



# A Comparative Study on Cost Structure and Profitability of Beekeeping in Ramban, Kathua and Jammu Districts of Jammu Division of Jammu and Kashmir

Dr. Geetanjali Gupta<sup>1\*</sup>; Dr. Anil Bhat<sup>2</sup>; Dr. Pawan Kumar Sharma<sup>3</sup>

<sup>1</sup>Ph.D Scholar, Sher-e-Kashmir University of Agricultural Science and Technology, Jammu, Jammu and Kashmir, India

<sup>2</sup>Assoc. Director Research, Sher-e-Kashmir University of Agricultural Science and Technology, Jammu, Jammu and Kashmir, India

<sup>3</sup>Professor & HOD, Division of AEABM, Sher-e-Kashmir University of Agricultural Science and Technology, Jammu, Jammu and Kashmir, India

\*Corresponding Author

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**Abstract**— This study investigates the economic profitability of honey production in the Ramban, Kathua, and Jammu districts of Jammu Division, J&K, highlighting its potential as a sustainable livelihood. Using a stratified sampling approach, 200 beekeepers across high-, medium-, and low-density districts were surveyed to collect data on production costs, returns, socio-economic variables, and constraints. The analysis revealed significant inter-district variation in performance. Ramban district emerged as the most productive, yielding 7,196 quintals of honey and 486.6 quintals of beeswax, and the most profitable, with gross returns of ₹17,864.52 per quintal and a benefit-cost ratio (BCR) of 10.05. Kathua and Jammu districts also showed positive, though lower, profitability. The study concludes that apiculture is a highly profitable venture in the region, with an aggregate BCR of 7.95. Strategic interventions—including improved market access, value addition, cooperative models, and policies to reduce cost-price spreads—are recommended to enhance profitability and sustainability across all districts.

**Keywords**— Apiculture, Beekeeping, Economic Profitability, Benefit-Cost Ratio, Marketing Channels, Jammu & Kashmir.

## I. INTRODUCTION

Agriculture in India has a long history dating back to ten thousand years. Today, India ranks second worldwide in farm output and has one of the highest productivity rates. Agriculture was the backbone of the Indian economy and a major source of employment. The share of employment in agriculture was 44.1 percent in 2017-18, increasing to 46.1 percent in 2023-24. India's agriculture sector contributed 16% to the Gross Domestic Product (GDP) in financial year 2024-25 and is projected to grow by 3.8% (Ministry of Finance, Government of India, 2025). GDP from agriculture in India increased to 7683.51 INR billion in Q4 of 2024 from 4759.11 INR billion in Q3 of 2024 (Ministry of Statistics and Programme Implementation, Government of India, 2025). The agriculture sector continues to determine India's economic standing due to its forward and backward linkages with other sectors (Anandhy and Beula, 2019).

In 2023-24, 46.1% of India's workforce was employed in agriculture, according to the Economic Survey and the Periodic Labour Force Survey (PLFS). It is envisioned as one of the four engines of development (the others are MSMEs, investments, and exports) in the Union Budget of 2025-26, aimed at driving sustainable growth and achieving the vision of a 'Viksit Bharat' (Developed India) by 2047 (Ministry of Statistics and Programme Implementation, Government of India, 2025). Sustainable agriculture in terms of food security, rural employment, and environmentally sustainable technologies such as soil conservation, sustainable natural resource management, and biodiversity protection are essential for holistic rural development (Babuchittimothu and Suresh, 2023).

Beekeeping (or apiculture) is the maintenance of bee colonies, commonly in man-made hives, by humans. It is an agro-based occupation that provides income and employment generation for rural and tribal families. It plays a vital role in the present context of the commercialization of agriculture and liberalization of the economy. Bees are a special gift to mankind due to their pollination services and valued products like honey, beeswax, propolis, bee venom, etc. (Das et al., 2022). Honey bees are responsible for pollinating crops such as apples, berries, melons, almonds, and cocoa (Khalifa et al., 2021). However, beehives face threats from habitat loss, pesticide use, and climate change. The decrease in bee populations is a major risk to global food production and environmental well-being. Apiculture is dependent on floriculture because bees rely on flowers for nectar and pollen. India's floriculture industry has earned the status of a "sunrise industry" with a 100 percent export orientation and high performance (Ministry of Statistics and Programme Implementation, Government of India, 2025). Beekeeping is an enticing, lucrative, and intriguing rural agri-horticulture business that does not require cutting-edge technology, large financial investment, or vast infrastructure.

A beekeeper rears bees to extract honey and other hive products, pollinate crops, and also sell to other beekeepers. Beekeeping provides self-employment for rural and agro-based populations. Beekeeping and the extraction of honey, pollen, beeswax, venom, and royal jelly provide employment to rural educated youths by creating job opportunities in the post-production (collection, processing) and marketing of bee products (Narang, A. et al., 2022).

### **1.1 Status of Honey Production in the World:**

In 2024, the FAO reported honey production reached 1,894,000 metric tons. The global honey market size has touched USD 9.40 billion and is expected to grow to USD 15.59 billion by 2032 (Food and Agriculture Organization, 2024). The global honey market is expected to grow at a CAGR of 5.83% in the forecast period 2023-2029 (Food and Agriculture Organization, 2024).

