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BEE FLORA FOR URBAN BEEKEEPING IN NASIK CITY

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Abstract: The investigations on the bee-flora and their identification, classification was undertaken during the years 2017-2018 in the Nashik City. Honey bee species found inhabiting Nashik city are *Apis florea*, *Apis cerana indica*, *Apis dorsata* and *Trigona*, The identified bee-flora was further grouped into pollen, nectar, and both pollen and nectar yielding plants, and the forage value of the bee plants has been provided. The study revealed that more than 214 plants are useful to honeybees. However, the present paper lists about 194 bee plant species, which are well distributed and commonly observed in the study area. The identified bee flora comprises of ornamentals, timber, medicinal, fruits, vegetables, and other commercial important plants like spices, pulses, cereals, oil yielding, fiber, fodder etc. When all plants are categorized as per the flowering period, it revealed that throughout the year, bee forage is available in Nashik city. Because of economic importance of these urban plants, they are protected and propagated. They also serve as alternate food resource for the bees. Being pesticide free urban area they play a great role in conservation of these bee species. Beehive and bee should be protected in the City.

Keywords: Honey bee, Bee flora, Nectar, Pollen, Urban beekeeping.

I INTRODUCTION

Beekeeping or Apiculture is maintaining honey bee for pollination and bee products. Beekeeping serves as a fifth important resource of Indian agriculture. When bee boxes are kept in garden, terrace or galleries in scattered clusters by beekeepers it is called as urban beekeeping. Urban beekeeping is a seasonal resource of migratory bees. Nashik city is located on latitude 19°33' and on longitude 73°-16', covering an area of 259.13 Sq. Km. in Maharashtra state of India. The city's tropical location and high altitude combine to give it a relatively mild version of a tropical wet and dry climate. Season here is very favorable for honey bee habitat. It is surrounded by mountains and forest as well as it's a good agricultural belt for the production of Tomato, Grapes and Pomegranates. This city itself holds lots of plants and Gardens. Increasing pesticides based agriculture in surrounding, city plantation stands as a pesticide free resource for the bees. When lots of migratory honey bee species were observed in the various areas of Nashik city, we found need and importance of urban beekeeping in Nashik city. Hence in present research attempt is made to enlist bee flora available throughout the year in the periphery of 5 km in Nashik city.

II MATERIAL AND METHOD

Honey bee visits different plant species flower as a forager sometimes for nectar, pollen and sometimes for both. Classification of plant as nectariferous and polleniferous depends on activities performed by honey bees on different flowers. After landing on flower if honey bee sits calmly and extends its proboscis into the flower or collect the nectar from outside nectaries the flora was considered as nectariferous flora and if bees are hyperactive inside the flower carrying pollen on their body or in pollen basket (hindleg) from the flower, this flora was considered as polleniferous flora. Flowers with honey bees showing both the activities were considered under nectariferous as well as polleniferous flora. Such Nectariferous (N), polleniferous (p) and both (N+P) plants were enlisted using literature on Flora of Nashik city. Further these plants were physically verified for their presence in periphery of 10 km from the center of city (Figure No. 1). The present study was conducted during April, 2017 to March, 2018 at Nashik city. Data was presented in Table No.1. These plants species data was presented (Figure No. 2) month wise to visualize the possibilities of availability of bee pasturage in city.

III RESULTS AND DISCUSSION

Literature survey of Nashik flora was screened to identify Nectariferous (N), polleniferous (p) and both (N+P) plants. The data reveal 214 plants to be useful as bee forage. Observations were made throughout the year for physical presence and flowering of these plants. In this survey 192 plant species were found to exist in the study area as listed in Table no. 1. All these plants have scattered distribution in city area. In the periphery of 10 km, all these plants serve as reliable food resources for the bees, primarily *Apis dorsata* and *Apis florea*, whereas *Apis cerana* and *Trigona* were scanty. Majority of *Trigona* were found foraging on small household garden plants around and near vicinity of nest. Critical analysis of primary data (Figure No. 2) reveals that throughout the year 4 to 16% bee floral plants are available in the Nashik city.

