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A REVIEW

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# Traditional beekeeping for the restoration of degraded Agro ecosystem under Himalayan conditions of Jammu and Kashmir

MUNEER AHMAD SOFI AND S.S. PATHANIA

**ABSTRACT :** Jammu and Kashmir constitutes one of the most important bee-keeping zones in India. The three essential principles for the success of an industry viz., availability of raw material, skilled labor and consumer demand of the product are fully met within the state. Kashmir particularly is known for its floral gaities where numerous varieties are cultivated and wild plants bloom from early spring till late fall. This provides sufficient raw material (nectar and pollen) to the honey bees, for the production of honey and bees wax for commercial purposes. This industry is of considerable national importance. It provides gainful employment to the thousands of rural families and can provide extra income to unemployed youth. It does not compete with agriculture but is complimentary to it. It does not require costly equipments tools. Tools used in this industry are fabricated locally and are within the reach of common man with little financial support. The honey bee habit of nesting in the dark enabled man to keep it in indigenously designed hives ranging from clay pots, boxes, logs, wall recesses of old houses inserted in Kashmir. One successful design for culturing *Apis Cerana* which was carried through generations and has become an ancestral heritage of villagers and beekeepers in almost all parts of Kashmir. Our state has plentiful bee flora in its natural endowment. The potential and success in beekeeping development is dependent on the quality and quantity of bees and bee flora available and the technology used. The necessary interventions are required at improving the efficiency and productivity of traditional methods, focusing on aspects of partial harvesting, such as leaving the brood-combs and taking only the honey comb. As per government census 2500 bee keepers registered with J&K's Apiculture department. Kashmir have a potential to sustain one lakh bee colonies. On average, a colony produces 15 kilograms of honey and thus we have a potential to produce 15000 quintals of honey every year. Economic efficiency of *Apis cerana* (indigenous beekeeping) can prove more efficient than *Apis mellifera* and the local bees work in low temperatures as well so beekeeping with *Apis cerana* should be encouraged for rural households with low investment capacity.

**KEY WORDS :** Traditional beekeeping, Degraded, Ecosystem, Himalaya

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## INTRODUCTION

Honey Hunting and traditional beekeeping using Mud

wall recess and logs have long been part of the subsistence economy of people in most parts of Kashmir valley. Humans have collected honey from wild bee nests for more than 8,000 years, as shown in Mesolithic rock paintings dating from 6000 B. C. E. By 2500 B. C. E. , Egyptians were keeping bees in artificial hives. Hives exploit the honeybees' natural tendency to build nests in cavities and allow apiculturists to move and manipulate bee colonies easily. Primitive hives were made of hollow logs, holes built in mud walls, or cones of mud, earthenware, or thatch (Crane, 1998). *Apis cerana* is a part of the natural heritage of mountain community which is known as indigenous bee. This bee prefers nesting Habitat in closed condition with low light intensity and usually builds multiple combs in different type of bee hives, viz., modern bee hive, under ground, simple wooden box, wall crevices, road culverts. The traditional bee hive and equipments reflects the remnants of ancient bee keeping knowledge and their relics of honey collection techniques being practiced by hilly region farmers through the centuries. Bee keeping is an important tool for sustainable agriculture and conserving the biodiversity especially in hill area. The indigenous technologies require scientific assessments and there is huge scope for their refinement through techno scientific inputs. Beekeeping with *Apis cerana* was a tradition and there was hardly a house in the length and breadth of the valley without traditional hives. According to one report there were about 50,000 colonies of bees in traditional hives in Kashmir prior to the appearance of acarine disease in 1962 (Shah and Shah, 1982). Although their number has decreased due to the destruction of forests, clear cultivation, urbanization, modern house design, and modernization of beekeeping in the last fifty years, traditional hives even