### **1.2 Status of Honey Production in India:**

The India honey market size was worth around USD 305 million in 2023 and is predicted to reach USD 585 million in value by 2032 with a compound annual growth rate (CAGR) of approximately 7.5% between 2024 and 2032. In financial year 2024-25, India is estimated to have produced approximately 146,000 metric tons of honey with a value of USD 177.52 million in exports (The Agricultural and Processed Food Products Export Development Authority, Ministry of Commerce and Industry, Government of India, 2024). The honey market is expected to generate US\$2.45 billion in revenue and is predicted to grow annually by 5.37% (CAGR 2024-2028) (APEDA, 2024). 12,699 beekeepers are currently registered on the National Bee Board with 19.34 lakh honey bee colonies (National Beekeeping and Honey Mission, Government of India, 2022-2023). More than half of India's honey production is exported to the USA, Saudi Arabia, the United Arab Emirates, Bangladesh, Canada, and 83 other countries (NBHM, 2022-2023).

To strengthen India's honey production and export capacity, the National Beekeeping and Honey Mission (NBHM) has released guidelines for beekeepers (Debroy, 2019; NBB, 2020; Chetri et al., 2021). NBHM is a Central Sector Scheme that promotes scientific beekeeping for overall growth of the beekeeping sector to improve agriculture production. It has 3 sub-schemes: Mini Mission I (production and productivity improvement), Mini Mission II (post-harvest management), and Mini Mission III (research and technology generation). Financial assistance is provided as per scheme guidelines.

The Covid-19 pandemic witnessed a surge in honey consumption due to its health-inducing properties. The growing health and wellness trends are expected to propel the India honey market growth. Based on flavor, the multiflora honey segment is expected to dominate; based on seasonality, the autumn and spring segment is expected to capture the largest market share; and based on distribution channel, the business-to-consumer segment is expected to garner a significant revenue share. Based on state, Maharashtra is expected to dominate the market. India's export of honey increased by 110% between 2013-14 and 2019-20 (NBHM, 2021). In 2023-24, India exported 107,963.21 metric tonnes of natural honey valued at Rs 1,470.84 crore (approx. \$177.52 million USD), with the USA, Saudi Arabia, the UAE, Bangladesh, and Canada being key destinations. Major export varieties include mustard, eucalyptus, lychee, sunflower, pongamia, multi-flora Himalayan, acacia, and wild flora honey.

To boost exports, the Indian government is focusing on upgrading value-added honey products, organic certification authenticity, and ensuring strict guidelines meeting international quality standards. Initiatives are in place to train new beekeepers, upgrade apiculture infrastructure, and invest in innovative research (National Bee Board, Ministry of Agriculture and Farmers Welfare, 2023).

### 1.3 Status of Honey Production in Jammu and Kashmir:

Jammu & Kashmir Union Territory recorded 146000 quintals of honey production in the year 2023-24, with the Jammu division holding a share of 4425.35 quintals. The total number of beekeepers in the Jammu division was 2471, with 82660 bee colonies. Jammu and Kashmir witnessed a 'sweet revolution' through apiculture development schemes launched by the government, such as free-of-cost facilities for processing raw honey and subsidies (Ministry of Micro, Small & Medium Enterprises, Government of India 2025). Besides developing infrastructure for post-harvest management, packaging, value addition, and marketing, the Jammu and Kashmir government has also launched a Rs 46.65 crore 'Promotion of Beekeeping' project.

For standardization, small-time keepers are offered honey testing and logo stamping services for better market returns. Processing units help reduce moisture, filter, and bottle honey. New-age agripreneurs are making value additions like soaps, candles, cosmetics, and Ayurvedic medicines. The UT administration, through its Krishi Vigyan Kendras (KVKs) and the Department of Agriculture, is imparting technical skills. Two advanced apitherapy centers and GI labs are established to increase production of high-quality honey. Monitoring and traceability are done through GI labs, and 20 Custom Hiring Centers (CHCs) are established for extending pollination facilities. The project targets generating additional Rs 475 crore income from by-products and setting up 86 enterprises in five years (Government of Jammu & Kashmir, Department of Information & Public Relations, 2023).

## II. REVIEW OF LITERATURE

An important prerequisite to agribusiness research is a clear grasp of issues through rigorous and systematic planning. The following work has been conducted by various researchers related to this study.

