

IMPACT OF BEE FARMING ON THE INCOME OF FARMERS

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ABSTRACT

It is a fact that Indian economy is purely agricultural and a large population depends on agricultural and allied sectors for their livelihood. Although the share of agriculture is declining, we can't ignore its importance due to the huge dependency of people on agriculture. The dependency on agriculture is continuously increasing due to high growth of population. Due to this the marginal productivity of the people is continuously decreasing and it is negative in many cases. There is a strong need for agricultural diversification. Various new occupations like apiculture, Goat farming, Poultry farming etc are emerging now a day's which yields huge returns and thus the socio economic status of the farmers can be enhanced. Present study tries to find out the impact of Beekeeping (apiculture) on the income of the farmers.

Keywords: Agriculture, Apiculture, Beekeeping, Income, Agricultural Diversification.

Introduction

It is a well known fact that Indian economy is an agricultural economy. Almost two third part of the population depends on agriculture and allied activities for their livelihood. Although the share of agricultural sector in National income is declining but we cannot ignore its importance for providing employment to such a huge part of the country. Beekeeping has a long history in India. Honey bees evolved millions of years ago and produced honey from nectar of flowering plants that abounded in rich forest extant all over the country. There are three basic stages in the historical development of human relationships. These are Bee Keeling, Bee having and Bee Keeping rearing of honey bees is known as Bee keeping or apiculture.

Beekeeping or apiculture was a very successful industry in India in 1960, The PAU, Ludhiana successfully introduced the European bee hive. In recent years beekeeping is a low input, high output industry. The output to input ratio in the small unit of 5 colonies is low which improves as the colony member increases. In units with higher member of colonies, both productivity and efficiently get increased. Beekeeping requires very little inputs. A bee box is the only essential requirement to start the industry. The output is comparatively quite high for the illiterate poor in remote areas of the country. This could be an ideal occupation that could be taken up by them besides their traditional agriculture and forest related main occupation.

Honey industry in India is at present in utter chaos. Production of honey has already been dwindling in the past few decades due to indiscriminate deforestation. The situation is now aggravated by appearance of bee diseases, increased costs of timber and other inputs for beekeeping, high cost as bee keeping with exotic bees, uncertain economic returns from this bee, problems of marketing, absence of clear cut policies and direction at national level of bee keeping development and honey industry. This new industry needs a low amount of inputs while yields a huge monetary returns. Many farmers are adopting these new occupations, Here, in the present study we have made an attempt to analyze the role of bee keeping in the socio-economic development of the farmers of Rajasthan.

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Review of Literature

Review of Literature is the first step for any research. It gives the direction to the researcher about what has been done on the research problem and what have to be done.

Following research studies has been studied in this research;

Dr. O.P. Chaudhary⁽¹⁾ has reported that the north western India, including the states of Haryana, Punjab, Western UP, Uttaranchal and lower Himachal Pradesh is the major honey producing area of India. Haryana- the near of this region, being the major contributor is rightly called the "honey Basket of India". Here 123 plant species were recorded serving as nectar and pollen sources to the honeybees which included 6 oilseeds, 9 pulses, 3 cereals, 11 fruit trees, 19 vegetables, 19 trees, 30 ornamentals, 24 meeds and 2 forage plants. Five major migratory routes have been established. South-Western Haryana and adjoining areas of Rajasthan provided rapeseed and mustard bloom from mid November to mid February. Second migration on eucalyptus in North-Eastern and central haryana provided bee Forage from February to April. Litchi (*Nephelium litchi*) served as a secondary route to many beekeepers from end March to April in Western Uttar Pradesh. Third major Flora was sunflower (*Helianthus annuus*) in North-Western Haryana and Southern district of Punjab from May to June. Khair (*Acacia catechu*) served as the Fourth major source in the Shivalik foothills of Haryana and Uttar Pradesh. The fifth major flora was Toria (*Brassica*) from October to November in North-Eastern Haryana. In addition 6 alternate and 2 additional minor migratory routes have also been identified. Migratory beekeeping provided Bee Forage for more than 8 months, good beekeepers extracting an average of up to 80Kg honey/colony. In recent years, drastic shrinkage in the acreage of sunflower and taria coupled with substitution of eucalyptus plantations with poplar and adverse climatic conditions have put a big question mark on the very survival of this once lucrative enterprise.

