kevan. Bee botany: Pollination, foraging and floral calendar. Expert committee on beekeeping with *Apis mellifera* in tropical and sub-tropical Asia, FAO : Rome, 1984, 51 – 55pp.
- [2]. M.C Suryanarayan. Honeybee – flower relationship. *Bulletin of Botanical survey of India*, 28 (1-4), 1986, 55-62.
- [3]. H.H.W Velthuis. Pollen digestion and the evolution of sociality in bees. *Bee world*, 73 (2), 1992, 77 – 89.
- [4]. O. Hargasim. Bee as pollinators of entomophilous crops. *Bee world*, 55 (4), 1974, 137 – 140.
- [5]. G. M. Loper and R.L. Berdel. A nutritional bioassay of honeybee brood – rearing potential. *Apidologie* 11, 1980, 181 – 189.
- [6]. J.B. Free. Insect pollination of crops. London, U.K. : Academic press, 1970, 544 pp.
- [7]. C.C. Zamarlicki. Evaluation of honeybee plants in Burma – a Case study. Proceeding of the FAO (UN) expert committee, 1984, 57-76.
- [8]. M. Sharma. studies in the flower of *Datura stramonium* Linn. In relation to bee botany. *Journal of palynology*. 1972, 8 : 17-21.
- [9]. B.A. Baptist, and R.W.K. Punchihewa. A preliminary analysis of the principal factors which will affect apiary honey production in Sri Lanka. Proceedings of the 2nd conference of Apiculture in Tropical Climates, New Delhi, 1980, 75 – 81.
- [10]. J.B. Free. Insect pollination of crops, Academic press, London, 1960, 544pp.
- [11]. F.S. Gilbert. Flower visiting by hoverflies (Syrphidae) *Ann. Rev. Ecol and Syst.*, 6, 1980, 139 – 170.
- [12]. N. Naim, and R.P. Phadhe. Bee flora and seasonal activity of *Apis cerana indica* at Pusa (Bihar). *Indian Bee journal*, 38 (1-4), 1976, 13- 19.
- [13]. V. Sivaram. Bee flora, honey flow and beekeeping in the plains of Karnataka. Doctoral thesis, Bangalore university Bangalore, India. 1995.

Jasvir Singh Dalio “Foraging Activity of Dwarf Honey Bee (*Apis Florea*) On Bloom of *Ocimum Basilicum* L.” *Quest Journals Journal of Research in Agriculture and Animal Science*, vol. 05,no.1, 2018, pp. 11–14.