



Foraging Preferences of *Apis dorsata* Honey Bees in Nagarkurnool District, Telangana State: A Study of Bee pasturage Plants

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Abstract

This research paper delves into the foraging preferences of *Apis dorsata* honey bees in Nagarkurnool, Telangana, through a comprehensive study of bee pasturage plants from 34 squeezed honey samples. Honey bees, particularly *Apis dorsata*, play a vital role in pollinating crops and maintaining ecological balance. To gain insights into their dietary choices, a detailed survey was conducted to identify and categorize the bee pasturage plants utilized by these bees in the region. Melissopalynological analysis uncovered a 25 pollen types from 16 families, including trees, shrubs/climbers, and herbaceous plants. Notably, *Prosopis juliflora*, *Punica granatum*, *Borassus flabellifer* and *Citrus aurantifolia* were among their predominant sources of nectar. This research contributes to our understanding of how bee pasturage plants are crucial for the survival and well-being of *Apis dorsata* honey bees, with implications for apiculture, agriculture, and ecological stability in Nagarkurnool District, Telangana State.

Introduction:

Honey bees, particularly the giant Asian honey bee species *Apis dorsata*, are vital components of ecosystems and agriculture due to their indispensable role as pollinators. In the district of Nagarkurnool, located in the state of Telangana, India, *Apis dorsata* plays a critical role in pollinating a wide variety of crops, impacting crop yields and ecosystem stability (Klein et al., 2007). Understanding the foraging preferences and behaviours of these honey bees is paramount for conservation efforts and sustainable apiculture. This research endeavours to shed light on the bee pasturage, the plant sources of nectar and pollen, which sustain the *Apis dorsata* honey bee population in Nagarkurnool. Geographical origins might produce various types of honey with their own uniqueness, which being a marker to

differentiate them from one another (Mahani Majid et al. 2020)

Pollination by honey bees, including *Apis dorsata*, has significant economic implications for agriculture, enhancing the production of fruits, vegetables, and various cash crops (Aizen et al., 2008). Moreover, these bees play a crucial role in maintaining biodiversity by contributing to the reproduction of native plant species (Potts et al., 2010). Thus, the well-being of *Apis dorsata* has far-reaching consequences, both for the local economy and the environment. This study focuses on identifying the bee pasturage plants that are the primary nectar and pollen sources for *Apis dorsata* in Nagarkurnool, Telangana. It aims to contribute valuable insights that can inform conservation strategies, sustainable land management practices, and the continued well-being of these essential pollinators. The conservation and sustainable

management of these plants, such as neem (*Azadirachta indica*), pomegranate (*Punica granatum*), and lime (*Citrus aurantifolia*) etc. are of particular significance as they directly impact honey production and, consequently, local livelihoods and ecological stability.

MATERIALS AND METHODS:

Collection of Honey:

Honey samples were collected from beehives located in Nagarkurnool district, Telangana, India. The collection was carried out in sterile glass jars to prevent contamination. A total of 34 honey samples were obtained from different hives to ensure a representative dataset. Then the honey samples were extracted by squeezing the honey to separate honey from wax and other impurities. The squeezed honey was filtered through a fine mesh to remove any remaining debris or foreign particles. The filtered honey was stored in clean, airtight containers to prevent moisture absorption and fermentation.

Acetolysis Procedure:

A representative sub-sample of each honey sample, approximately 5ml, was collected for acetolysis. Acetolysis is a technique used to dissolve the pollen grains in honey to prepare them for microscopic analysis. For the acetolysis process, 9ml of acetic anhydride and 1ml of concentrated sulfuric acid were mixed in a fume hood with extreme caution due to their corrosive nature. Agashe and

Rangaswamy (1997). The mixture was then cooled to room temperature. A small amount of honey was added to the acetolysis mixture. The mixture was heated gently and continuously stirred until the honey sample was completely dissolved. The solution turned dark brown during this process.

