

Indigenous beekeeping for sustainable development in Himachal Himalaya

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Indigenous beekeeping is the indigenous techniques of harvesting honey and beeswax from bees, using various indigenous styles of hives and other equipments. India and the neighbouring East Asian region are considered to be the centre of origin and evolution of honey bee species. Himachal Pradesh, owing to its varied agro-climate, has a great variety of bee forage sources that provide the basis for development of beekeeping industry in the state. The potential and success in beekeeping development is dependent on the quality and quantity of bees and bee flora available and the technology used. A survey conducted in seven blocks of district Chamba revealed that there are about 2.45 hives per house and occupancy rate of hive is 53.94 % in the region testifying to the rich ness of this culture. The Indigenous wall hives are locally called as *Ganari* in Chamba district. The dimensions of wall hive was accordingly, made by leaving a cavity in the wall when the house is under construction. On the inside, it is covered usually with a slate or stone plastered with mud. The size depends upon the availability of hollow tree trunk of *Toon*, *Robinia*, *Bann*, *Kail* trees. Beekeepers of district Chamba prefer the wall hive, however quantity of total honey harvested and ease of harvest is best in log hives. People clean their hives by scrubbing them from inside with scrubbers made of pine needle, *Juniperis* sp. or old raw combs. This helps in attracting the bees to the hives. Economic efficiency of *Apis cerana* (Indigenous beekeeping) is shown to be more economic than *Apis mellifera*. Beekeeping with *Apis cerana* should be encouraged for rural households with low investment capacity.

Keywords: Indigenous beekeeping, Chamba, Honey, Beeswax, Sustainable development, Himachal Pradesh, Himalaya

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Beekeeping is one of the most indigenous or traditional practices in India. Indigenous knowledge refers to the unique, Indigenous local knowledge existing within and developed around the specific conditions of women and men specific to particular geographic area¹. Indigenous beekeeping with *Apis cerana* is part of the natural heritage of mountain communities. *Apis cerana* is gentle in temperament, industrious and well adopted to the ecological conditions of South and Southeast Asia. Beekeeping with *A. cerana* is an Indigenous industry and forms an integral part of the social and cultural heritage of rural and tribal communities in the country. It is also an environment friendly occupation^{2,3}. In different part of Himachal Himalayas, several types of hives such as hollowed logs, wall recesses and boxes of various dimensions and designs are in use even today for beekeeping with *Apis cerana*. These traditional beehives reflect the remnants of ancient bee knowledge and are the relics of honey-collection techniques being practiced by mountain farmers

through the centuries⁴. Beekeeping with *Apis cerana* does not require a lot of management like sugar feeding, disease control and migration. Therefore, it is easy for an isolated farming community to practice beekeeping with this bee species on the basics of their indigenous knowledge⁵. There exists great potential for development of beekeeping in Himalayan region, because of the diversity of the bee flora and ideal agro-climatic conditions. There are remote and inaccessible areas in the state, where farmers do not make use of chemicals, fertilizers and biocides, so possibility of producing organic honey in the state is tremendous not only to small and marginal farmers but even to the landless. In different agro-climatic zones of the state, farmers have evolved need based and location specific beekeeping technologies, which need to be documented. The technologies require scientific assessment and there is a great scope for their refinement through scientific and technical inputs.

Methodology

The studies were made in order to know the current status of several Indigenous beekeeping technologies

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in Chamba district, which lies between North latitude 32°10' and 33°13' and East longitude 75°45' and 77°33' with an estimated area of 6,92,419 ha, surrounded on all sides by lofty hill ranges with altitude ranges between 2,000 and 21,000 amsl. A questionnaire was prepared and 201 households (with different socioeconomic background) were interviewed in different villages of seven blocks (Bharmour, Bhattiyat, Chamba, Mehala, Salooni, Tissa, Pangi) of district Chamba. Agriculture is the main occupation of around three-quarters of the total rural population. The average size of landholdings is 1.62 ha. Although a large number of holdings are less than 1 ha.

