



Beekeeping with *Apis cerana*: An indigenous tradition of tribal areas of Chamba district (Himachal Pradesh)

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Received 24 March 2020; revised 09 November 2021

Traditional beekeeping in Chamba is very primitive. This paper provides evidence besides focusing on the traditional methods adopted by the local beekeepers of Chamba district and their inherited traditional knowledge of beekeeping with *Apis cerana*. The cluster data of 250 traditional beekeepers were collected from 25 villages of five development blocks of Chamba district during 2018-2019. The suitable agro-climatic conditions, plenty of wild as well as cultivated bee flora and their traditional knowledge offer vast potential for the development and success of apiculture in the district. The traditional wall hives, known as Ganar, are made on the walls of the under-construction/newly constructing *kachha* houses by keeping space (25-30 cm x 25-30 cm). The size of log hives depends upon the tree trunk collected from the forest. Honey harvesting is done in a rational way by squeezing the combs, hence destructions of beehives. Cleaning of hives is done with raw comb mixed with flower extracts or juniper/ pine needles, which in turn helps them to attract swarms. Unfortunately, traditional beekeeping of *A. cerana* is under threat due to the construction of pucca houses and the lack of scientific knowledge of beekeeping of the traditional beekeepers.

Keywords: *Apis cerana*, Chamba, Honey harvesting, Indigenous beekeeping, Traditional knowledge

IPC Code: Int Cl.²²: A01K 59/00, A01K 59/04, A01K 59/06, A61K 35/644

Beekeeping is an environmental friendly¹ and agroforestry based occupation² which is very important in the development of hilly areas³. It is one of the most indigenous and traditional practices in India⁴. Beekeeping is not only an income generation occupation but also important for the upliftment of rural unemployed youth, pollination of fruits, vegetables, cereals, oilseeds etc. besides utilising forest flora for their honey production⁵. Himachal Pradesh has a vast wild forest area with plentiful bee flora from the natural endowment. Tribal people of Chamba have immemorial practice with rich traditional knowledge and skill about beekeeping, which offers enormous potential for the development of apiculture in the Chamba district. Beekeeping with indigenous bees, *Apis cerana*, in Himachal Pradesh is a small household activity proving honey for their domestic use and very little quantity for sale in the local market. *A. cerana* has been described as docile,

mild, tolerant and timid with a gentle temperament and relatively low stinging tendency however, it does sting when cornered / disturbed⁶. *A. cerana* is said to be less prone to stinging than *A. mellifera* and has less alerting pheromone in its sting (half the amount of *A. mellifera*) resulting in fewer additional stings by depending bees². This bee prefers nesting habitat in closed conditions with low light intensity and usually builds multiple combs in different types of beehives viz., modern beehives, underground, simple wooden box, wall crevices, road culverts, bamboos and tree hallows^{7,8}. In different parts of the Himachal Himalayas several types of beehives such as hollowed logs, wall recesses and boxes of various dimensions and designs are in use⁴. These traditional beehives reflect the age-old traditional bee keeping knowledge of the tribals of the district besides the ancient techniques of honey collection practised by them through the centuries⁹.

The success of beekeeping depends upon various factors like availability of suitable bee flora, favorable

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climatic conditions, management of bee colonies and their breeding. The combination of above mentioned factors will increase the production of honey and wax¹⁰. The progress in beekeeping in north India is very slow despite the fact that this enterprise is gaining popularity in rural areas¹¹. The management practices followed by these small traditional beekeepers do not include sugar feeding, seasonal management and migration during winter months making it convenient for poor and tribal farmers to practice beekeeping with their traditional knowledge¹². The tribal and rural farming community of the Chamba district is not making use of chemical pesticides, fertilizers and biocides and hence there is an enormous possibility of producing organic honey in the district. The technologies adopted by these farmers require scientific assessment for refinement of these technologies through scientific and technical inputs⁴. Detailed literature on various aspects of traditional beekeeping in Himachal Pradesh is inadequate and hence this study focuses on the traditional and indigenous methods of beekeeping.

Methodology

The present study was conducted in rural and tribal villages of the Chamba district. Chamba is located on the banks of river Ravi and is known for its exquisite natural beauty, rich biodiversity and its art and crafts, particularly its Pahari paintings. Geographically Chamba lies between North Latitude 32° 11' 30" and 32° 42' 1" and East Longitude 75° 49' and 77° 3' 30", with an estimated area of 6,522 square km with well defined three mountain ranges. The total number villages in Chamba district are 1591. The district is divided into seven development blocks and the main occupation of the rural and tribal populations is agriculture. The data was collected during field survey/visits during 2018 and 2019 from five development blocks. At least five villages from each block viz., Bharmour, Mehla, Chamba, Tissa and Salooni blocks were randomly selected for the collection of data. Interviews of respondents based on their socio-economy, traditional methods of hive technology, swarm catching, honey extraction and colony management were done. The data has been collected by interviewing these traditional beekeepers during field visits. In total, 250 farmers were interviewed in five blocks of the Chamba district.