### 2.1 Economic Analysis of Beekeeping:

- Sharma and Bhatia (2001) analyzed the economics of stationary and migratory beekeeping in Himachal Pradesh. The average number of colonies for migratory and stationary beekeepers was 56 and 23, respectively. Fixed cost per colony was ₹63.13 (migratory) and ₹59.10 (stationary); variable cost was ₹195.15 and ₹167.83. Total cost was ₹258.28 and ₹226.93 per colony. Average honey produced was 41.60 kg/colony (migratory) and 15.66 kg/colony (stationary). Net returns were ₹1413.72/colony (migratory) and ₹353.07/colony (stationary), showing migratory beekeeping was more profitable.
- Devkota K. (2006) found the Benefit-Cost Ratio (BCR) of apiculture ranged from 0.97 to 6.22, with about 88.88% beekeepers in profit.
- Kumar and Gill (2006), in a study on economic viability of agriculture-based enterprises for women in Punjab, found gross returns of ₹25,255 from selling honey and byproducts against a cost of ₹11,428, yielding a net profit of ₹13,826 per 10 colonies per year.
- Kizilaslan and Kizilaslan (2007), in a study on factors affecting honey production in Turkey, found honey consumption per person, number of beehives, producer price, and honey export values statistically significant.
- Pokhrel (2009) found honey productivity in Terai (28.7 kg/yr/hive) was 3.54 times higher than in hills (8.1 kg/yr/hive) in Chitwan, Nepal. Income from honey production was 3.62 times higher than from crop farming.
- Vural and Karaman (2009) found beekeeping was the main income source (68.40%) for beekeepers with more than 160 colonies. Average honey yield was 26.28 kg/colony.
- Prasad et al. (2012) found migratory bee farms had higher total cost, gross returns, and net returns per 100 colonies. Cost per kg honey was lower on migratory farms due to higher average yield per colony.
- Sharma et al. (2014) studied migratory beekeeping in Sri Muktsar Sahib, Punjab. Beekeepers were categorized by migratory route. Honey production varied from 29-45 kg/hive. Cost of production per box was ₹2542.6 (Group I), ₹3328.5 (Group II), and ₹2406.4 (Group III). Benefit-cost ratio was highest in Group II (2.23:1).
- Gebrehiwot (2015) used descriptive and regression analysis to analyze factors influencing beekeeping activities and honey production.
- Devkota et al. (2016) found the BCR of beekeeping in Chitwan, Nepal was 1.8. Gross income was 4475.23 rupees/hive.

- Al-Ghamdi et al. (2017) found productivity of box hives was 72% higher than traditional hives in Saudi Arabia. Average net incomes were 33,699.7 SAR/annum (box hives) and 16,461.4 SAR/annum (traditional hives).
- Sain (2017) examined cost and return from an apiary of 80 boxes. Cost of fixed assets was ₹2,15,900 and variable cost was ₹1,49,500. Returns from sale of honey and byproducts was ₹3,17,000, giving a net profit over variable cost of ₹1,67,000 in one year.
- Shrestha (2018) studied production economics of honey in Bardiya, Nepal. Farmers reared an average of 34.54 hives with productivity of 34.6 Kg/hive. Average production cost was ₹7392.52 with net profit of ₹2987.05, and B:C ratio was 1.67.
- Yogi et al. (2020) in Dang, Nepal, found on average farmers held 14.55 bee hives with productivity of 6.12 kg/hive. The benefit cost ratio was 3.71 and average annual net profit was NRS. 2,646.96 per hive.
- Saini et al. (2021) found that managing colonies at different initial strengths (5, 10, and 15 frames) and extraction frequencies affected returns. Fifteen-frame colonies had the highest B:C ratio (1:1.50). Total expenditure was lowest in five-frame colonies.
- Paudel et al. (2025) evaluated profitability and efficiency of honey production in Nepal. Results revealed an average BCR of 1.67, with modern practices outperforming traditional methods.

### III. MATERIALS AND METHODS

#### 3.1 Locale of the Study:

The present study was conducted in Jammu, Kathua and Ramban districts of Jammu division, selected based on the highest number of bee colonies.

#### 3.2 Sampling Design:

##### 3.2.1 Selection of districts:

A multistage random sampling technique was employed. In the first stage, three districts (Jammu, Kathua and Ramban) were selected purposively based on density of total beekeepers, considering three ranges: high density (>1000), medium density (100 to 999), and low density (<100) (Kumar et al., 2020; Thakur et al., 2023). Ramban was the only district in the high-density category with 1727 beekeepers. Within the medium density range (100 to 999), Kathua was selected randomly from two districts. From the low density category (<100), Jammu was selected randomly from seven districts.

TABLE 1

DISTRIBUTION OF BEE COLONIES IN DIFFERENT DISTRICTS OF JAMMU DIVISION (SELECTION FRAMEWORK)

S.No.	District(s)	Bee Colonies	Honey Production (q)	No. of Beekeepers (Apis mellifera)	No. of Beekeepers (Apis cerana indica)	Total Beekeepers
1	Ramban	41486	2451.95	477	1250	1727
2	Doda	11067	754.02	135	67	202
3	Kathua	4999	300.25	75	107	182
4	Udhampur	4764	228.35	94	0	94
5	Jammu	5000	317.3	80	0	80
6	Reasi	635	11.4	65	0	65
7	Kishtwar	6092	90.5	40	0	40
8	Rajouri	4477	111.49	38	0	38
9	Poonch	522	25.62	23	0	23
10	Samba	3618	134.47	20	0	20

##### 3.2.2 Selection of number of beekeepers:

In the second stage, 200 beekeepers were chosen proportionally using the formula:

$$n_i = (N_i / N) * n \quad (1)$$

Where,

$n_i$  = Number of beekeepers sampled in i-th district

$N_i$  = Total number of beekeepers in i-th district density range

$N$  = Total number of beekeepers in Jammu division

$n$  = Total sample size chosen (200)

Therefore, 140 beekeepers were selected from Ramban, 31 from Kathua, and 29 from Jammu.