Results

Out of 201 households surveyed, 35.32% respondents learnt the method of beekeeping from father, 54.72 % from grandfather and 9.95 % from other agencies. This shows that the Indigenous beekeeping practices are passed from generation to generation. Only 4.95% respondents take it as full time job, while others as part time. 57.21% of surveyed persons want to pass this practice to next generation as such, but 35.82% want some modification in the method. Out of 201 households surveyed, 25.8% respondents want to go for Indigenous beekeeping, 39.80% peoples prefer modern beekeeping and 39.32% want to modify Indigenous beekeeping practices. A total of 20 % household (respondent) in seven blocks was interviewed randomly as Indigenous technology existing areas. Overall average number of hives per family was 2.47%, where as the highest average in Bharmour was 2.85% and lowest was 1.47%. Average, number of working bees' hives / family was 1.31% and maximum in Bharmour area (1.58%) and lowest in Bhattiyat area (0.7%).

Indigenous wall / log hive and their characteristics

Wall hives

The wall hive is a cavity left in the wall when the house is under construction; it is located at a height of about 150 cm from the floor. It has an entrance hole of about 2 cm diameters towards the outside, on the inside it is covered usually with wood, slate / stone and plastered with mud. *A. cerana* descends naturally and settles in this hive making parallel combs. The wall hive is opened only to harvest the honey and never otherwise. Commonly named as *Ganar* in whole district with various dimension from 9 cm to

1.066 m fitted according to the thickness of the wall of the house. Wood used for the wall hive is of Bann, Kail, Toon, Robinia and Devdar. In Chamba block one of the oldest wall hives is more than 30 yrs, outside this hive stone / slate has been used and dimension of hive is 0.762 × 0.762 × 1.066 m long.

Log hives

It is commonly named as *Ganari* with various undesirable sizes. Size depends upon availability of hollow tree trunks of *Toon*, *Robinia*, *Bann*, *Kail* trees. Maximum recorded in Tissa area with 0.457 m diameter and 0.762 m length.

Miscellaneous hives

Commonly named as *Gai* these are made up of various materials like bamboo, grass, pots and used boxes, etc.

Types of hives

The beekeepers first preference is the wall hive, the log hives and the miscellaneous hives (Figs. 1-12). But different parameter, i.e. quantity harvested and ease of harvest is best in log hives, because it can be opened from both sides and the combs are easy to cut. Where as in wall hives, it is not so easy because wall hives are built in walls and can be opened only from one side. In wall hives, all are the other factors such as heat properties, cost, resistance to rain, and durability, are best adjusted as compared to log hives.

Colony age

There are 47.65% colonies in Bharmour area, which have not deserted the hive for the last 16 yrs or so. However, this number is lowest (15.3%) in Bhattiyat area due to drought conditions followed year after year. Whereas, in four blocks of district Chamba, Mehala, Salooni, Tissa and Pangi it is more than 40 %. Absconding between 6–10 yrs, is minimum (11.76%) in Bharmour highest (26.66%) in Bhattiyat block due to drought age colonies between 1–5 yrs as usual lowest absconding in Tissa area with 4% and 5.85% in Bharmour block with highest in Bhattiyat block with 40% due to environmental factors. Overall average occupancy of 53.64% was found in all the studied blocks. Lowest in Salooni (45.6%) and Bhattiyat (47.8%), highest in Mehala block with 66%. 58.8% in Pangi (not significant) and 57.1% in Chamba with significant results.

