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Prospects and constraints in traditional beekeeping in Jammu and Kashmir

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Abstract

The present study aimed to document the indigenous knowledge and traditional methods of beekeeping in Jammu region. A survey was conducted in Doda, Kishtwar and Ramban district during 2021-2022 to access the socio-economic back ground of beekeeper, honey production quantity, honey processing method, honey harvest method, constraints faced by the beekeeper. A total of 300 beekeepers were interviewed through questionnaire survey, study revealed that average age of the beekeepers was 43.20 years with average landholding and experience in beekeeping of beekeeper was 0.40 ha, 17 years, respectively. It was found that 11% of the beekeepers were exclusively dependent on farm income. The majority of the beekeepers possessed log hive followed by wall hive and honey production in log hive and wall hive was 7.67 kg and 6.93 kg/hive/season, respectively. The 68% of beekeepers harvested honey once a year while only 14% practiced honey processing. Among the diseases and enemies of honey bees, the incidence of wax moth, wasp, ant and bee eater birds was reported by 73, 45, 40%, and 34% of respondents, respectively. It was found that none of the honey had received AGMARK certification, nor was any brand name given to the honey. The average honey produced by each beekeeper was 24.24±1.44 kg and average amount of honey sold by beekeeper was 18.46±1.44 kg. Beekeepers sold honey at a higher price (Rs.907 kg⁻¹). Most beekeepers sell honey directly to consumers without any intermediaries in the supply chain. Except honey other bee products are not gathered by the beekeepers. The major constraint faced by beekeepers were attack of ants, attack of wax moth, lack of consultation and availability of medicine in case of disease outbreak.

Keywords: *Apis cerana*, traditional beekeeping, disease, predators

Introduction

Beekeeping has been practiced throughout Asia for many centuries and plays an important, though under-recognized role in contributing to the livelihood and cultural heritage of many indigenous communities (Schouten *et al.*, 2019) [14]. Beekeeping with *Apis cerana* is an indigenous industry that forms an integral part of the social and cultural heritage of rural communities in India (Singh, 2014) [16]. Five decades ago, there were hardly any houses in the valley without traditional hives. According to one report, there were approximately 50,000 colonies of bees in traditional hives in Kashmir prior to the appearance of acarine disease in 1962, which caused a major loss to beekeeping (Shah, 1984) [15]. The beekeeping industry experienced another setback in 1985–1986, with the outbreak of the Thai sac brood virus causing loss of over 95% of the stocks of *A. cerana* (Abrol and Bhat, 1990) [3]. However, *A. cerana* colonies have also decreased owing to the destruction of forests, clean cultivation, urbanization, modern house design, and modernization of beekeeping (Shah, 1984) [15]. In the Jammu region, there are around 8,538 colonies of *Apis cerana* and 1458 beekeepers rearing *A. cerana* in traditional hives, producing approximately 213.45 quintal honey (Anonymous, 2023) [6]. The Jammu and Kashmir has the potential to sustain more than 6,00,000 bee colonies, producing 9000 tonnes of honey per year and providing job opportunities for 12,000 families. Moreover, the average honey yield per colony ranges between 10 and 12 kg, compared with four–six kg produced elsewhere in the country (Abrol, 2004) [2]. Whereas, there are 10,49,974 colonies of *A. cerana* that produce approximately 82,700 quintals of honey, with an average of 7.88 kg average per colony. Similarly, 7,16,500 colonies of *A. mellifera* produce approximately 2,65,500 quintals of honey, with an average of 37.06 kg per colony in India. Considering this, an additional 719.87 lakhs colonies are required to meet the pollination requirements for various crops in India (Anonymous, 2017) [5]. Beekeeping with *A. cerana* does not require much management, such as sugar feeding, disease control, or migration.

Therefore, it is easy for isolated farming communities to practice beekeeping with this type of bee species, based on their indigenous knowledge. Beekeeping has improved people's economic and nutritional requirements (Reda *et al.*, 2018) [12]. Beekeeping acts as a source of additional income to farmers, as it does not involve high investment and is not labour-intensive (Gupta *et al.*, 2015) [8]. There are four agro-climatic zones ranging from low-altitude subtropical, intermediate, temperate, and cold alpine in Jammu and Kashmir, and the diversity of geographical features plays a dominant role in determining the topography, climate, and plant species present in the region, which offers great potential for both migratory and non-migratory beekeeping (Abrol, 2004) [2]. Having unique agro-climatic zones in the state, farmers have evolved need-based and location-specific beekeeping technologies that need to be documented.