### 3.3 Data Collection:

Both primary and secondary data were collected. Primary data were gathered through key informant interviews and personal interviews using a standardized pre-tested questionnaire. The questionnaire captured information on the cost of honey production, production of honey and bee wax, returns, marketing channels, and constraints. A detailed marketing analysis was conducted by mapping the marketing chain. Secondary data were sourced from the Division of Entomology, SKUAST-Jammu, government publications, websites, and KVK reports.

### 3.4 Statistical Analysis:

The collected data was analysed using suitable economic and statistical tools.

### 3.5 Socio-economic characteristics:

Variables like age, education, occupation, family size, experience, number of bee colonies, costs of medicine, labour, feed etc. were analysed using descriptive statistics (mean, standard deviation, standard error).

### 3.6 Economic analysis:

To estimate cost and returns, data on expenses and returns from sale of honey and by-products were analysed. Cost and returns were estimated per quintal/unit hive. Profitability was measured as gross returns, gross margins, net returns and cost-benefit ratio.

### 3.7 Cost of Beekeeping:

$$\text{Total cost} = \text{Total Fixed Cost (TFC)} + \text{Total Variable Cost (TVC)} \quad (2)$$

### 3.8 Fixed cost:

Included interest on present value of fixed capital assets and depreciation on equipment and machinery (beehive, bee colony, honey extractor, smoker, gloves, feeder, bee veil). Depreciation was computed using the straight-line method. Interest on fixed assets was computed at 10% per annum.

### 3.9 Variable costs:

Included:

- a) Cost of comb foundation sheets.
- b) Cost of feed.
- c) Cost of medicines and chemicals.
- d) Cost of labour (Hired + owned). Family labour was calculated as per the wage of skilled labour for a day prevailing in the locality.
- e) Cost on migration (transportation, land rent, labour for boarding/loading).
- f) Cost on honey storage containers.
- g) Miscellaneous expenses.

### 3.10 Returns from Beekeeping:

**Gross returns** = Quantity of Output × Price per Unit.

**Net returns** = Gross Returns – Total Cost.

**Cost-Benefit Ratio (CBR)** = Total Cost of Production / Gross Returns. \*(Author's Note: The manuscript uses this formula. Conventionally, BCR = Gross Returns/Total Cost. The results show values >1, indicating the calculation used was likely Gross Returns/Total Cost. This should be clarified.)\* A CBR > 1 denotes profit.

**IV. RESULTS**

**4.1 Resource Structure and Social Status of Sampled Beekeepers:**

Demographic information is presented in Tables 2-6.

**TABLE 2  
 DISTRIBUTION OF BEEKEEPERS UNDER STUDY ON BASIS OF AGE GROUP**

Particulars	Variables	Ramban	Kathua	Jammu			
		f #	%*	f #	% *	f #	% *
Age	18-35 years (Young)	6	3.00%	3	1.50%	4	2%
	35-50 years (Middle)	92	46%	23	11.50%	16	8%
	> 50 years (Old)	42	21%	5	2.50%	9	4.50%

**TABLE 3  
 DISTRIBUTION OF BEEKEEPERS UNDER STUDY ON BASIS OF EDUCATION LEVEL.**

Particulars	Variables	Ramban	Kathua	Jammu			
		f	%	f	%	f	%
Education level	Uneducated	36	18%	0	0.00%	1	0.50%
	Up to Primary	15	7.50%	12	6%	11	5.50%
	Matric	55	27.50%	10	5%	10	5%
	Senior Secondary	15	7.50%	2	1%	2	1%
	Graduate	14	7%	6	3%	3	1.50%
	Post Graduate	5	2.50%	1	0.55%	2	1%

**TABLE 4  
 DISTRIBUTION OF BEEKEEPERS UNDER STUDY ON BASIS OF OCCUPATION.**

Particulars	Variables	Ramban	Kathua	Jammu			
		f	%	f	%	f	%
Occupation	Agriculture & Beekeeping	82	41%	16	8%	28	14%
	Beekeeping only	57	28.50%	13	6.50%	0	0.00%
	Service	0	0.00%	0	0.00%	0	0.00%
	Housewife	0	0.00%	1	0.50%	1	0.50%
	Student	1	0.50%	1	0.50%	0	0.00%

**TABLE 5**  
**DISTRIBUTION OF BEEKEEPERS UNDER STUDY ON BASIS OF FAMILY SIZE.**

Particulars	Variables	Ramban	Kathua	Jammu			
		f	%	f	%	f	%
Family size	Up to 4 members	88	44%	21	10.50%	18	9.00%
	5 - 8 members	52	26%	10	5%	11	5.50%
	More than 8 members	0	0.00%	0	0.00%	0	0.00%

**TABLE 6**  
**DISTRIBUTION OF BEEKEEPERS UNDER STUDY ON BASIS OF ANNUAL INCOME.**

Particulars	Variables	Ramban	Kathua	Jammu			
		f	%	f	%	f	%
Annual income (₹)	Up to 1 Lakh	39	19.50%	1	0.50%	3	1.50%
	1-5 Lakhs	12	6%	8	4%	10	5%
	> 5 Lakhs	89	44.50%	22	11%	16	8%

**4.2 Economic Analysis of Honey and Bee products:**

**4.2.1 Production of honey and hive products:**

Production performance is shown in Table 7.