Results

A. cerana is the only species of honey bees that is reared by the respondents of these five blocks by

traditional/indigenous methods. Most of these respondents have learnt beekeeping from their parents, elders and neighbourhood. Very few have gained skills and experience from trainings organized by different agencies. Education standards of most of the beekeepers are from primary to middle and most of them were over the age of 40 years. The average landholdings vary from 0.5 hac to 1.5 hac. Agriculture is the main occupation whereas beekeeping is a part-time occupation.

Types of bee hive

Wall hives

Wall hives are locally known as "Ganar" in the whole district which is mostly rectangle in shape and is made on the walls of the under-construction/newly constructing *kachha* houses or cattle sheds by keeping space (Fig. 1). On the outer middle portion of the wall hive, the bees enter / exit the hives through a small, circular / round opening. The size of the entrance hole varies from 1 -2 cm in diameter (Fig. 2). *A. cerana* bees live naturally inside these hives by making parallel combs. The inner, as well as outer walls of these hives are smoothed with a mixture of cow dung and clay. These hives are opened only at the time of honey harvest. Usually, space is kept for a single hive in each wall but the number may increase to 2-3, in exceptional cases. These hives are made at a height of around 100-150 cm from the ground/floor. The size of wall hives varies in different locations some wall hives were 25-30 cm in length and 20-30 cm in width and height but very few were bigger in length which ranged from 45-60 cm (Fig. 3 and Fig. 4).



Fig. 1 — Outer view of wall hive



Fig. 2 — Entry of wall hives



Fig. 3 — Honey sealed combs in wall hive



Fig. 4 — Internal view of wall hive hives



Fig. 5 — Parallel Combs in Hives

Log hives

Log hives are also known as “Ganar”. There are two types of log hives used in the Chamba district.

Round Log Hives

These hives are made from cylindrical hollowed pieces of tree trunk preferably at *Cedrus deodara*, *Pinus* spp., Himalayan Oak trees (*Quercus* spp.), fir and spruce, *Rhododendron* sp. The diameter of these tree trunks vary from 20 cm to 30 cm and the length varies from 50 cm to 70 cm. The entrance hole (about 2 cm) is made in the middle of the front side of hives. These hives are closed from both ends with a piece of wood which are plastered on the hollowed ends of tree trunk with a paste made by mixing cow dung and clay. The good quality hives are still in practice for

the last 30 years and hence the hive making poses no threat to the forests. Honey bees make parallel combs in all types of wooden hives (Fig. 5-8). These hives are kept hanging in the outer corridor of the house or hanged from the top of the roof (Fig. 9).

Rectangular log hives

These are similar to the above in all aspects except the shape. These are about 60 cm in length and 40 cm in diagonal. These can be seen hanging from the top of the roof on the outer walls of houses or can be seen lying horizontally on the raised platforms of stones/ outer courtyard.



Fig. 6 — Internal view of log hive



Fig. 7 — Internal view of log hive

Methods of attracting and catching swarm

Swarming is an important and natural means of reproduction. Swarming is performed when the old queen bee is replaced by a new queen bee which carries a large group of worker bees but there is very less information on the physiological changes it brings in workers to induce swarming¹³. Thus, swarming is a natural means of the multiplication of honey bee colonies. The beekeepers of the Chamba district have a unique method of attracting the swarms. They used to clean their empty hives with pine needles and rub the collected wax combs on the walls and entry of hives to attract the swarms of honey bees. They also used to make balls of wax



Fig. 8 — Empty log hives



Fig. 9 — Log hives hanging in wall

comb in which they add the local wild flora like *Brassica* sp. and keep these balls with them which further used to rub inside the hives while cleaning the hives and thus attract the swarms of bees.

Beekeepers adopt different methods to catch the swarms. Some of the beekeepers are well experienced. They let the swarms settle on the tree branches and then with bare hands identify the queen in a swarm. Then they gently shift the queen to ordinary baskets and carry them to wall/log hives. The workers follow the queen and hence they catch the swarms. But as it requires skill and experience to capture the queen in a settled swarm, only 1% of the respondent's capture swarms by this method. While the others throw ash on the swarms to distract the swarm path and when the swarm settles they catch them in ordinary baskets. Some beekeepers also use water to capture the swarms. In these methods, after catching the swarms they carry them to their home in baskets covered with muslin cloths and shift them to the hives. The farmers also apply layers of honey on the inner side of the basket and displace the swarm to it by smoking. The beekeepers then transfer the settled colonies to their traditional beehives. They

wait for the colonies to settle in the hive and then they remove the baskets carrying the settled swarm. They then close the wooden cover and smear it with cow dung and clay. Some of the beekeepers are also making a mixture of jaggery and honey and paste it on hives entrances and walls to attract the swarms.