Material and Methods

Location of study

The present study was conducted in the Jammu region of the U.T of J&K. Three districts were selected purposively (Doda, Kishtwar and Ramban) as the maximum number of beekeepers rearing *Apis cerana* in these districts.

Profile of the Study Area

The U T of J&K and Ladakh is situated in the Northwest Himalayan region extending over 32°-17 and 36°-58 North latitude and 73°-26' and 80°-30' East longitude. The UT of Jammu and Kashmir is bordered by Pakistan in the west, the UT of Ladakh is situated on the northern and eastern side, and the States of Himachal Pradesh and Punjab lie South to the UT of Jammu & Kashmir. The average height of the state above the mean sea level varies from less than 300 to 5550 meters. The average annual rainfall varies from approximately 600 to 800 mm, and the average annual temperature ranges from sub-zero to 40 °C. The total geographical area of U.T of the Jammu and Kashmir is 42,241 sq. kilometre which is 3.66 percent of the total geographical area of India.

Sampling Plan of the Study

Three districts were purposively selected as the maximum number of beekeepers are found in the region. Two blocks were selected from each of the selected districts. Therefore, the total number of blocks were six, and fifty beekeepers rearing *Apis cerana* were selected using a convenient sampling method from each block. Thus, data was collected from total 300 households in the study area.

Sampling technique

A multistage sampling technique was employed to select the sample of beekeepers using traditional and modern hives for *A. cerana*.

Tools of data collection

A questionnaire was prepared for study. For this the data was collected by personal interview method.

Result and discussion

Socio-economic profile

The socio-economic profile of traditional beekeepers is shown in table 1. The average age of beekeepers in the study area was 43.20±13.01 years and average education level of beekeepers in terms of the number of years of schooling was

7 years with majority of the respondents were illiterate (26%), followed by matriculate (24%), middle (23%), and 10+2 (12%). Only 8 and 6% of the respondents had primary and graduate qualifications, respectively. The studies are in agreement with Adgaba *et al.*, (2014) [4]; Pocol *et al.*, (2021) [11]; Nagma *et al.*, (2021) [10] who reported somewhat similar results. Whereas, average landholding and experience in beekeeping of beekeeper was 0.40 ha, 17 years, respectively. Similar findings were reported by Esakkimuthu and Kameswari (2017) [7]; Mulatu *et al.*, (2021) [9]. The prevalence of nuclear families dominated among traditional beekeepers; only 37 percent of beekeepers had a joint family. Whereas, 63 percent had nuclear families. A similar result was demonstrated by Soh *et al.*, (2021) [17]. The overall average number of beekeeper family members associated with beekeeping was 1.26 per family, with an average male participation rate of 1.09 per family. Furthermore, the overall average female participation rate per family was extremely low i.e. 0.15 per family. The average village distance from the market was 14.95 km. The study agrees with Reda *et al.*, (2018) [12]; Said (2019) [13] who reported similar results.

Hive possession

The majority of the beekeepers possessed log hive at an average of 2.87±0.14 per beekeeper in the study area, followed by wall hive (1.93±0.10) and honey production in log hive and wall hive was 7.67 kg and 6.93 kg/ hive/ season, respectively. Whereas, average honey production in log hive and wall hive in a year was 8.67 and 8.27 kg. Only 14% of the beekeepers practiced honey processing. The present study is in line with Singh (2014) [16], who reported 3.78 bee hives per beekeeper. A similar study was conducted by Abebe (2011) [11] who reported 6.22±5.97 kg honey production.

Disease and enemies of honey bee

Among the diseases and enemies of honey bees, the incidence of wax moth, wasp, ant, bee eater birds was widely spread in bee colonies by 73, 45, 40%, and 34%, respectively. The present study is in line with the findings of Nagma *et al.*, (2021) [10]; Singh (2014) [16] who reported somewhat similar results.

