

Bumble bee: The teddy bear of class Insecta

Neha Negi

Bumble bees are the members of the family Bombidae, order Hymenoptera and belong to the genus *Bombus* Latreille. *Bombus* species are annual eusocial insects with short-lived colonies that are found predominantly in temperate climates around the world. These bees are the primary pollinators and the main service providers with more pollinator diversity and play a critical role in ecosystems by delivering key pollination services which are required for all living organisms (Potts et al., 2010; Khan et al., 2018).

Bumble bees have unique physical and behavioural adaptations for collecting nectar and pollen from the flowers they visit. These adaptations include hairy bodies well adapted for pollen gathering, pollen baskets or corbicula on the hind legs of bees, mandibles and lengthy tongues used to retrieve pollen grains from anthers and moistening pollen grains with regurgitated nectar droplets. These insects unlike other species of bees can forage outside in cold and bad weather conditions and are regarded as important and capable pollinators. These bees are largely restricted to high land ecosystems in India, with distinct species confined to elevations ranging from 1000 m to 5500 m amsl. These bees build their nests in the earth, frequently in abandoned rat tunnels or in tall grasses above ground. When the queen finds the nest, she supplies it with a ball of pollen mixed with nectar and a single wax nectar pot. The queen will deposit the first clutch of eggs in the ball of pollen in close proximity to the nectar pot and then incubate them using her body heat. The eggs will mature into larvae and then pupate over the period of 3-5 weeks before emerging as first worker offspring.

Workers who have just taken up foraging and brood care, allowing the queen to focus on egg-laying. Bumble bee colonies in the early spring are made up of a single fertilised queen, female workers, and immature brood. Depending on the species, nests can develop to be rather large (300–400 workers) or reach a peak population of around 100 workers. The colony turns to generate reproductive in late summer and early fall (*i.e.*, males and gynes). The male offspring

are created first, followed by the female progeny *i.e.*, unfertilized queens.

The only caste of *Bombus* that survives the winter is the queens whereas the workers and males die in the late summer and early fall, respectively. The young queens go into diapause after mating while the colony's founder queen, workers and males die. The queens that have survived hibernation give birth to the next generation in the following spring.

In India, bumble bees are mostly confined to the high-altitude regions. These species are so adapted to their specific habitats that many of species that are found in highly elevated areas are not reported from low altitude areas and vice-versa. Bumble bees are closely related to various types of flowers and can be seen foraging in a variety of hilly environments. In comparison to the locked deep and dark forests, bumble bees prefer wide sunshine meadows.

Many plant species have a close relationship with the existence and activity of bumble bees as a result of the adaptation. They are nearly totally reliant on plants for nourishment as social insects. The range and availability of floral resources accessible to bumble bees depend upon the distance from the nests where they forage. In the Himalayas, different species have different host plants depending on altitude. Bumble bees feed significantly on *Cirsium arvensis*, *Cirsium falconeri*, *Carduus* spp., *Nepeta* spp., *Prunella vulgaris*, *Impatiens balsamina*, *Saussurea* spp., *Trifolium repens* and *T. pratense*.

Bumble bees come in two hundred and sixty-five different species around the world and between species, there is a lot of diversity in reproductive, developmental, behavioural and ecological features. Bingham (1897) compiled a list of 23 species in British India's fauna, which included some data from neighbouring nations such as Myanmar, Bhutan, and Nepal. Following workers added 149 taxa to the list, bringing the total number of species to 172 however due to a lot of synonymies, only 47 species are considered legitimate, according to Williams (1998). Genus *Bombus* is at present represented by