Honey bee comprises mainly four species namely *Apis dorsata*, *Apis florea*, *Apis cerana*, and *Apis mellifera*. For commercial beekeeping, *Apis cerana* and *Apis mellifera* are most popular honey bees reared and maintained for honey production in India. In the area under investigation, Nashik city area, *Apis dorsata*, *A. florea*, and *A. cerana* are prevalent bee species. Honeybees get their food from local floras. They collect nectar, a sweet sugary liquid; carbohydrate rich source of energy from floral and extra floral nectaries present in flower and leaves; which is the primary raw material for honey and pollen as a protein source for their broods. For urban beekeeping, one should have some idea about the availability of bee food in their vicinity. The plants that yield nectar and pollen are collectively referred as bee flora or bee pastures [2]. For the initiation or promotion of urban beekeeping in any area, it is compulsory to study the bee flora of that region. Proper records of presently available bee flora in some ready reference form helps the beekeeper of that particular area to sustain beekeeping.

The recent decline of pollinating insect populations is driven by a conjunction of factors, including habitat fragmentation, use of pesticides, multiplication of pathogens, global warming and the decline of the wild flora [1]. Many cities in India have diverse plant species flourishing all year long due to traditional and plantation practices [Add reference from Indian literature], thus providing resources throughout the year for pollinators. The low pesticide policies applied in many cities may also create favorable conditions for the maintenance of diverse pollinator communities [9]. In the same time, honey bees are supposed as a mark of biodiversity and ecosystem well-being by many city-dwellers and the media. Urban introductions of honey bee colonies and conservation of native bee species have been promoted by public authorities and decision makers all over the world. Man constraint of conservation of these bee species in city

area is misconception of bee fear and pest control agencies' cruel way of removing these hives.

Honey bees collect nectar and pollen from the flowers. Nectar serves as a source of energy for broods, and pollen provides proteins to the entire beehive colony (Freitas & Silva 2006). From the above study and data collected, it clearly indicates bee floral plant species as forty-two (42) plant species were pollen yielding, seventy-seven (77) were nectar yielding and seventy (70) were both nectar and pollen yielding for honey bees, which is a significant number for the survival of managed and feral native colonies of honey bees. The good health of a colony causes a direct effect on performance and ultimately benefits to beekeeping. This exclusively depends on the availability of bee food. Presence of diversified bee flora helps flourishing the apiaries in a healthy manner. Throughout the year minimum 4% and maximum 16% plant species are available. Further research has to be carried out for foraging behavior of different bee species on Nashik city bee flora to quantify the exact potential of urban beekeeping and number of bee colonies required in Nashik city. This study will impact on the policy maker and NGO for promoting Urban beekeeping in the society.

IV CONCLUSION

In present research indicates potential of Nashik city for urban beekeeping. In the periphery of 10 km we reported 194 plant species useful for bees. Throughout the year native and exotic honey bee species will have sufficient diversity of bee flora in Nashik city, on an average 4 to 16% plant species remain flowering all the year. This rich source of bee flora will definitely serve as an alternative migration site for the endangered bee species in surrounding agriculture belt. Also this extensive data can be used by the social forestry for selection of better plant species for plantation drive in the city area. Further research can be done to quantify the potential of these bee flora with respect to number of bee colonies to be kept in the Nashik city.

REFERENCES

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Figure No. 1: Dense urban area selected for the study was 10 km periphery from the center of Nashik city.

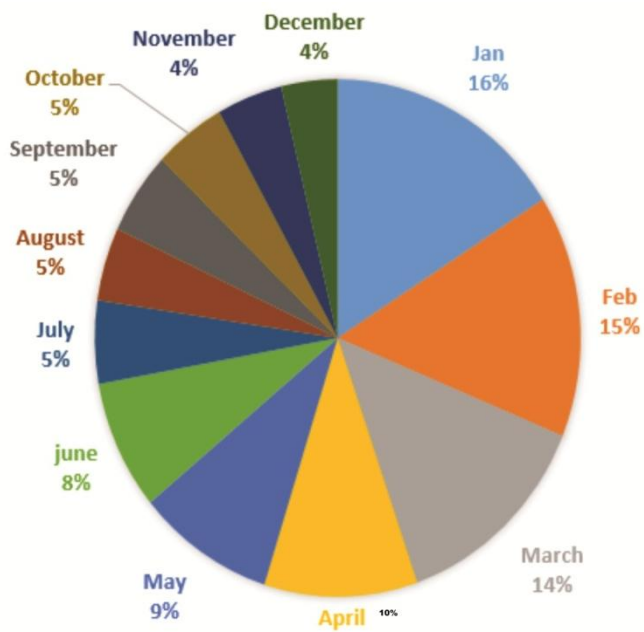


Figure: No.2: Seasonal availability of Bee forage plants in Nashik city.