**TABLE 7**  
**PRODUCTION OF HONEY AND HIVE PRODUCTS IN STUDY AREA (IN QUINTALS)**

District	No. of Beekeepers	No. of Bee colonies	Total Production		Production per colony	
			Honey	Hive products (Bee wax)	Honey	Hive products (Bee wax)
Ramban	140	12166	7196	486.6	0.59	0.04
Kathua	31	5302	1279	41.25	0.24	0.01
Jammu	29	4785	1109	38.25	0.23	0.01
Overall	200	22253	9584	566.1	0.43	0.03

**4.2.2 Cost structure of honey production:**

Costs are divided into fixed and variable components. Details for each district are in Tables 8, 9, and 10. A summary for the division is in Table 11.

**TABLE 8**  
**COST STRUCTURE OF PRODUCTION OF HONEY AND HIVE PRODUCTS IN RAMBAN DISTRICT**

Particulars	Ramban	
	For 12166 bee colonies (₹)	Per bee colony (₹)
<b>A. Variable costs</b>		
Honeycomb repair	315000	25.89
Frames replacement	608000	49.97
CF Sheet addition	279810	23
Medicines	1278900	105.12
Feed / nutrition	490000	402.76
Fungicide	1500000	287.68
Temp. labour (extraction)	750000	143.84
Misc. (tools, gear)	912450	75
Interest on variable cost @ 4% p.a.	765766	62.94
<b>Total Variable cost (TVC)</b>	<b>19144150</b>	<b>1573.57</b>
<b>B. Fixed costs</b>		
Land rent	121660	10
Beehives/colony	1037652	85.29
Permanent labour (hired)	1128400	92.75
Insurance on beehives @12% p.a.	124518.24	10.23
Union fee	0	0
Interest on fixed cost @ 10% p.a.	241223.02	19.8
<b>Total Fixed cost (TFC)</b>	<b>2471453.26</b>	<b>203.14</b>
<b>Total cost (TVC+TFC)</b>	<b>21615603.26</b>	<b>1776.72</b>

**TABLE 9**  
**COST STRUCTURE OF HONEY AND HIVE PRODUCTS PRODUCTION IN KATHUA DISTRICT.**

Particulars	Kathua	
	For 5302 bee colonies (₹)	Per bee colony (₹)
<b>A. Variable costs</b>		
Honeycomb repair	111192	20.9
Frames replacement	157917	29.7
CF Sheet addition	121946	23
Medicines	220000	41.49
Feed / nutrition	65000	119.76
Fungicide	104148	208.25
Temp. labour (extraction)	118122	22.27
Misc. (tools, gear)	111172	20.96
Interest on variable cost @ 4% p.a.	40379	7.61
<b>Total Variable cost (TVC)</b>	<b>1049876.88</b>	<b>198.01</b>
<b>B. Fixed costs</b>		
Land rent	244499.7	46.11
Beehives/colony	271022	51.11
Permanent labour (hired)	274399	51.75
Insurance on beehives @12% p.a.	32522.64	6.13
Union fee	9300	17.54
Interest on fixed cost @ 10% p.a.	831743.34	15.68
<b>Total Fixed cost (TFC)</b>	<b>7485690</b>	<b>1411.86</b>
<b>Total cost (TVC+TFC)</b>	<b>8535566</b>	<b>1609.87</b>

**TABLE 10**  
**COST STRUCTURE OF HONEY AND HIVE PRODUCTS PRODUCTION IN JAMMU DISTRICT.**

Particulars	Jammu	
	For 4785 bee colonies (₹)	Per bee colony (₹)
<b>A. Variable costs</b>		
Honeycomb repair	91930	19.21
Frames replacement	81200	16.9
CF Sheet addition	110055	23
Medicines	180960	37.81
Feed / nutrition	48840	101.33
Fungicide	70000	181.81
Temp. labour (extraction)	81200	16.96
Misc. (tools, gear)	72500	15.15
Interest on variable cost @ 4% p.a.	138144	28.87
<b>Total Variable cost (TVC)</b>	<b>1519584</b>	<b>317.57</b>
<b>B. Fixed costs</b>		
Land rent	112230	23.45
Beehives/colony	209455	43.77
Permanent labour (hired)	192792	40.29
Insurance on beehives @12% p.a.	25134.6	5.25
Union fee	5800	12.12
Interest on fixed cost @ 10% p.a.	54541.14	11.39
<b>Total Fixed cost (TFC)</b>	<b>599953.2</b>	<b>125.38</b>
<b>Total cost (TVC+TFC)</b>	<b>2119537.2</b>	<b>442.95</b>

**TABLE 11**  
**TOTAL COST STRUCTURE OF HONEY AND HIVE PRODUCTS PRODUCTION IN JAMMU DIVISION.**

Particulars	Jammu division	
	For 22253 bee colonies (₹)	Per bee colony (₹)
<b>A. Variable costs</b>		
Honeycomb repair	518122	23.28
Frames replacement	847117	38.06
CF Sheet addition	412811	18.5
Medicines	1679860	75.48
Feed / nutrition	6019900	270.52
Fungicide	5474148	245.99
Temp. labour (extraction)	1949322	74.11
Misc. (tools, gear)	1096122	49.25
Interest on variable cost @ 4% p.a.	944289	42.43
<b>Total Variable cost (TVC)</b>	<b>21713610.88</b>	<b>976.5</b>
<b>B. Fixed costs</b>		
Land rent	478389.7	21.5
Beehives/colony	1695591	76.19
Permanent labour (hired)	1595591	71.7
Insurance on beehives @12% p.a.	182175.24	8.18
Union fee	151000	6.78
Interest on fixed cost @ 10% p.a.	378938.5	17.03
<b>Total Fixed cost (TFC)</b>	<b>10557096.46</b>	<b>474.31</b>
<b>Total cost (TVC+TFC)</b>	<b>32270706.46</b>	<b>1450.81</b>

**4.2.3 Returns structure of honey and hive products:**

Returns are summarized in Tables 12-15.