Microscopic Analysis:

Following the acetolysis, the solution was allowed to cool to room temperature. A drop of the cooled acetolysis solution was placed on a microscope slide, and a coverslip was added. The slide was then examined under a light microscope. Pollen grains present in the honey were identified and counted to determine the botanical origin of the honey. The melissopalynological analysis aimed at the characterization and identification of pollen according to the guidelines outlined by the International Bee Botany Commission to determine their botanical sources. The prepared slide was then mounted on glycerin jelly and examined under a compound microscope at magnifications of 400×, 600×, and 1000×.

Results:

The results of the acetolysis analysis revealed the botanical origin of the honey samples collected from Nagarkurnool district, Telangana, India. Pollen grains from various plant species were identified and counted in each sample. The following plant species were the dominant sources of pollen in the honey:

Table:1 showing important bee pasturage plant pollen recorded in honey samples

S.No	Name of the plant	family	Common name	Habit
1	<i>Coriandrum sativum</i>	Apiaceae	Coriander	Herb
2	<i>Cleome gynandra</i>	Cleomaceae	Spider Plant	Climber
3	<i>Eucalyptus globulus</i>	Myrtaceae	Blue Gum Eucalyptus	Tree
4	<i>Citrus aurantifolia</i>	Rutaceae	Lime	Tree
5	<i>Punica granatum</i>	Punicaceae	Pomegranate	Tree
6	<i>Azadirachta indica</i>	Meliaceae	Neem	Tree
7	<i>Sesamum indicum</i>	Pedaliaceae	Sesame	Herb
8	<i>Mutarda nigra</i>	Brassicaceae	Black Mustard	Herb
9	<i>Madhuca indica</i>	Sapotaceae	Indian Butter Tree	Tree
10	<i>Gymnosporia emarginata</i>	Celastraceae	Rough-leaved Jujube	Climber
11	<i>Sphaeranthus indicus</i>	Asteraceae	East Indian Globe Thistle	Herb
12	<i>Muntingia calabura</i>	Muntingiaceae	Jamaican Cherry	Tree
13	<i>Erythrina indica</i>	Fabaceae	Indian Coral Tree	Tree
14	<i>Grewia asiatica</i>	Malvaceae	Phalsa	Tree
15	<i>Coccinia grandis</i>	Cucurbitaceae	Ivy Gourd	Herb
16	<i>Schleichera oleosa</i>	Sapindaceae	Kusum Tree	Tree
17	<i>Trachyspermum ammi</i>	Apiaceae	Ajwain	Herb
18	<i>Prosopis juliflora</i>	Fabaceae	Mesquite	Tree
19	<i>Leucaena leucocephala</i>	Fabaceae	Leucaena	Tree
20	<i>Prosopis cineraria</i>	Fabaceae	Velvet Mesquite	Tree

21	<i>Senna tora</i>	Fanbaceae	Sickle Senna	Herb
22	<i>Alangium salvifolium</i>	Alangiaceae	Sage-leaved Alangium	Tree
23	<i>Capsicum frutescens</i>	Solanaceae	Chili Pepper	Herb
24	<i>Legerstroemia parviflora</i>	Lythraceae	Deciduous Crape Myrtle	Tree
25	<i>Borassus flabellifer</i>	Arecaceae	Palmyra Palm	Tree

Discussion:

The results of the pollen analysis provided valuable insights into the floral sources of the honey produced by *Apis dorsata* honey bees in Nagarkurnool district. The dominance of certain plant species in the honey samples reflects the foraging preferences of these bees.

Azadirachta indica (Neem) and *Punica granatum* (Pomegranate) were prominent in the honey, suggesting that these trees are major nectar sources for *Apis dorsata* in the region. The presence of *Citrus aurantifolia* (Lime) pollen indicates that citrus orchards contribute significantly to the honey's botanical origin. Additionally, the presence of *Eucalyptus globulus* (Blue Gum Eucalyptus) and *Cleome gynandra* (Spider Plant) pollen suggests that both wild and cultivated plants are important for the honey bee foraging habitat (Table:1, Fig:1). The occurrence of culinary herbs such as *Coriandrum sativum* (Coriander) and *Carum copticum* (Ajwain) in the honey samples underscores the diversity of sources within the bees' foraging range. Furthermore, the presence of *Madhuca indica* (Indian Butter Tree) pollen emphasizes the role of indigenous trees in honey production. The presence of exotic plant species like *Prosopis juliflora* (Mesquite) and *Leucaena leucocephala* (Leucaena) in the honey may indicate the adaptability of *Apis dorsata* to various plant resources, including non-native species.