Beekeeping practices

It was found that 11% of the beekeepers were exclusively dependent on farm income. The major source of bee colony procurement was catching migratory bees. The maximum number of honey harvests recorded per year was two, with one harvest and two harvests per year, followed by 68 and 32% of the beekeepers, respectively. For packaging of honey, plastic cans and tin were mostly preferred by beekeepers, with 92 and 29 percent preference rates for storing honey, respectively. It was observed that neither the honey had received AGMARK certification, nor was any brand name given to the honey. A similar investigation was carried out by Reda *et al.*, (2018) [12]; Tiwari *et al.*, (2013) [18], who reported similar results.

Honey production

The average honey produced by each beekeeper in the study area was 24.24±1.44 kg and average amount of honey sold by beekeeper was 18.46±1.44 kg. Furthermore, beekeepers sold honey at a higher price, with an overall average rate of Rs 907 per kg. Most beekeepers sell honey directly to consumers

without any intermediaries in the supply chain. Furthermore, it was observed that none other product than honey was sold by the beekeeper. This study is in accordance with Yirga and Teferi (2011) ^[19], who reported 8-15 kg of honey production.

Constraints

The major constraint faced by the beekeeper was the attack of

the wax moth, reported by 73 percent of the beekeepers, followed by lack of consultation/medicine (60%) attack of ants (40%) during the disease outbreak. Similar findings were reported by Reda *et al.* (2018) ^[12]. Despite of being constrains faced by the beekeepers, it was found that all beekeepers were satisfied with the performance of the beekeeping unit.

Table 1: Socio-economic profile of traditional beekeepers.

Parameters (unit)	Mean
Average age (in years)	43.20 (\pm 13.01)
Average education (in years)	7.11(\pm 4.84)
Education level (%)	
Illiterate	26
Primary	8
Middle	23
Matriculate	24
Senior secondary	12
Graduation and above	6
Average Landholding of beekeeper (ha)	0.40 (\pm 0.48)
Irrigated	0.38 (\pm 0.43)
Unirrigated	0.02 (\pm 0.17)
Average beekeeping experience (in years)	17.38 (\pm 13.28)
Type of family (No.)	
Joint	37
Nuclear	63
Average family members per house hold (No.)	6.33(\pm 2.49)
Average members associated with beekeeping (No.)	
Male	1.09 (\pm 0.36)
Female	0.15 (\pm 0.36)
Total	1.26 (\pm 0.52)
Average village distance from market (km)	14.95 (\pm 10.38)

Table 2: Average different types of active hive possessed by beekeepers

Type of hive	Mean
Log hive	2.87 (\pm 0.14)
Wall hive	1.93 (\pm 0.10)

Table 3: Honey production in different types of hives in sampled district (kg/hive)

Type of hive	Average yield
Average yield / hive/season	
Log hive	7.67(\pm 1.72)
Wall hive	6.93 (\pm 0.98)
Average yield / hive/year	
Log hive	8.67(\pm 2.25)
Wall hive	8.26(\pm 1.47)

Table 4: Disease and enemies of honeybee reported by the beekeepers (%)

Disease and enemies	Percentage (%)
Varroaosis	31
Nosemosis	12
Bear	3
Pseudoscopian	15
Ant	40
Wasp	45
Wax moth	73
Bee eater bird	34

Table 5: Constraints faced by beekeeper (% beekeepers)

Constraints	Percentage (%)
Attack of ants	40
Attack of wax moth	73
Availability of sugar feed	2
Unavailability of beekeeping tools and other instruments	20
Theft of hives	3
Lack of consultation/ medicine during disease outbreak	60

Conclusion

The traditional hives require minimum investment from the beekeepers as they are made from locally available material, but the major problem arises in these hives is that their ends are fixed or plastered with wood and clay so routine inspection of colony is not possible. Traditional beekeeping in Doda, Kishtwar, and Ramban districts has the potential to be developed on modern scientific lines. Scientific beekeeping is not possible in traditional hives, whereas movable comb frames can be taken out and observed for colony health, bee strength, and food storage. So, moveable frame hives should be promoted among traditional beekeepers for easy colony management and will enhance the quality and quantity of honey.

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