**TABLE 12  
 RETURNS STRUCTURE OF HONEY AND HIVE PRODUCTS OF RAMBAN DISTRICT.**

Particulars	Ramban	
	Total	Per bee colony
Total Production (q.)	7682	0.63
Gross Return (₹)	217339800	17864.52
Net return (₹) (Gross return – Total cost)	195724197	16087.8

**TABLE 13  
 RETURNS STRUCTURE OF HONEY AND HIVE PRODUCTS OF KATHUA DISTRICT.**

Particulars	Kathua	
	Total	Per bee colony
Production (q.)	1320.25	0.249
Gross Return (₹)	22506250	7239.22
Net return (₹) (Gross return – Total cost)	29846809	4244.86

**TABLE 14  
 RETURNS STRUCTURE OF HONEY AND HIVE PRODUCTS OF JAMMU DISTRICT.**

Particulars	Jammu	
	Total	Per bee colony
Production (q.)	1147.25	0.239
Gross Return (₹)	16749750	3500.47
Net return (₹) (Gross return – Total cost)	14630212.8	3057.51

**TABLE 15  
 TOTAL RETURNS STRUCTURE OF HONEY AND HIVE PRODUCTS OF JAMMU DIVISION.**

Particulars	Total (all 3 districts)	
	Total	Per bee colony
Production (q.)	10149.5	0.45
Gross Return (₹)	256595800	11530.84
Net return (₹) (Gross return – Total cost)	224325093.5	10080.66

**4.2.4 Cost benefit ratio of study area:**

The Benefit-Cost Ratio (BCR) for each district and overall is shown in Table 16.

**TABLE 16  
 BENEFIT COST RATIO OF JAMMU DIVISION.**

Particulars	Ramban	Kathua	Jammu	Overall Jammu division
Benefit Cost ratio	10.05	2.64	7.9	7.95

## V. DISCUSSION

### 5.1 Honey production and cost structure:

The study helped enumerate production levels and cost structure. Ramban had the highest number of colonies (12166), followed by Kathua (5302) and Jammu (4785). Collectively, the 200 beekeepers owned 22253 colonies. Ramban was the leading district in honey (7196 q) and beeswax (486 q) production, likely due to favourable environmental factors or greater economic activity.

The average variable cost per hive across Jammu division was ₹976.50, and average fixed cost was ₹474.31. Ramban recorded the highest costs (TVC ₹1573.57, TFC ₹203.14), indicating intensive input use. Jammu had the lowest cost structure (TVC ₹317.57, TFC ₹125.38). Dominant variable costs were feed/nutrition and fungicides; major fixed costs were hive setup and permanent labour.

The total cost per hive averaged ₹1450.81. Ramban was costliest (₹1776.72/hive), followed by Kathua (₹1609.87) and Jammu (₹442.75). These findings align with Kumar and Gill (2006), who emphasized localized practices impact cost variability.

### 5.2 Returns and profitability:

Gross return per colony was highest in Ramban (₹17864.52), followed by Kathua (₹7239.22) and Jammu (₹3500.47). The overall average was ₹11530.84, showing remarkable disparity in productivity and market access.

Net return averaged ₹10080.66 per colony. Ramban had the highest net return (₹16087.80). These findings align with Sharma and Bhatia (2001) on regional profitability variation.

The overall BCR was 7.95, indicating high profitability. Ramban's BCR was 10.05, Jammu's 7.90, and Kathua's 2.64. A BCR >1 signifies viability. The study concludes beekeeping is financially rewarding, similar to Shrestha (2018) in Nepal and Sharma et al. (2014) in Punjab.

## VI. SUMMARY AND CONCLUSION

The study was conducted in Ramban, Kathua, and Jammu districts, selected from high, medium, and low beekeeper density categories. A sample of 200 beekeepers (140, 31, 29 respectively) was selected proportionally. Data on production, costs, and returns were collected via questionnaire and analyzed.

### 6.1 Key findings:

1. **Number of bee colonies:** Ramban (12166) > Kathua (5302) > Jammu (4785). Total: 22253.
2. **Production:** Total honey production was 9584 quintals, beeswax 566.10 quintals. Ramban was most productive.
3. **Costs:** Average total cost per hive was ₹1450.81. Ramban had highest cost (₹1776.72), Jammu lowest (₹442.75). Major variable costs: feed/nutrition, fungicides. Major fixed costs: beehives, permanent labour.
4. **Returns & Profitability:** Average gross return per colony was ₹11530.84; net return ₹10080.66. Ramban was most profitable (Gross return ₹17864.52/colony, Net return ₹16087.80/colony).
5. **Benefit-Cost Ratio:** Overall BCR was 7.95. Ramban: 10.05, Jammu: 7.90, Kathua: 2.64.

