

HIMACHAL PRADESH ENROUTED TRACKS OF BEEKEEPING IN INDIA: A REVIEW

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Abstract: Beekeeping is the rearing of honey bee colonies in maneuvered hives purposefully by humans. Diversified agro-climatic conditions of India provide great potential for beekeeping. India produced 1,33,200 metric tonnes (MTs) of honey and exported 74,413.05 MT of natural honey in 2021-22, that value as US\$ 163.77 million. At present about 12,699 beekeepers and 19.34 lakh honey bee colonies are registered with NBB. The honey market in India valued as Rs. 23.3 billion in 2022 and is expected to grow at a CAGR of 8.4% to Rs. 38.8 billion by 2028. India stands at 6th position in honey production, whereas among its states; Himachal Pradesh holds 6th position in honey production and produced 5.85 thousand metric tonnes of honey in 2021-2022. In Himachal Pradesh 361 beekeepers registered with NBB collectively possess 56252 bee colonies however the beekeepers number is over 1 lakh and produce 1555 MT of honey. Beyond honey, various other hive products, viz. bees wax, bee pollen, royal jelly, propolis and bee venom greatly widen the scope of apiculture. Price of beeswax sold in India ranges between Rs.250-500/kg, bee pollen is sold at Rs.1,000-2,000/kg; royal jelly produced very little for sale for Rs. 2,200-32,000/kg; propolis cost ranges Rs.500-2000/kg and dry bee venom up to Rs.15,000/g. Also the role of honey bees in crops pollination is well known owing to their floral constancy and floral fidelity traits. As per NBB for meeting Indian pollination requirement, the country needs 200 million colonies and would provide employment to 30.9 million people. Beekeeping industry needs low level of sophistication however, limiting factors such as poor management of bee colonies, high input cost and less profit threatens the future of bees up to 30-40%. To overcome these impediments proper infrastructure, channelized methodology and enhanced awareness is needed.

Keywords: Beekeeping, honey bees, honey, bee venom, royal jelly, beeswax, pollination

Overview of Beekeeping

Geography of India and the varied agro climatic conditions favor the growth of a wide variety of flora natural and cultivated. The widespread area of forest and millions of acres of cultivated land makes beekeeping and management a diverse profession. In India, beekeeping stationary or in migratory modes is practiced in mountains, foot hills, forests, agricultural lands, mangrove forests etc. The vital geographical regions which aids in development of beekeeping are classified into 1) Southern peninsular region 2) North east region 3) Indo-

Gangetic plains and 4) Northern hill region (Thakar, 1976). Realizing the potentiality of beekeeping, the Khadi and Village Industries Commission took up beekeeping as a village industry and extensively organized beekeeping programme throughout India (Thomas et al. 2002). Integrating beekeeping activities with agriculture is very useful in increasing the income of the farm (Singh et al. 2020). Beekeeping is an important ancillary activity in agriculture providing nutritional and economic security to these masses through valuable and nutritional products, honey, protein rich pollen and brood. Pollination services contribute in the country worth Rs. 1,12,615.73 crores/year (Chaudhary and Chand 2017). The raw material for production of honey is available free from nature, bee hives neither demand additional land space nor do they compete with agriculture or animal husbandry for any input (Agrawal, 2014).

Traditional apiculture relied on honey hunting from *Apis cerana* (Asian honey bee) and two wild honey bee species; *Apis dorsata* and *Apis florea* (Kishan Tej et al. 2017). Low honey production of *A. cerana* worried apiculture scientists across the nation and challenged them to establish the exotic western honeybee, *Apis mellifera*. In India, introduction of *A. mellifera* was initiated in 1882 in West Bengal, several attempts were made to introduce and establish *A. mellifera* into various parts of the country from 1920s to 1950s, but all met with failures. An introduction that led to successful establishment of *A. mellifera* was achieved in Himachal Pradesh in the year 1962-64 at Bee Research Station, Nagrota Bagwan (Rao and Rao 2011). This historical event was a flier to the commercial beekeeping in the country.