Honey harvesting and colony management

The harvesting of honey is done twice a year i.e., in June/July and again in the month of late September or early October. Honey harvesting in traditional beekeeping means destruction of the beehives and sometimes extermination of the bees. Smoking is done by burning cow-dung cakes or jute gunny bags or eff trays to tame the bees. The combs are cut one by one with household use knife or sometimes with sickles. The segregation of honey area from pollen area and brood area is practiced by only 5% of beekeepers under study, thus producing pure honey. The rest of surveyed beekeepers are unaware of this segregation but fortunately, honey is harvested from more than 80% honey sealed combs. The combs are squeezed and collected in big containers filtered through a muslin cloth. The filtered honey is allowed to settle for one or two days and then kept/ collected in bottles or jars. The average yield of honey in the Chamba district is 12 kg per year maximum being 15 kg per year in Tissa block and a minimum of 10 kg/ year in Mehla Block. Beekeepers do not provide sugar feeding in the winter months. They presume that the bees manage the winters of their own and believe that keeping two to three sealed honeycombs in the hive is sufficient for feeding during the dearth months or winter months.

Merits of traditional bee keeping

Traditional beehives are made from cow dung and clay mixed with stones or by using wooden logs. Similarly, wall hives are made in the walls of the *kuccha* house. These hives are generally considered safer from the attack of wild animals like bears, can maintain desired climatic conditions (temperature and moisture level) and are free of cost. The life of wall hives can be assumed larger than modern wooden hives. These hives are easy to design and are in practice for centuries. Log hives are also collected from fallen trees in forests. There is no input cost involved in sugar feeding, purchase of foundation sheets and other chemicals required for commercial beekeeping with *Apis mellifera*. No colony management is done except for catching swarms and

honey harvesting. Thus this indigenous beekeeping is an example of integration among the prevailing traditions and socio-economic conditions of the tribals of the district and indeed helps in conserving the biodiversity through intensive pollination.

Discussion and Conclusion

The agro-climatic conditions of the Chamba district are good for the growth of traditional beekeeping with *A. cerana*, which is a live heritage in Chamba. Traditional beekeepers have inherited the knowledge of rearing of *A. cerana* colonies through their ancestors. Thus neglecting their indigenous technology knowledge (ITK) will not be a wise decision. These traditional hives can also help in promoting eco-tourism in the Chamba district. Indigenous beekeeping is an example of integration among the prevailing traditions and socio-economic conditions of the tribals of the district. The major constrain to traditional beekeeping is the replacement of mud houses with pucca houses. The number of traditional beehives is decreasing in negative correlation to the construction of pucca houses. Thus, there is an urgent need to conserve the traditional beekeeping to sustain bee habitat and also to provide them nesting sites. Integration of the indigenous methods with the scientific concept of wooden frames will be beneficial for the conservation of *A. cerana* bees which are on the verge of decreasing population. Mud hives are a better replacement for these traditional wall/ log hives, which are getting popular among the beekeepers in the Chamba district. The mud hives integrates the traditional knowledge of wall hives and modern movable frames making beekeeping easy, environment friendly and economical. These mud hives provide natural conditions to indigenous bees which are preferred by them for breeding and maintaining the colonies. Training and encouragement will lead to greater success in beekeeping and hence village-based training are imparted by scientists of Krishi Vigyan Kendra, Chamba in association with NABARD funded project for capacity building of local beekeepers as trainers and to provide follow-up support. Mud hives are being constructed free of cost to the beekeepers by this center who have been trained under this project. The traditional beekeeping had a scope of new intensive research studies to sustain its natural heritage and integration with the modern scientific methods of beekeeping methods

like scientific honey harvesting. Hence, there is a lot of scopes to encourage traditional beekeepers to move towards scientific beekeeping.

Acknowledgement

This study was well supported by the Principal Scientist and Head, and other scientific and technical staff, KVK Chamba of Dr. Y.S. Parmar University of Horticulture and Forestry, Nauni, Solan, which is gratefully acknowledged. The authors also thank the Department of Horticulture, Chamba and also Panchayat Pradhans for providing support and guidance for the above investigation.

Conflict of Interest

The authors declare that there is no conflict of interest

Authors' Contributions

AS, RK and MT conducted surveys at rural parts of District Chamba. AS and KST facilitated in collection of data from tribal villages of Bharmaur block of Chamba district. All authors provided critical feedback and helped in preparation of manuscript. The authors read and approved the final manuscript.

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