Honey production

Production / yield of honey in different blocks, i.e. Bharmour, Bhattiyat, Chamba, Mehala, Salooni, Tissa



Fig. 1 Wall hive



Fig. 2 Wall hive



Fig. 3 Wall hive



Fig. 4 Wall hive



Fig. 5 Internal view of wall hive



Fig. 6 Combs in hive



Fig. 7 Log hive



Fig. 8 Log hive



Fig. 9 Log hive



Fig. 10 Log hive

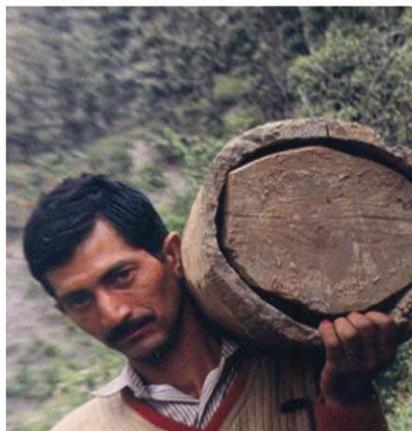


Fig. 11 Log hive (side view)



Fig. 12 Swarm catching basket

and Pangi per hive per year were with an average of 5.48 kg; Maximum of 6.5 kg in Bharmour and 6.2 kg in Salooni block, respectively. Minimum yield 4.02 kg is in Bhattiyat block. The production of honey in wall hives is 35.71% in Chamba, 35.66% Bharmour and 42.42% in Tissa blocks; lowest in Pangi block. Production of honey in log hive is maximum (29.34%) in Salooni with more than 5 kg per hive and lowest in Pangi block. However, production of honey in miscellaneous hives is 13.04% with 3-5 kg per hive in Bhattiyat area and lowest in Bharmour block (7%). In wall hives honey yield with minimum 1-2 kg per hive was not found anywhere, but it was present in miscellaneous hives in Pangi (5.88%) and Salooni area (4.34%). Under the category of 3-5 kg per hive of honey production in various types of hives are 42.42% in wall hives and 34.34% in log hives in Tissa block. Lowest rate of honey production of 3-5 kg per hive was 17.39% in log hives of Salooni area, Bharmour with 28.6 %, Bhattiyat with 43.47%, in Chamba it was 25%, Mehala 22.22% and Pangi 35.29 %.

Colony management

Colony management in winter by 201 farmers / beekeepers was 55 (27.36%), who claimed to feed their bees in winter, 72.63% people of district Chamba do not give anything to honeybees as food. They think that honey bee make its own living. Those people who collect honey and earn money from them, they keep sugar in bee hives once in a week, but their number is only 9.45%. Some people (17.91%) do not take off all the honey but leave 1/3 part of it in the hives for the bees.

Indigenous method of baiting hive to capture swarms

Out of 201 beekeepers, 159 (79.10%) beekeepers said that they cleaned the hives by scrubbing them inside with pine needles, 59 (29.35%) used *Juniperis spp.*, 100 (49.75%) used old raw combs to attract bees and others do not apply any thing. Most of the people in district Chamba capture the swarms by hand, but in rare cases in Pangi region people had a special type of basket to catch and carry the swarms. Some people in Tissa area capture the swarms by throwing ash in the air to disturb the path of the swarms when they settle down beekeeper capture the swarm in ordinary basket. Some time they use water to disturb the path of swarm. Some people of Pangi and Salooni do not allow any one to disturb the path and they freely give

the freedom to swarms to settle down in any log hive or basket in the forest. People think they are lucky who have a swarm in the basket. They carry swarm basket to their home and shift the colony from basket to wall hive in their homes. People of Bharmour and Chamba area believe that honeybees are the *Shiv Gunn* (soldier) of Lord *Shiva* because the common name of bee is *Gunn* (means soldier) in this area.

Honey harvesting and processing method

Beekeepers of district Chamba use dry cow dung (*uplae*) as a smoker to harvest the comb. The combs are cut by domestic knife, *Tentha / Palta*; some times they also use sickle. In fixed wall hives, the combs are cut from one side and in log hives they are cut alternatively. The combs are squeezed and heated till the wax melt. Honey is filtered with cloth and it is kept under normal room temperature, packed in jar or bottles. People of this area do not believe in honey sale they prefer to distribute it to their relatives free of cost and use it in their homes and also for local medicinal practices for common diseases. Some time they use honey for exchange to buy other things from the market.

