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An analysis of the income and employment opportunities of honey production in Saharanpur District of Western Uttar Pradesh

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Abstract

Honey production has emerged as a promising agricultural enterprise with significant potential for income generation and employment creation in rural areas. The present study was conducted to analyze the income and employment opportunities associated with honey production in Saharanpur district of Western Uttar Pradesh. Primary data were collected from 180 honey producers, who were categorized into small, medium and large-scale beekeepers based on the number of bee boxes maintained. Descriptive statistical techniques were employed to assess income and employment generation, while a log-linear regression model was used to examine the influence of selected factors on income from honey production. The explanatory variables included season days, total labour utilization and employment generation.

The findings revealed that honey production serves as an important source of livelihood and economic empowerment for rural households. Income and employment opportunities increased substantially with the scale of beekeeping operations, with large-scale producers generating the highest returns and employment compared to medium and small-scale producers. The regression results indicated that season days, labour utilization and employment generation exerted a positive and statistically significant influence on income from honey production. The estimated model demonstrated a high degree of explanatory power ($R^2 = 0.91$), suggesting that the selected variables accounted for a major proportion of the variation in income. The study highlights the potential of beekeeping as a viable and sustainable enterprise capable of enhancing rural incomes, generating productive employment and promoting agricultural diversification and rural economic development in the study area.

Keywords: Income generation, employment generation, beekeeping enterprise, rural livelihoods and agricultural diversification

Introduction

Honey production is an important agro-based enterprise that contributes significantly to rural income generation, employment creation and sustainable agricultural development. Beekeeping (apiculture) requires relatively low investment and limited land resources, making it a suitable livelihood option for small and marginal farmers. In addition to producing honey and other bee products, beekeeping enhances crop productivity through pollination services, thereby supporting agricultural growth and biodiversity conservation. India ranks among the leading honey-producing countries in the world and the sector provides employment opportunities to a large number of rural households.

Saharanpur district of Western Uttar Pradesh is recognized as one of the major honey-producing regions of the state due to its favorable agro-climatic conditions and rich floral diversity. The district is popularly known as the “City of Honey” and supports extensive beekeeping activities through the availability of nectar-rich crops such as mustard, eucalyptus, sunflower, mango, guava, basil, fennel and ajwain. Honey production has emerged as an important source of supplementary income for rural families in the district and generates both direct and indirect employment opportunities in production, processing, packaging, transportation and marketing activities. The growing domestic and international demand for honey has further enhanced the economic significance of apiculture in the region.

Despite its considerable potential, honey production in Saharanpur faces several challenges,

including fluctuating market prices, limited access to modern technology, pest and disease infestations and inadequate marketing infrastructure. These constraints may affect the income and employment benefits derived from beekeeping enterprises. Therefore, a systematic analysis of the income and employment opportunities associated with honey production is essential for understanding its contribution to rural livelihoods and economic development.

Materials and Methods

The Saharanpur district of Western Uttar Pradesh was selected for the present study due to its significant contribution to honey production and the extensive scale of beekeeping activities practiced in the region. The district is popularly known as the "City of Honey" because of its rich floral diversity, favorable agro-climatic conditions, and strong agricultural base. Large-scale apiculture is supported by a variety of nectar-producing crops, including mustard, eucalyptus, sunflower, mango, and guava. Among the eleven development blocks of the district, six blocks-Gangoh, Nakur, Nagal, Sarsawa, Muzaffarabad, and Sadauli Qadeem-were purposively selected for the study owing to their higher concentration of beekeeping enterprises and greater potential for honey production.

A multistage sampling technique was employed for the selection of respondents. In the first stage, the Saharanpur district was selected purposively, followed by the purposive selection of the six development blocks. A comprehensive list of honey producers in the selected blocks was prepared using records obtained from the District Agriculture Office (DAO), the District Horticulture Office (DHO), and other official agricultural sources. The respondents were categorized into three groups based on the number of bee boxes maintained: small (1–100 boxes), medium (101–200 boxes), and large (above 200 boxes). Finally, 30 honey producers were selected from each block through a stratified random sampling technique, resulting in a total sample size of 180 respondents for the study.

Analytical Tools

The employment opportunities generated through honey production were assessed by calculating the total number of labour-days utilized in beekeeping activities. The total employment generated (in terms of human-days) was calculated as follows:

$$\text{Total Employment (man-days)} \\ = \text{Family labour (days)} + \text{Hired labour (days)}$$

Employment generation

Employment generation method provides a clear estimate of total work opportunities created, helping to understand the role of honey production in supporting employment and rural livelihoods.

$$\text{Employment Generation} = \text{Season (In days)} \times \text{Total labours}$$

Linear Regression Model

The linear regression model was used to analyse the impact of key factors on income from honey production. In this model, income (Y) was taken as the dependent variable, while season days (X_1), total labour (X_2) and employment generation (X_3) were considered as independent variables, all in logarithmic form. The estimated results showed that all variables positively influenced income, with season days having the highest impact, followed by labour and employment. As the model is linear

form, the coefficients represent elasticities, indicating that a percentage increase in these factors leads to a proportional increase in income.