Fig. 1. *Bombus haemorrhoidalis* foraging on onion flower

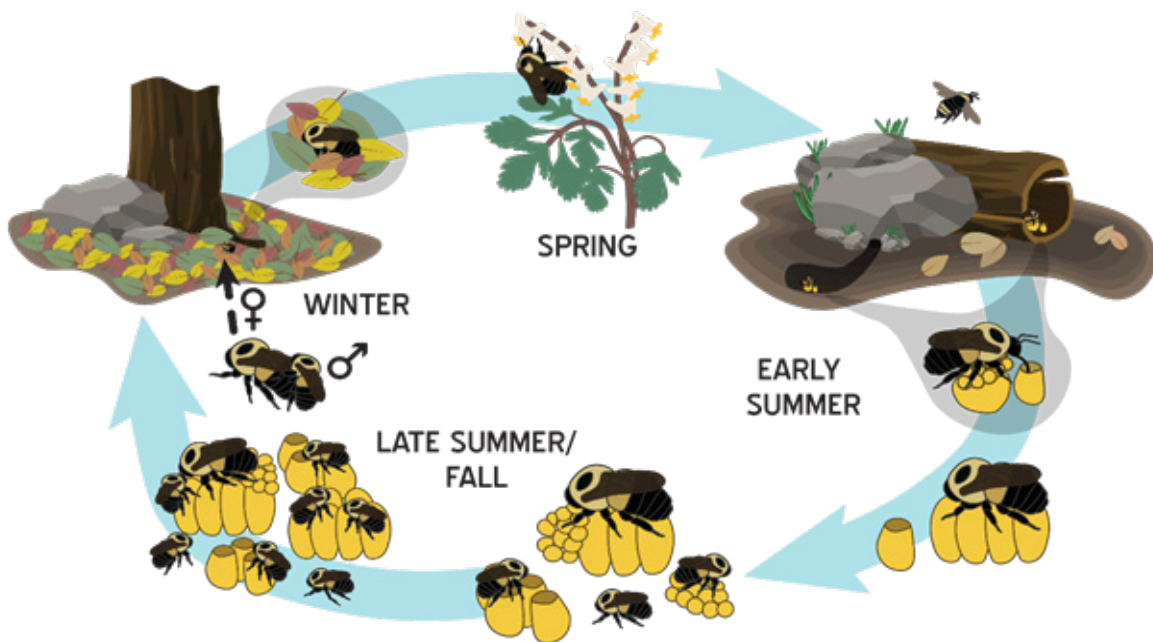


Fig. 2. Life cycle of bumble bees

48 species from India. Several native bumble bee species are present in Himachal Pradesh viz., *Bombus waltoni* Cockerell, *Bombus keriensis* Morawitz, *Bombus asiaticus* Morawitz, *Bombus personatus* Smith, *Bombus rufofasciaticus* Smith, *Bombus haemorrhoidalis* Smith and *Bombus tunicatus* Smith. They are important pollinators of a bewildering variety of cultivated as well as wild flowering plants in the high-altitude regions of Himalayas thereby playing a major role in conserving a fabulous tapestry of plant diversity particularly confined to an inhospitable environment of alpine meadows and snow-clad mountains.

Bumble bee laboratory rearing has a lengthy history, beginning with Sladen 1912, who worked on bumble

bees in 1912 and published his findings in his well-known book 'The Humble Bee'. Successful rearing of bumble bees is being tried in some countries like Japan, China, Israel, Turkey, Australia, etc. Worldwide only five species of bumble bees namely *Bombus terrestris* (L.), *Bombus impatiens* (C.), *Bombus occidentalis* (G.), *Bombus lucorum* (L.) and *Bombus ignites* (S.) are commercially reared and used for pollination (Velthuis and Doorn, 2006). Thakur (2002) made the first attempt in India to study and rear bumble bees (*B. haemorrhoidalis*). The studies on biology, domestication and development of the local bumble bee species *B. haemorrhoidalis* in India began in 2004 with the establishment of this species in laboratory conditions (Dayal and Rana, 2004). Despite the fact that the diversity of bumble bees can

be used to pollinate a wide range of crops, greenhouse farming, floriculture, fruit trees, vegetables and medicinal plants. There is a limited number of researchers have been working on the diversity and species record of bumble bees and very few attempts have been made on the domestication of bumble bees, keeping all this in view, there is a need of advanced research in this field.

References

Bingham C T. 1897. The fauna of British India, including Ceylon and Burma. Hymenoptera. Vol. 1. Wasps and bees. Taylor and Francis, London.

Dayal K, Rana B S. 2004. Record of domestication of *Bombus* species (Hymenoptera: Apidae) in India. *Insect Environment* **10**:64-65.

Goulson D. 2012. *Bumblebees: Behaviour, Ecology and Conservation*, 2nd ed.; Oxford University Press: Oxford, UK.

Hines H M, Hendrix S D. 2005. Bumble bee (Hymenoptera: Apidae) diversity and abundance in tallgrass prairie patches: effects of local and landscape floral resources. *Environmental Entomology* **34**: 1477-1484.

Khan H, Rafi M A, Baset A, Husssain A, Attaullah M, Waris A. 2018. Exploring of bumble bee fauna and its biogeographical affiliation in district Swat, Khyber Pakhtunkhwa, Pakistan. *Journal of Entomology and Zoology Studies* **6**: 1041-1048.

Potts S G, Biesmeijer J C, Kremen C, Neumann P, Schweiger O, Kunin W E. 2010. Global pollinator declines: trends, impacts and drivers. *Trends in ecology and evolution* **25**: 345-53.

Saini M S, Ghattor H S. 2007. Taxonomy and food plants of some bumble bee species of Lahaul and Spiti valley of Himachal Pradesh. *Zoo's Printing Journal* **22**: 2648-2657.

Saini M S, Raina R H, Khan Z H. 2012. Species diversity of bumblebees (Hymenoptera: Apidae) from different mountain regions of Kashmir Himalayas. *Journal of Scientific Research* **4**: 263-272.

Sladen F E L. 1912. *The bumble bee life history and how to domesticate it*. Mac Millan London, pp253.

Thakur R K. 2002. First attempt to study nest

architecture and domiciliation of bumble bee (*Bombus haemorrhoidalis*) in India. *In: 6th Asian Apicultural Association International Conference & World Apiexpo*. Bangalore, India. p. 172.

Williams P H. 1998. An annotated checklist of bumble bees with an analysis of patterns of description (Hymenoptera: Apidae, Bombini). *Bulletin of the Natural History Museum, Entomology* **67**: 79-152.

Williams P H, Ito M, Matsumura T, Kudo I. 2010. The Bumblebees of the Nepal Himalaya (Hymenoptera: Apidae). *Insecta Matsumurana* **66**: 115-151.

AUTHOR

Neha Negi

Maharishi Mrakandeshwar (Deemed to be university)
Mullana-Ambala, Haryana, India

Email: nnegi531@gmail.com