now outnumber modern ones. In some areas over twenty can be found in a single house, and traditional beekeeping is considered more economic than the modern system. Honeybees and bee-keeping are important components for the sustainable management of hill agro-eco systems and integrated rural development programmes in Jammu and Kashmir. For many crops, the most widely used pollinator is the European honey bee (*Apis mellifera*). However, European honey bee colonies have suffered declines of approximately 59 per cent in the Kashmir over the past 10 years due to a variety of factors, mostly related to infection by pathogens and parasites (*Varroa destructor*). In 2005 we saw even more dramatic losses of honey bee colonies due to colony collapse disorder (CCD), which has been attributed to pesticide use, poor management practices. Given the apparent declines in honey bee colonies of *Apis mellifera* throughout the state, it is imperative that we begin to examine alternative native honey bee (*Apis cerana*) as pollinators for our crops which is cold resistant. It becomes necessary to revive the traditional beekeeping of our indigenous honey bees (*Apis cerana indica*).

Honeybees and bee-keeping are important components for the sustainable management of hill agro-eco systems and integrated rural development programs in Jammu and Kashmir. Amongst insects, undoubtedly honey bees are ultimate pollinators because they are active the whole year for pollination; do not hibernate, works longer periods but remain indoor during winter months in Kashmir. The number of worker bees per colony is also higher than the other insects, dense hairs on the corbicula for carrying abundant pollens and their average foraging rate. Table 1 depicts that highest number of bee colonies both *Apis mellifera* and wall colonies *Apis cerana*. There

**Table 1 : Status of beekeeping in Kashmir**

Sr. No.	District	No. of Bee-keepers	No. of colonies	Wall colonies
1.	Srinagar	95	1365	65
2.	Baramulla	-	-	80
3.	Budgam	45	877	150
4.	Kupwara	153	334	220
5.	Shopian	71	380	31
6.	Anantnag	135	330	31
7.	Pulwama	383	1563	296
8.	Bandipora	101	300	105
9.	Kulgam	75	463	110
Total		998	5978	2030

Source:- Davinder Sharma ,World beekeeping

are at present only 11,000 bee colonies in the state. Production of honey too reduced to about 45 tonnes. It was about 400 tonnes in 2000. In his note on the disease (in Bee Culture, February 2006) F.A. Shah said that 35,000 out of 40,000 bee colonies perished in 2005 alone due to the mite infestation to *Apis mellifera* colonies. It is the time to revive the traditional bee keeping to save the degraded agro ecosystem of the valley. There is huge seasonal management charges to rearing *Apis mellifera* and winter chill loss of bees has been recorded of about 12.44 per cent (Table 2).

### Merits of traditional beekeeping :

The traditional systems of beekeeping have the following advantages:

- The traditional bee hives are made with locally available materials or using wall spaces in the dwellings which are safer from wild animals and maintain a suitable temperature.
- The designs of the hives are very simple, the only consideration is the volume of the bee cluster to be accommodated.
- There is no input in the form of sugar feeding, comb foundation, chemicals etc.

– Management of colonies is minimal and consists of arrangements for the attraction of swarms and harvesting of honey.

– Traditional beekeeping integrates itself with the prevailing customs and socio-economic conditions of the people and helps conserve the biodiversity in bee fauna

The data in Table 3 shows that peak foraging time of the day is 9 to 11.30 in case of *Apis cerana* means it can work in morning chill hours also. The data also depicts that *A. cerana* is good for Kashmir valley conditions which gives impetus to revive traditional beekeeping in Kashmir. In order to be able to scientifically and economically manage the honey bees in the wall hive and to obtain their services for pollination of our desired crop at a particular time and particular place there is need to improve the traditional wall hive by providing movable comb frames. The introduction of the movable frames into the wall hive will facilitate colony management, manipulation for pollination and better and hygienic honey production (Verma, 1990). No experiments and attempts have earlier been made towards improving or modernizing the wall hive, Singh (1962) and Ahmad (1992), however, mentioned the scope of exploring such possibilities.