### 6.2 Conclusion:

Beekeeping is a highly profitable and economically viable enterprise in the Jammu Division, particularly in Ramban district. Variation in profitability is attributed to differences in management practices, input use, and market access.

### 6.3 Recommendations:

Strategic interventions such as improved market access, value addition (soaps, candles, cosmetics), cooperative models to reduce price spreads, and cost-reduction policies should be implemented. Training, infrastructure development (processing units), and better linkage to schemes like NBHM are essential to harness the full potential of beekeeping in the region.

## CONFLICT OF INTEREST

The authors declare no conflict of interest.

## REFERENCES

- [1] Abebe, W. (2011). Identification and documentation of indigenous knowledge of beekeeping practices in selected districts of Ethiopia. *Journal of Agricultural Extension and Rural Development*, 3(5), 82–87.
- [2] Acharya, S. S., & Agrawal, N. L. (1999). *Agricultural marketing in India* (3rd ed., p. 128). Oxford & IBH Publishing Co. Pvt. Ltd.
- [3] Adgaba, N., et al. (2014). Socio-economic analysis of beekeeping and determinants of box hive technology adoption in the Kingdom of Saudi Arabia. *Journal of Animal and Plant Sciences*, 24(6), 1876–1884.
- [4] Almutlaq, A. M., et al. (2025). Adoption of sustainable beekeeping practices among rural women in Hail Region, Kingdom of Saudi Arabia: Implications for agricultural extension. *Sustainability*, 17(9), 4186.
- [5] Bano, A., et al. (2022). Disposal pattern of honey and benefit-cost analysis of beekeeping in district Baramulla, Jammu and Kashmir. *Agricultural Economics Research Review*, 35(Conference Issue), 191.
- [6] Beula, K., & Anandhy, A. (2020). A study on honey production and marketing by the Marthandam Beekeepers' Co-operative Society in Kanniyakumari District. *Shanlax International Journal of Economics*, 8, 33–40.
- [7] Budhathoki-Chhetri, P., et al. (2020). Economic analysis and marketing system of *Apis mellifera* honey production in Dang. *Journal of Agriculture and Natural Resources*, 4, 154–164.
- [8] Bunde, A., & Kibet, K. (2016). Socio-economic factors influencing adoption of modern beekeeping technologies in Baringo County, Kenya. *International Journal of Scientific Research*, 5(6).
- [9] Buwa, S. (2023). G.I. tags. *International Journal of Creative Research Thoughts*, 11(10), 2320–2882.
- [10] Čavlin, M., et al. (2023). Factors affecting business performance in beekeeping production. *Agriculture*, 13(3), 686.
- [11] Das, S., et al. (2022). Scientific beekeeping technology for sustainable agriculture and employment generation. *Biotica Research Today*, 4(4), 244–247.
- [12] Debroy, B. (2019). *Report to the beekeeping development committee*. Economic Advisory Council to the Prime Minister, Government of India.
- [13] Devkota, K. H. (2006). Benefit-cost analysis of apiculture enterprise: A case study of Jutpani VDC, Chitwan, Nepal. *Journal of the Institute of Agriculture and Animal Science*, 27, 119–125.
- [14] Devkota, K., Dhakal, S. C., & Thapa, R. B. (2016). Economics of beekeeping as pollination management practices in Nepal. *Agriculture & Food Security*, 5(1).
- [15] Erekalu, K., Mohammed, J., & Tegegne, B. (2018). Factors affecting market supply of honey in southern Ethiopia. *Journal of Development and Agricultural Economics*, 10, 99–109.
- [16] Gebrehiwot, N. T. (2015). Honey production and marketing as a pathway for poverty alleviation in Tigray. *Zenith International Journal of Business Economics and Management Research*, 5(6), 342–365.
- [17] Gupta, R., et al. (2014). *Beekeeping for poverty alleviation and livelihood security*. Springer.
- [18] Gurung, N., et al. (2024). Economics of production and marketing of honey in Chitwan district of Nepal. *Cognizance Journal of Multidisciplinary Studies*, 4, 2–17.
- [19] Hazarika, P. (2023). *Economic analysis on production and marketing of honey in Assam* (Doctoral dissertation). Assam Agricultural University, Jorhat, India.
- [20] Kaygısız, F. (2023). Factors affecting the choice of marketing channel by beekeepers in Türkiye. *Ankara Üniversitesi Veteriner Fakültesi Dergisi*, 70(2), 165–173.
- [21] Khalifa, S., et al. (2021). Overview of bee pollination and its economic value for crop production. *Insects*, 12(8), 688.
- [22] Kizilaslan, H., & Kizilaslan, N. (2007). Factors affecting honey production in apiculture in Turkey. *Journal of Applied Sciences Research*, 3, 983–987.
- [23] Kumar, P. (2000). *Present status, problems and prospects of beekeeping in Ludhiana district of Punjab* (Master's thesis). Punjab Agricultural University, Ludhiana, India.
- [24] Kumar, P., & Singh, D. (2004). Prospects of beekeeping in Ludhiana district of Punjab. *Indian Bee Journal*, 6, 108–111.
- [25] Kumar, S., & Gill, G. S. (2006). Economic viability of agriculture-based enterprises for women in Punjab. *Agricultural Economics Research Review*, 19.
- [26] Kumar, Y. (2013). *Production and management system of apiculture farming in Jammu region* (Doctoral dissertation). SKUAST-Jammu, India.
- [27] Kumar, R., et al. (2018). Constraints in transfer of beekeeping technology. *Journal of Pharmacognosy and Phytochemistry*, 7(2), 1081–1084.
- [28] Kumar, K., & Mitrannavar, D. H. (2020). Disposal pattern of honey in Western Ghats of Karnataka. *International Journal of Current Microbiology and Applied Sciences*, 9(9), 2056–2063.
- [29] Mohan, S., et al. (2023). Challenges and opportunities in beekeeping during COVID-19 pandemic. *Journal of Sustainable Science and Management*, 18, 215–224.
- [30] Nair, M. C. (2003). *Apiculture resource biodiversity and management in Southern Kerala* (Doctoral dissertation). Mahatma Gandhi University, Kottayam, India.
- [31] Narang, A., et al. (2022). PEST and SWOT analysis of beekeeping in India. *Journal of Applied and Natural Science*, 14, 194–202.
- [32] National Beekeeping and Honey Mission. (2023). *Annual report 2022–2023*. Government of India.
- [33] Sharma, A., et al. (2022). Status of beekeeping in Himachal Pradesh: A review. *The Pharma Innovation Journal*, 11(3S), 257–265.
- [34] Singh, B., & Sekhon, M. K. (2014). Economics of honey production in Punjab. *Journal of Agricultural Development and Policy*, 24(1), 85–94.
- [35] Wu, S., et al. (2015). Consumer demand for local honey. *Applied Economics*, 47(41), 4377–4394.