The functional form of the log-linear regression model was specified as:

$$\log Y = a + b_1 \log X_1 + b_2 \log X_2 + b_3 \log X_3 + u$$

The estimated equation obtained from the analysis was

$$\log Y = -5.214 + 1.842 \log X_1 + 0.764 \log X_2 + 0.528 \log X_3$$

Results and Discussion

This chapter deals with the various aspects of Bee keeping along with discussion and interpretation of the result. Various aspects of Beekeeping were analyzed. The results obtained have been resented under the following heads:

- Income opportunities of honey production
- Employment opportunities of honey production
- Linear Regression Analysis of Income and Employment Opportunities

Income opportunities of honey production

Income opportunities of honey production are presented in Table 1.

Table 1: Income opportunities of honey production in the study area

Sl. No.	Category (In Box)	No. of Producer	Amount (In Lakhs)
1.	Small (1-100)	18	1.45
2.	Medium (101-200)	54	5.50
3.	Large (more than 201 to above)	108	15.19
	Overall	180	7.38

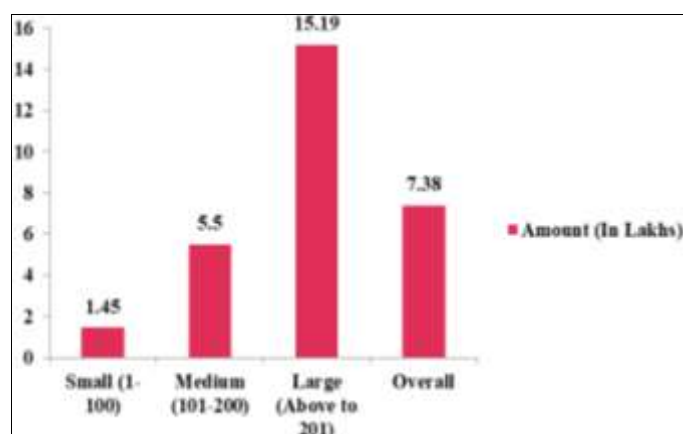


Fig 1: Income opportunities of honey production

Table No. 1 shows the income-generating opportunities from honey production among small, medium and large-scale producers in the study area. The average income from honey production was estimated at ₹7.38 lakhs per producer. Income varied from ₹1.45 lakhs among small producers to ₹15.19 lakhs among large producers, while medium producers earned ₹5.50 lakhs per producer. Large producers generated the highest income due to larger production capacity, a greater number of beehives and better commercialization of honey production activities. The findings indicate that income from honey production increased with the scale of the beekeeping enterprise, making honey production an important source of income generation in the study area.

Employment opportunities of honey production

Employment opportunities of honey production are presented in

Table 2.

Table 2: Employment opportunities of honey production in the study area

Sl. No.	Category (In Box)	No. of Producer	Employment generation in different categories				Employment generating (man-days per season)
			Season (In days)	Labour requirement			
				Family labour	Hired labour	Total labour	
1.	Small (1-100)	18	120 (30.38)	25 (6.25)	10 (2.57)	35 (4.44)	4200 (3.86)
2.	Medium (101-200)	54	135 (34.18)	116 (29.00)	84 (21.59)	200 (25.35)	27000 (24.83)
3.	Large (more than 201 to above)	108	140 (35.44)	259 (64.75)	295 (75.84)	554 (70.21)	77560 (71.31)
	Overall	180	131.67	133.33	129.67	263.00	34629.21