**Table 2 : Winter mortality loss of managed honey bees (*Apis mellifera*) in Kashmir due to harsh winter chilling**

District	Per cent loss of honey bee colonies due to winter chilling					
	2008	2009	2010	2011	2012	2013
Ganderbal	14.00	12.00	8.00	14.00	10.00	14.00
Srinagar	12.00	14.00	12.00	14.00	8.00	16.00
Ananthnag	14.00	8.00	16.00	12.00	14.00	12.00
	Pooled (winter mortality % loss)					12.44

**Table 3 : Foraging behaviour of *Apis cerana* and *Apis mellifera* during pollination of apple bloom**

Sr. No.	Parameter	<i>Apis Cerana</i>	<i>Apis mellifera</i>
1.	Initiation of foraging (Time of day)	06.63	06.27
2.	Cessation of foraging time (Time of day)	19.13	18.55
3.	Duration (h) of foraging activity	13.10	12.28
4.	Peak foraging hours (Time of day)	9.00-11.30	11.00-13.20
5.	No. of stigmas touched/flower	3.09	3.33
6.	No of bees on shaded side	14.3	12.4
7.	No. of flowers visited/foraging Trip by individual bee	172.1	193.1
	Preference for foraging distance (No. of bees at different distances)		
	100m	9.78	9.0
	250m	9.1	8.5
	500m	5.1	4.8

### Improvement of traditional wall hive :

The improved technology provides a workable strategy for easy adoption by the farmer. It overcomes the drawbacks of the traditional hive simultaneously providing ease of operations for appropriate colony management. The technical manipulations involved in improving the wall hive are outlined as 1) The wall hive is opened from the rear side by removing mud plastered board covering the back of the hive, 2) The dimensions of the wall recess are recorded. Frames of requisite size with proper inter-comb distance (bee space) are made on the spot, 3) Bees are smoked. Combs are cut one by one with the help of sharp edged knife like the one used for uncapping the honey combs, 4) Honey combs are separated. Combs with brood, pollen and honey are cut in such a way as to separate the upper sealed honey from the lower brood area. The brood comb is immediately mounted on to the frame and is supported with wires. The wall recess is thoroughly cleaned to remove pseudoscorpions, mites, wax moth, beetles, ants and other scavengers. Then two supports are inserted and fixed one each in the upper two opposing sides of the wall recess for resting comb frames. The comb frames are introduced onto the supports one by one and the bees are settled on the combs. Care is taken to complete all the processes in as short duration as possible to prevent chilling and loss of brood.

### Constraints :

There are two types of constraints 1) Natural constraints: It is not migratory type, people are lazy enough to adopt the modern techniques, 2) The other problem is that the risks involved in investing in new technology are too high for many subsistence farmers and beekeepers. As already indicated, beekeeping is part of multiple land use strategy aimed at food security and minimizing the risk of depending on one activity too heavily.

### Advantages of improved wall hive :

The use of improved wall hives renders the following advantages:

- The modernization process causes very little burden on the beekeepers pocket. The entire improvised structure involves an expenditure of Rs. 100 to 150 for wooden frames nails, wire and labour per wall hive (Fig. 1).



Fig. 1 : Wall hive (*Apis cerana*) in Kashmir

- It offers situations for scientifically managing the honey bee colony.
  - The movable comb frames can be taken out and observed for colony health, bee strength and food storage.
  - The hive interior can be cleaned to keep off the wax moth, scavengers and robbers.
  - The colony can be checked for disease and managed appropriately.
    - In times of dearth of forage and during winters, the colony can be managed by providing sugar feeding.
    - Facilities checking for the presence of the queen, replacement of non-prolific queen, presence of additional queen cells and swarming and absconding conditions.
    - Providing additional combs and comb foundation sheets for increasing space during strength built up of colony and honey flow.
    - Provides for division and multiplication of colonies.
    - Easy management for pollination.