These findings have implications for apiculture and the conservation of specific plant species, such as neem and pomegranate, which significantly contribute to honey production in the region. The diverse floral sources also highlight the role of honey bees in pollinating both cultivated and wild plants, which has positive implications for agriculture and ecosystem stability in Nagarkurnool district. Conservation efforts should aim to protect these valuable plant species to ensure the continued well-being of *Apis dorsata* honey bees and the production of high-quality honey.

Conclusion:

The results of the acetolysis analysis provided a comprehensive understanding of the botanical sources contributing to the honey produced by *Apis dorsata* honey bees in Nagarkurnool district, Telangana, India. This study revealed a diverse

array of pollen grains originating from both indigenous and exotic plant species.

Prominently, *Azadirachta indica* (Neem), *Punica granatum* (Pomegranate), and *Citrus aurantifolia* (Lime) emerged as the primary botanical sources, reflecting the significance of these plants in *Apis dorsata* foraging habitats. The presence of pollen from culinary herbs like *Coriandrum sativum* (Coriander) and *Carum copticum* (Ajwain) further emphasized the bees' ability to explore various resources, including those cultivated by humans. The inclusion of indigenous plant species such as *Madhuca indica* (Indian Butter Tree) underscored the importance of native flora for honey production. Moreover, the presence of exotic species like *Prosopis juliflora* (Mesquite) and *Leucaena leucocephala* (Leucaena) suggested the adaptability of *Apis dorsata* to diverse forage sources. These findings have significant implications for apiculture, as they highlight the importance of conserving specific plants, particularly neem and pomegranate, which are major contributors to honey production. Furthermore, the study underscores the role of honey bees in pollinating both cultivated and wild plants, thereby enhancing agricultural productivity and supporting ecosystem stability in Nagarkurnool district.

The diversity of beepasturage plants utilized by *Apis dorsata* honey bees in the region reflects the bees' adaptability and the dynamic nature of their foraging habits. Conservation efforts should prioritize the protection of key plant species, the preservation of natural habitats, and the sustainable management of agricultural landscapes to ensure the continued well-being of *Apis dorsata* honey bees and the production of high-quality, ecologically significant honey. This research contributes valuable insights into the interdependence of honey bees, plants, and the environment, fostering a holistic approach to apiculture and biodiversity conservation.

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Fig:1 Important pollen types recorded in honey samples

References:

Klein AM, Vaissiere BE, Cane JH, Steffan-Dewenter I, Cunningham SA, Kremen C, & Tscharrntke T. 2007. Importance of pollinators in changing landscapes for world crops. *Proceedings of the Royal Society B: Biological Sciences*, 274(1608), 303-313.

Aizen MA, Garibaldi LA, Cunningham SA, & Klein AM. 2008. How much does agriculture depend on pollinators? Lessons from long-term trends in crop production. *Annals of Botany*, 103(9), 1579-1588.

Mahani Majid, Mohammed S. Ellulu, and Mohd Fadzelly Abu Bakar, 2020. Melissopalynological

Study, Phenolic Compounds, and Antioxidant Properties of *Heterotrigona itama* Honey from Johor, Malaysia, *Hindawi Scientifica*, Volume 2020.

Potts SG, Biesmeijer JC, Kremen C, Neumann P, Schweiger O & Kunin WE. 2010. Global pollinator declines: trends, impacts and drivers. *Trends in Ecology & Evolution*, 25(6), 345-353.

Agashe SN and Rangaswamy, 1997 "Melissopalynological studies of honey samples Bongardka, Dakshina Kannada District, Karnataka," *Indian Bee Journal*, 59, pp. 8–11,.