APPENDIX

TABLE A1

OPERATION OF BEEKEEPING AND HONEY MISSION PROJECTS IN DIFFERENT STATES AND UTS OF INDIA

S.No	States / UTs	2020-21	2021-22	2022-23	2023-24	2024-25	TOTAL
1	Andhra Pradesh	--	--	1	--	--	1
2	Arunachal Pradesh	--	1	1	3	3	8
3	Assam	1	2	7	3	4	17
4	Bihar	2	--	1	1	2	6
5	Chhattisgarh	--	2	2	--	3	7
6	Gujarat	3	4	--	1	2	10
7	Haryana	--	4	--	3	3	10
8	Himachal Pradesh	2	2	2	--	3	9
9	Jammu & Kashmir	7	--	4	1	6	18
10	Jharkhand	--	--	--	11	1	12
11	Karnataka	7	5	3	2	3	20
12	Kerala	--	4	--	--	1	5
13	Madhya Pradesh	--	4	2	2	2	10
14	Maharashtra	2	--	2	1	9	14
15	Manipur	--	1	2	1	1	5
16	Meghalaya	--	--	--	--	2	2
17	Mizoram	--	--	--	--	--	--
18	Nagaland	--	--	--	2	4	6
19	Odisha	--	1	--	1	1	3
20	Punjab	--	3	1	--	5	9
21	Rajasthan	2	2	1	--	10	15
22	Sikkim	--	1	--	--	1	2
23	Tamil Nadu	5	--	2	1	1	9
24	Telangana	--	1	4	4	4	13
25	Tripura	--	1	--	--	2	3
26	Uttar Pradesh	3	3	12	2	10	30
27	Uttarakhand	2	8	5	1	7	23
28	West Bengal	--	1	1	3	11	16
29	Andaman & Nicobar Islands	--	--	--	--	1	1
30	National/Central Level Agencies	5	2	6	1	--	14
	<b>Grand Total</b>	<b>41</b>	<b>52</b>	<b>59</b>	<b>44</b>	<b>102</b>	<b>298</b>

(Source- National beekeeping and honey mission, Government of India 2025)

**TABLE A2**  
**TOP EXPORT COUNTRIES/DESTINATIONS OF INDIAN HONEY IN WORLD (2023-24)**

S.No.	Country	Quantity in Metric Tonnes
1	United States of America	89,494.70
2	United Arab Emirates	8,524.01
3	Saudi Arab	1,735.37
4	Qatar	1,030.19
5	Libya	1,125.26
6	Morocco	1,070.18
7	Bangladesh	682.15
8	Nepal	605.48
9	Canada	366.28
10	Portugal	554.4

(Source- Directorate General of Foreign Trade, Government of India, 2024)

**TABLE A3**  
**DISTRIBUTION OF BEE-KEEPING UNITS (DISTRICT WISE) AND HONEY PRODUCTION IN JAMMU DIVISION**

S. No.	District	Bee Colonies	Honey Production	No. of Bee-keepers	No. of Bee-keepers	Total
				(Apis mellifera)	(Apis indica)	
1	Ramban	41486	2451.95	477	1250	1727
2	Doda	11067	754.02	135	67	202
3	Kathua	4999	300.25	75	107	182
4	Udhampur	4764	228.35	94	0	94
5	Jammu	5000	317.3	80	0	80
6	Reasi	635	11.4	65	0	65
7	Kishtwar	6092	90.5	40	0	40
8	Rajouri	4477	111.49	38	0	38
9	Poonch	522	25.62	23	0	23
10	Samba	3618	134.47	20	0	20

(Source- SKUAST JAMMU, 2023)