### Economic efficiency :

*Apis cerana* (Traditional beekeeping) is shown to be more economical than *Apis mellifera* as. 10 *Apis cerana* colonies would show more economics 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 - 15 colonies. With *Apis mellifera* it is not feasible to have a low in put and small number of colonies because there will not be sufficient income to cover overheads. Beekeeping with *Apis cerana* should be encouraged for

rural household with low investment capacity. *Apis mellifera* should be introduced by beekeeping organizations or individuals, who can invest larger sums. 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.

#### **Traditional hives :**

*A. cerana* beekeeping has been practiced in J&K since times immemorial. Traditionally, the beekeepers keep their colonies in log, wall and box hives. There are several different types of *A. cerana* bee hives used in the state.

#### **Log hives :**

A log hive consist of a tree trunk hollowed from inside, closed at both ends having holes of a suitable size along its length. The log hives are still used in Udhampur, Doda, Kishtwar and Ramban districts. The cylindrical hives are made of hollowed-out logs. The wall thickness is usually 5-6 cm. The dimensions of the horizontal log hives vary between 60-70cm long and 30-35cm wide with entrance hole of 5-6mm in the middle of the log. The two open ends are closed combs from centre to centre is 3cm which provides enough space for the movement of bees. Each end of the log hive is provided with 4 or 5 old comb strips and the central ones are left empty for the bees to build new combs themselves. In such a log hive, the bees build combs parallel to the end of the log, only the combs at the two ends are removed for honey extraction and the central combs with brood and honey are kept intact. The honey is harvested by opening one of the side circular doors. The log hives are kept in a horizontal position in front of a balcony/rooftop covered with a shed to afford protection from rain and enemies. The vertical log hives are similar to the horizontal ones except that they are kept in an upright vertical position instead of horizontal position. The honey production from these hives varies between 3-5kg.

#### **Wall hives :**

Wall hives are still very common in the sub-Himalayas, from the upper Indus basin east through Himachal Pradesh and Uttar Pradesh in India, as far as Nepal. In India, wall hives were common in Kashmir, where 'most of the families' kept bees in them. Wall hives are an integral part of construction in many areas of the state. In Jammu and Kashmir, the entire Kashmir region and Kishtwar, Poonch, Rajouri, Reasi areas of Jammu region, hollows are provided in mud walls. In general square type wall hives with dimensions of 30-40 cm wide and 30-40 cm high were observed in different areas of state. The entrance of the hive is kept outside. The side walls are plastered with mud or cow dung whereas the floor or roof is provided with wooden planks. The inside is sealed in the same manner as log hives. Before they are sealed, however, empty log and house hives may be baited using a mixture of beeswax, honey, herbs and other substances thought to be attractive to bees. The honey is collected from inside the hive and only the combs with honey are removed.

#### **Conclusion :**

Traditional beekeeping is a heritage of rural people in Kashmir. Traditional beekeeping (*Apis cerana*) was a suitable farming activity in the study area and had the potential to enhance environmental conservation as well as improve household income, nutrition and health, hence leading to poverty alleviation. The adoption of improved technology is low as the majority of the beekeepers preferred the traditional technology which often led to low quality products. Beeswax was treated as a waste hive product. However, the development of external markets could help to absorb this valuable product. Training is therefore required during harvesting and processing in order to raise the quality and quantity of honey and open the way for new hive products. Lack of an organized marketing structure had also given the middle-men an opportunity to exploit the beekeepers by offering low prices for hive products. Consequently, the government is required to play a more active role in development of external markets, and to take steps to minimize exploitation of beekeepers by middlemen in the industry. Beekeepers for their part need to come together in the form of groups and begin to actively seek solutions to their common marketing

problems, which cannot be tackled on individual basis. Although beekeeping is an important livestock enterprise among the agro pastoral households in the study area, there had been a notable decline in productivity in the last decade. This was attributed to recurrent droughts, deforestation, and inefficiency in the allocation and utilization of resources by the farmers. The existence of self-help groups played a positive role in enhancing the adoption of modern beekeeping technology particularly by women and the youth. Such groups if strengthened would in the long run be instrumental in increasing production, self-employment and food security.

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