Himachal Pradesh offers a great potential for the development of beekeeping as 37.033 square km area is under forest cover of which mostly include bee pasturage. The state has another benefit of having women as the major work force to carry out such a professional work (Gupta et al. 2019). The earliest record of beekeeping in the state was reported in 1882-1884 when Sir Louis Dane, kept bees in modern hives. The modern beekeeping started in 1934 in Kullu district while during 1936 in Kangra district. Commercial bee farms with improved beekeeping equipments were established in district Kangra, Nagrota during 1936 and Raison in Kullu which was shifted to Katrain, Kullu in 1939 (Verma 1990). There are different agro-climatic zones in the state with varying bee flora and with profuse variation at intra as well as inter-species levels and represents one of the most important beekeeping state in the country. The hive bees, *Apis cerana* and *Apis mellifera* are domesticated in the state mainly for honey and pollination services. Before 1971, only 1250 bee colonies were reared in modern bee hives in whole of Himachal Pradesh. Number of beekeepers in Himachal

Pradesh increased to 2365. Apart from household feral colonies commercially reared colonies in state are about 99264 with annual honey production of 5.85 thousand MT (NBB 2023). Different number of commercial registered beekeepers with NBB from the state are however 361 and rearing 56252 bee colonies. At present, the state department through the department of horticulture has set 32 beekeeping demonstration apiaries. The whole state is divided into two zones i.e. north and south zone. South zone has 17 demonstration apiaries whereas north zone has 15 demonstration apiaries. Himachal Pradesh hold 6th position in honey production in India in year 2021-22 and produced 5.85 thousand metric tonnes of honey. In Shivalik hill region where multifloral honey is a specialty. Annual honey production of 8.15 kg per colony is the potential documented for stationary beekeeping (Kumar and Kaundal 2016).

Migration of bee colonies from place to place is an important part of beekeeping activities and for migratory beekeeping the state beekeeping is exemplary. 95% of our commercial beekeepers are migratory. To overcome harsh conditions of the state, the beekeepers keep their colonies from April to October in the state and migrate their colonies to the plains of Punjab, Haryana, Uttar Pradesh to avail *Brassica*, *Eucalyptus*, *Trifolium*, *Helianthus* etc. and also to litchi orchards up to April (Negi et al. 2020). State government provides migration grant in the form of transportation subsidy @ Rs. 10,000 per year for performing interstate migration. Mobile beekeeping by using *Apis mellifera* colonies allows the beekeeper to go for multiple harvests every year and that provide an average annual honey production of about 30-40 kg/colony generating a significant income (Sharma et al. 2013; Kishan Tej et al. 2017). In addition, the strength of the colonies also improves due to migration (Brar et al. 2018). In a survey report of Sharma (2001) where 60 beekeepers from Kangra district of Himachal Pradesh mentioned that migratory beekeeping resulted in higher honey yield averaging to 41.60 kg/colony as compared to stationary beekeeping (15.66 kg/colony). According to an estimate, 10,000 honey bee colonies directly and indirectly provide employment to 1,543 persons. Thus apiculture holds a great livelihood promise. The role of honey bees in cross pollination is well known owing to their floral constancy and floral fidelity traits. According to HP Horticulture Development Society (2022) more than 40 species of insects have been reported visiting apple flowers in the state, out of which honey bees are considered as main pollinating agent. Both *A. mellifera* and *A. cerana* are used for commercial pollination. Growers hire honey bee colonies apart from state beekeepers from Rajasthan, Haryana, Uttarakhand, Punjab and Uttar Pradesh for pollination. Hives are usually placed in the orchard

when the crop reaches 5-10% bloom. In apple orchard 2-4 *A. mellifera* and 5 *A. cerana* hives/hectare are used for pollination.