Indigenous methods of disease control

Farmers recognize diseased bees in various ways, black / angry bees, and absconding bees, bees not working, (inactive) and hanging bees. Brood disease is recognized when bees are seen throwing out dried larvae (that look like grains of cooked rice) with a sour smell and black combs. The Indigenous treatment of disease is by feeding with excess honey. External hazards with pseudo scorpion, mite infection, beetle attacks and ant attacks are made to run away from their hives with the help of broom.

Economic efficiency

Apis cerana (Indigenous beekeeping) is shown to be more economical than *Apis mellifera*. 10 *Apis cerana* colonies would show more economic as keeping 46.25 (hives) of *Apis mellifera* colonies. *Apis cerana* beekeepers can begin with only a few colonies. Even under low input condition they can be developed to 10-50 colonies. With *Apis mellifera* it is not feasible to have a low input and small number of colonies because there will not be sufficient income to cover overheads. Beekeeping with *Apis cerana* should be encouraged for rural households with low investment capacity. *Apis mellifera* should be introduced by beekeeping organizations or individuals, who can invest larger sums.

The statistically non-significant regression coefficient for the number of frames per hives shows that each additional frame in a hive would result in increase of honey yield by 0.885 kg. Optimum number of frames per hive is about 8 giving enough space for bees to build normal combs for honey collection and storage. In case of indigenous beekeeping, comb weaving depends upon cavity (space) volume of hive (wall or log hive). If bees get maximum space, combs are increased otherwise they abscond to other desirable places. In the indigenous beekeeping technologies, production of honey mainly depends upon natural conditions and environmental factors because in drought, they are unable to migrate as their hives are fixed in walls. The other dependent factor is volume of the hive; there is no standardization of size and shape of indigenous hives. It depends upon the available space in the house; therefore bees have to adjust according to available space.

The improved economics of modernized wall hive is evident by the higher number of honey harvests, 1.4 as against 0.6 from Indigenous wall hives. It was observed that subsequently not only the number of honey harvests from the same colony increased but also the honey yield at each harvest was more in case of modernized hive. This is because the modernized hives provided facilities for efficient and hygienic extraction without any loss to the colony. There is scope for faster increase in yield by proper management in subsequent years.

Discussion and conclusion

Indigenous beekeeping is a live heritage in district Chamba. Indigenous hives, in shape and their location are solid-significantly safe, element of environment. For centuries, they have been taking care of *Apis cerana* bees in the way which came down from their fathers. It would be unwise to neglect their knowledge in the process of modernization. A history is a continuing process, nobody is able to change it, but wise protection of Chamba's heritage is an absolute necessity. In the process of improving tourism in Chamba valley, the indigenous image of villages should not be changed. Wall hives, are besides all economic relation, the important decorative motif of

almost every house. For anyone it is hard to imagine settlement without such elements.

Indigenous method of keeping *Apis cerana* in wall hives has certain advantages. The bees are protected from wild animals. Human habitat provides efficient temperature regulation particularly in cold areas during winters. Hybridization of the indigenous method with the modern concept of moveable frames adds to the ease of operation and management, readily acceptable in the field making the modernized wall hive is an ecofriendly, economically viable and environmentally sustainable technique for the future.

There is a lot of scope to encourage small scale honey vendors (who may or may not be beekeepers) to sell honey in locally available containers. Training and encouragement of small scale beekeepers would lead to greater success in beekeeping. Indigenous hives still have an excellent potential. The low cost of such hives is very attractive, and also the management. Compared to modern beekeeping, these indigenous systems of beekeeping have the advantages in the context of the life and customs of the rural and tribal populations. The bee hives are made with locally available materials or using wall spaces in the dwellings. The designs of the hives are very simple to adjust the volume of the bee cluster. There is no input in the form of sugar feeding, comb foundation and chemicals, etc. Management of colonies is minimal and consists of arrangements for the attraction of swarms and harvesting of honey. Indigenous beekeeping integrates itself with the prevailing customs and socioeconomic conditions of the people.

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