*Figure in Parenthesis indicate percentage

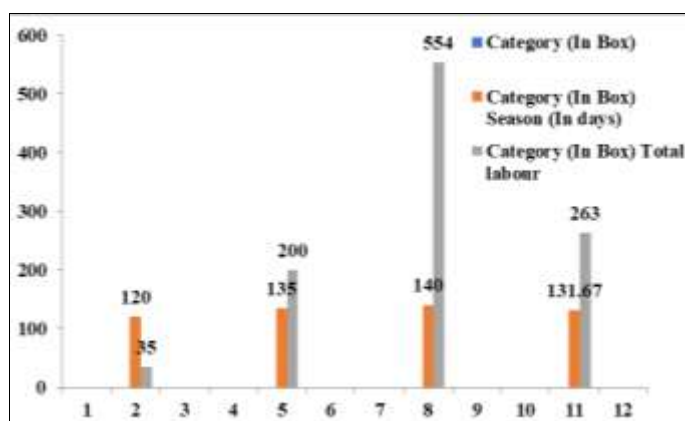


Fig 2.1: Employment opportunities of honey production

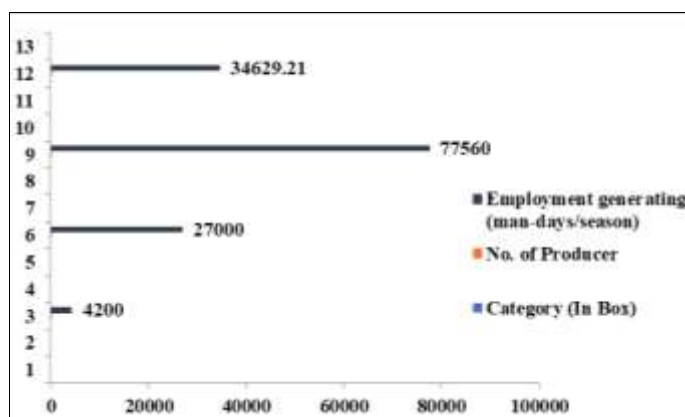


Fig 2.2: Employment generating (man-days per season) of honey production

Table No. 2 shows the employment opportunities generated through honey production among small, medium and large honey producers in the study area. The overall average employment generation was estimated at 34629.21 man-days per season. Employment generation ranged from 4200 man-days in the small category to 77560 man-days in the large category, while medium producers generated 27000 man-days per season. Large producers generated the highest employment opportunities with a total labour requirement of 554 labourers, including 259 family labourers and 295 hired labourers. Medium producers required 200 labourers, whereas small producers required only 35 labourers, mainly depending on family labour. The findings indicate that employment opportunities and dependence on hired labour increased with the expansion of beekeeping enterprises, making honey production an important source of rural employment generation in the study area.

Linear Regression Analysis of Income and Employment Opportunities

The table 3 presents the results of the linear regression analysis used to examine the Income and Employment Opportunities honey production.

Table 3: Linear Regression Analysis of Income and Employment Opportunities of Honey Production

Sr. No.	Variables	Coefficient	Std. Error	t-value	Significance
1.	Constant	-5.214	1.842	-2.83	**
2.	Season Days (X1)	1.842	0.624	2.95	**
3.	Total Labour (X2)	0.764	0.281	2.72	**
4.	Employment Generation (X3)	0.528	0.193	2.73	**

*** indicate the Significant at 1% level, ** indicate Significant at 5% level, indicate* Significant at 10% level and NS = non-significant

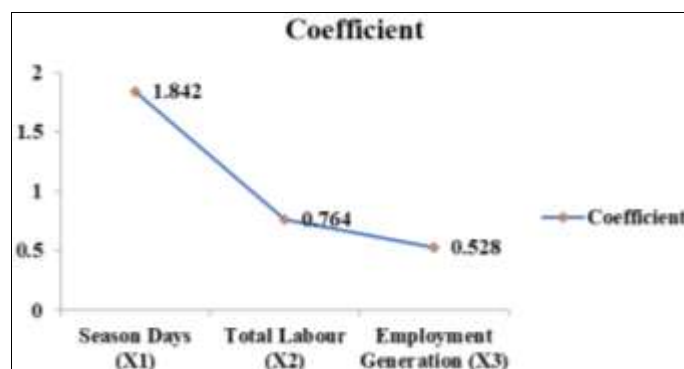


Fig 3: Linear Regression Analysis of Income and Employment Opportunities of Honey Production

S. No.	Particular	Value
1.	Particulars	Values
2.	R ²	0.91
3.	Adjusted R ²	0.87
4.	F-value	24.63
5.	Sample Categories	3
6.	Nature of Relationship	Positive

Table No. 3 presents the linear regression analysis of income and employment opportunities from honey production in the study area. The results revealed that season days, total labour and employment generated and a positive and significant influence on income generation among small, medium and large producers. The positive coefficients indicate that increased labour utilization and longer beekeeping activities enhanced both employment and income opportunities. The coefficient of

determination ($R^2 = 0.91$) showed that about 91 percent variation in income opportunities was explained by the variables included in the model. The significant F-value further confirmed the goodness of fit and reliability of the regression model.

Conclusion

The study revealed that honey production is a significant source of income in the Saharanpur district of Western Uttar Pradesh. The average income from honey production was estimated at ₹7.38 lakh per producer, with considerable variation observed among different categories of beekeepers. Large-scale producers earned the highest average income (₹15.19 lakh), followed by medium-scale (₹5.50 lakh) and small-scale producers (₹1.45 lakh). The results clearly indicate that income from honey production rises with the scale of beekeeping operations; this highlights the benefits of maintaining a larger number of bee colonies, optimizing resource utilization and achieving better commercialization. Thus, honey production has emerged as a financially lucrative activity capable of enhancing livelihood security for rural households.

The study also found that honey production plays a crucial role in generating employment in the region. Employment was generated throughout the season, with large-scale producers creating the highest number of job opportunities. Regression analysis confirmed that the number of operational days, total labor utilization and employment generation had a positive and statistically significant impact on income from honey production. A high coefficient of determination ($R^2 = 0.91$) indicated that these factors explained a substantial portion of the variation in income. Therefore, expanding beekeeping operations can play a pivotal role in boosting rural employment, increasing household incomes and promoting agricultural diversification and sustainability in the region.

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