Indian Beekeeping potentialities at a glance

India's arable land area of 159.7 million hectares is the second largest in the world. Based on the area under cultivation in India and bee forage crops, country has a potential to have about 200 million bee colonies as against 3.4 million bee colonies (NBB, 2023). At present about 12,699 beekeepers and 19.34 lakh honey bee colonies are registered with NBB 2021-22 estimate. The country has the prospective to increase honey production many folds from today's figure of 1.33 lakh metric tonnes (NBB, 2023). India exported 74,413.05 MT of natural honey in 2021-22, valued at US\$ 163.77 million. India exported 78.1% share of its total honey exports to the US valuing at US\$ 106.78 million during 2017 and 2021. It was followed by Saudi Arabia (US\$ 6.47 million), UAE (US\$ 6.37 million); Nepal (US\$ 2.35 million) and Bangladesh (US\$ 1.72 million), respectively. In export, however, India during 2022 stood on the 7th position with export potential of US \$ 190.06 million in comparison to no. 1 New Zealand for US \$ 327.15 million, followed by China (no.2) and Argentina (no.3) (TPCI, 2023). India under its fast – pace adoption of apiculture, has made a mark at the global level emerging as no.6 in honey production country (NBB 2023). The honey market in India valued at Rs. 23.3 billion in 2022 and is expected to grow at a CAGR of 8.4 per cent to Rs. 38.8 billion by 2028. Among the different states of India, the maximum honey production is from four states namely Uttar Pradesh which produces 22.5 thousand metric tonnes of honey followed by West Bengal and Punjab that produced 20 and 17 thousand metric tonnes of honey in 2021-2022. Himachal Pradesh hold 6th position in honey production in India in year 2021-22 and produced 5.85 thousand metric tonnes of honey (NBB, 2023). These states obtain honey mainly from *A. mellifera* colonies while part of its honey comes from the wild bees *A. dorsata* in particular, Sunderbans of West Bengal. The Southern states account for about 25% of the honey produced in India and that is obtained from the Asian bees, *A. cerana* and the rock bees *A. dorsata*. Mustard honey, eucalyptus honey, lychee honey, sunflower honey, multi-flora, Himalayan honey, acacia honey, white honey, wild flora honey, multi and mono floral honey are some of the major types of natural honey produced in India. Indian honey is also known for its medicinal properties and is often used in ayurvedic medicine and is believed to have antibacterial and anti-inflammatory properties.

Beyond honey, various other hive products, viz. bees wax, bee pollen, royal jelly, propolis and bee venom greatly widen the scope of apiculture. These products find their use in diverse

ways in various industries, as food supplements, in pharmaceutical industry, in cosmetic industry, as preservative, disinfectants etc. and have an excellent economic value. World production of beeswax was 63,100.55 tones in 2018 and has increased to 65,046.23 tones in 2021. India produced 24 thousand tones in 2021 constituted the country with largest, accounting for 38% of total production. India exports most of its beeswax to UK, Germany and United States and is the second largest exporter of beeswax in the world (FAOSTAT, 2023). Beeswax is used in cosmetics, pharmacy, candles etc. Price of beeswax sold in India ranges between Rs.250-500/kg. Depending upon the quality and package size the bee pollen price in Indian currency varies between Rs.1,000-2,000/kg; royal jelly between Rs. 2,200-32,000/kg; propolis between Rs. 500-2000/kg and dry bee venom between Rs. 5,000-15,000/g (BDC, 2019).

As per NBB (2023) for meeting Indian pollination requirement, the country needs 200 million colonies, to this it would provide employment to 30.9 million of people. In India, Chaudhary and Chand (2017) reported that out of 211 crops, 108 (51.2%) are dependent on animal pollination, and further that direct contribution of insect pollination to Indian agriculture worth Rs.1,12,615.73 crore (US\$ 22.52 billion) contributing as a whole to 8.72%. Among several pollinating insects, bees (Hymenoptera: Apiformes) are the most important one and responsible for pollinating about 80% (Michener, 2007) of all flowering plants of which majority are agricultural crops. More than 50% of India's cultivated plants depend on pollinators to produce fruits, seeds and nuts. 65% of the fruit yields and 40% of vegetable production happens with the help of insect pollinators.

Future prospects of beekeeping

Beekeeping has been recognized as an important agricultural input for increasing the productivity of agri-horticultural crops, but minimum support charges for bee pollination be provisioned at national level as a policy. Training on bee breeding and diversified beekeeping be part of curriculum. The year after year increasing production of honey must be supported with minimum support price, good export market, promotion for use of modern collection and storage as well as improved beekeeping equipment, honey processing plants. To counter nutritional abnormalities honey and pollen supplements be promoted at society level so that hive products may get their publicity in local market as well.

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