

Golden Nector Trials: Seasonal Bee Plants Amritsar

Kuldeep Kaur, Palak, Ankita, Pallvi, Tarunpreet, Sakshi, Vishav Dhaliwal,

*Vishav Thukral and Simran Bhatia

Department of Agriculture, Guru Nanak Dev University, Amritsar, Punjab, India

*Corresponding Author's email: vishavthukral@gmail.com

Amritsar, the holy city and the home of Guru Ramdas, is not only a center of spiritual significance but also the heart of Punjab's agrarian landscape. It stands as a symbol of intensive farming and rural prosperity. The region is blessed with fertile alluvial soils and a well-developed irrigation network, enabling the cultivation of a wide range of seasonal crops such as wheat, rice, mustard, sunflower, maize, sugarcane, and various fruit and vegetable crops. In recent years, the district has also shown increasing interest in the production of pure honey as a supplementary agricultural enterprise. The rich diversity of crops and associated flora provides abundant nectar and pollen resources, making the region highly suitable for quality honey production. The seasonal bloom of agricultural and wild plants creates a natural nectar pathway, directly linking farming systems with apiculture and pollination services. This ecological synchronization forms the foundation of successful beekeeping and enhanced agricultural productivity in the region. Thus, the agricultural fields of Amritsar serve not only as food baskets but also as golden nectar trails for honeybees.



Climate and geographic area to study

The success of beekeeping largely depends on suitable environmental conditions around the apiary site. Certain basic requirements must be fulfilled to ensure proper colony development, efficient foraging, and quality honey production. The site selected for beekeeping should be dry and free from dampness, as high relative humidity adversely affects bee flight activity and delays nectar ripening. A reliable source of clean water, either natural or artificial, should be available near the apiary to meet the needs of the colonies. Protection from strong winds is also essential, and trees often serve as effective windbreaks in open areas. Additionally, hives should be placed under partial shade, either beneath trees or under artificial structures, to protect them from excessive heat and direct sunlight.

Another crucial factor is the availability of abundant **bee pasturage**, which refers to plants that provide nectar and pollen for honeybees. Such flowering plants should be present in sufficient quantity around the apiary to ensure continuous food supply throughout the year. Amritsar district, located in the north-western part of Punjab, lies within the fertile Indo-Gangetic alluvial plains. The region is characterized by flat terrain, deep fertile soils, and a well-developed irrigation network supported by canals and tube wells. These geographic features make the area highly suitable for intensive agriculture as well as for apiculture.

The climate of Amritsar is classified as sub-tropical continental, marked by distinct seasonal variations that strongly influence flowering patterns and nectar availability. Summers are hot and dry, with temperatures often exceeding 40°C, whereas winters are cool, with temperatures occasionally dropping below 5°C. The monsoon season, extending from July to September, contributes the majority of the annual rainfall, which averages about 600–700 mm.

These climatic conditions play a significant role in determining the growth and flowering cycles of crops and natural vegetation. Cool winter conditions favor mass flowering of mustard and other oilseed crops, resulting in a major honey flow period. Spring encourages flowering of fruit crops and fodder plants, while summer and monsoon seasons provide relatively limited forage. Thus, the geographic setting and climatic pattern of Amritsar directly influence the seasonal availability of bee flora and contribute to the overall productivity of beekeeping in the region.

Taxonomy of Honey Bee

1. Domain: Eukaryota (Organisms with true nucleus)
2. Kingdom: Animalia (Multicellular, heterotrophic animals)
3. Phylum: Arthropoda (Jointed legs, segmented body, exoskeleton made of chitin)
4. Subphylum: Hexapoda (Six-legged arthropods)
5. Class: Insecta (Three body parts: head, thorax, abdomen; three pairs of legs)
6. Order: Hymenoptera (Bees, wasps, ants; two pairs of membranous wings)
7. Suborder: Apocrita (Narrow waist between thorax and abdomen)
8. Superfamily: Apoidea
9. Family: Apidae
10. Subfamily: Apinae
11. Tribe: Apini
12. Genus: Apis

Feeding habit-

Honeybees are herbivorous insects feeding mainly on nectar and pollen. Nectar provides carbohydrates for energy and honey production, while pollen supplies protein for brood development. In Amritsar (Punjab), bees forage on crops like mustard, sunflower, cotton, eucalyptus, and fruit plants depending on season. Their feeding varies with flowering pattern, showing build-up, honey flow, and dearth periods. They usually forage within 2–4 km radius of the hive.

Methodology

This study was carried out in Amritsar district during 2026 to examine the foraging behaviour of honeybees on various flowering crops. Observations were conducted in the fields of Guru Nanak Dev University, Khalsa College, and nearby local areas.

Attention was given to types of plants, floral structure, and bee activity. Data were collected through direct field observations and supported with real-time photographs.

The study focused on:

- Number of flowers visited by bees at a time
- Duration of stay on individual flowers
- It was noticed that foraging behaviour varied with crop type. Honeybees entered deeper into flowers like field pea, while in crops such as mustard and hollyhock, they mainly collected pollen from central parts.
- Different sites in Amritsar were surveyed to identify plants attracting honeybees, and all findings were recorded carefully.

Major bee flora**Rabi season flora**

Common name	Scientific name	Family	Detail	Picture
Mustard	<i>Brassica juncea</i>	Crucifers	Mustard is the most important winter bee forage crop in Punjab. It flowers from December to February and provides abundant nectar and pollen, resulting in high honey yield and production of light yellow mustard honey	
Linseed	<i>Linum usitatissimum</i>	Linaceae	Linseed is an important winter oilseed crop grown in Punjab that flowers during the late winter season. Its blue/white flowers produce moderate amounts of nectar and pollen, making it a useful forage plant for honeybees during the honey flow period. Although it is not a major honey-yielding crop like mustard, it contributes to sustaining bee colonies and supporting continuous nectar availability in agricultural landscapes.	
Methi	<i>Trigonella foenum-graecum</i>	fabaceae	Methi is an important winter season leguminous crop cultivated widely in Punjab. It flowers during late winter and serves as a good pollen source for honeybees. Although nectar secretion is moderate, its abundant flowering supports brood development and helps maintain colony strength during the honey flow period.	

Reference location-Guru Nanak Dev University Amritsar

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(Moongre / Radish pods)	<i>Raphanus sativus</i> var.	Brassicaceae.	It is grown for its tender green pods, which are edible and rich in vitamins and minerals. The plant produces small white to light purple flowers arranged in clusters. Honeybee pollination: Radish is largely cross-pollinated and highly attractive to honeybees due to its nectar and pollen. Honeybees improve seed set and yield, making it an important bee-forage crop during its flowering period.	 Reference location-Guru Nanak Dev University Amritsar
Nashi Pear	<i>Pyrus pyrifolia</i>	Rosaceae	Nashi pear is a deciduous fruit tree producing round, crisp, apple-like pears. It bears white spring blossoms that attract honeybees, and pollination is mainly insect-mediated. Cross-pollination by bees improves fruit set and fruit quality.	 Reference location-Guru Nanak Dev University Amritsar
Jamun	<i>Syzygium cumini</i>	Myrtaceae	Jamun is a tropical evergreen fruit tree producing small white fragrant flowers and purple-black berries. It is mainly insect-pollinated, and honeybees are strongly attracted to its nectar-rich flowers, making it a good source for summer honey flow	
Cucurbits (Pumpkin group)	<i>Cucurbita</i> spp. (e.g., <i>Cucurbita maxima</i> , <i>Cucurbita moschata</i>)	Cucurbitaceae	Cucurbits are vine crops like pumpkin, bottle gourd, cucumber, and bitter gourd. They have separate male and female flowers and depend on bees for pollination. These vegetables are important in summer and rainy seasons.	
sesame	<i>Sesamum indicum</i> L.	Pedaliaceae	Sesame is an important Kharif oilseed crop grown during the monsoon season. It has tubular white or pink flowers and is mainly self-pollinated but also visited by bees. The seeds are rich in oil and protein and are used for edible oil and sweets.	

Coriander <i>Coriandrum sativum</i> L. Apiaceae (Umbelliferae)	Coriander is a cool-season (Rabi) spice crop grown for its green leaves and dried seeds. It has small white to pink flowers arranged in umbels and attracts honeybees for pollination. The seeds and leaves are widely used in cooking and traditional medicine.	
Sunflower <i>Helianthus annuus</i> L. Asteraceae	It is an important oilseed crop grown in Rabi, Kharif, and Zaid seasons in India. The plant has a tall stem and a large yellow flower head (capitulum). It is mainly cross-pollinated by honeybees and is a good source of edible oil and nectar.	

Bees collect pollen from the anthers (male part) of flowers and carry it using special structures called pollen baskets (corbiculae) on their hind legs. They collect nectar from the nectaries of flowers using their long tube-like mouthpart called a proboscis. Nectar is stored temporarily in the honey stomach (crop) before being taken to the hive.

Summary

Beekeeping requires suitable environmental conditions such as dry surroundings, availability of clean water, protection from strong winds, and partial shade. The presence of rich bee flora ensures a continuous supply of nectar and pollen, which is essential for colony growth and honey production. Amritsar has favorable geographic and climatic conditions, including fertile alluvial soil and a sub-tropical climate. Seasonal variations influence flowering patterns, with winter crops like mustard providing the main honey flow, while other crops support bees throughout the year.

The study also highlighted the feeding habits and foraging behaviour of honeybees, showing that bees visit different crops based on flower structure and nectar availability.

Conclusion

Amritsar is highly suitable for beekeeping due to its climate, fertile land, and diverse bee flora. Seasonal crops play an important role in maintaining colony strength and honey production. Honeybees are essential not only for honey production but also for pollination, which improves crop yield and supports agricultural sustainability. Promoting beekeeping can benefit both farmers and the environment.

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