Mikhail Miklyaev⁽²⁾ has reported that Ethiopian honey production is characterized by the widespread use of traditional technology resulting in relatively low honey supply and poor quality of honey harvested when compared to the potential honey yields and quality gains associated with modern beehives. Modern beehives yield around 20 Kg of higher quality honey as compared to 6-8 kg. of yields from traditional beehives. This situation results in growing domestic prices of table honey and poor perspectives for reaching export markets. The objective of this study is to assess the financial and economic rationale of the USAID interventions addressed to improve the livelihood of poor honey producers through the provisions of Modern Beehives. This study identifies key risk factors facing producers, and estimates the projects stakeholders net economic benefits. A deterministic cost-benefit analysis was used to evaluate three intervention options: provision of 3 modern beehives/per beekeeper, provision of 3 modern beehives with tools/ and trainings on modern beekeeping/ per beekeeper.

NPCS Board of Consultants & Engineers et al⁽³⁾ have reported that beekeeping is the maintenance of honey bee colonies, commonly in hives, by humans. Bees are accommodated in artificial lives where they live comfortably within easy reach of the bee keeper for examination and extraction of surplus lovely, after keeping sufficient lovely in the combs for the bees. Honey is a part of bees, which gather sugar containing nectars from flowers. Honey should be processed as soon as possible after removal from the hive. Honey processing is a sickly operation, in which time and patience are required to achieve the best results. Careful protection against contamination by ants and flying insects is needed at all stages of processing. Bee honey is natural, unrefined food consumed as much in fresh or canned state. it is readily assimilated and is more acceptable to the stomach, particularly in the case of ailing persons, than cane sugar. It is an antiseptic and is applied to wounds and burns with beneficial results. Honey collection and its marketing in India are still not fully organized. The main uses of honey are in cooking, baking, as a spread on breads and as an addition to various beverages such as tea and as a sweetener in commercial beverages. Honey is the main ingredient in the alcoholic beverages mead, which is also known as honey wine or honey bear, honey is also used in medicines. A number of small scale industries depend upon bees and bee products. Honey and bees products find use in several industries for its consumption.

Naresh Pal et al⁽⁴⁾ have observed that the vast agriculture, horticulture and forest cover of India coupled with over dominance of its majority of rural population on agriculture and allied occupations make beekeeping one of the most important potential village industry. Because of the low level of mechanization involved, the beekeeping industry offers direct employment to lakhs of people especially hill dwellers, tribles. Sustainability of this industry is therefore vital to the country's economic well being and development. With the advancement of scientific knowledge, the pot hives, clay hives and the old method of bee rearing was replaced by moveable frame, standard bee hives and improved technology.

Lance Gegner et al⁽⁵⁾ has studied that this publication is intended as a guide for anyone interested in beginning or expanding a beekeeping enterprise. Whether the bees are kept as pollinators for crops or for the income from their products, producers need to be aware of their states' apiary laws concerning inspection, registration, and permits, as well as labeling and marketing standards. Producers also need to be aware of pesticide application laws and pesticide notification law relative to bees. Both beginning and experienced beekeepers need to consider liability insurance; the possibility of Africanized hybrid bees taking over the hives; and all the pests and diseases that afflict bees and their colonies. To maintain a healthy hive and guard against the new pests and diseases that have been introduced in recent years, beekeepers need to continually monitor new developments in apiculture. The Further Resources section of this publication lists many websites, USDA Research Facilities, periodicals, associations, and books with information on all aspects of beekeeping. It is important that beekeepers have their bees registered and inspected as required by law. The American Society of Beekeepers' free on-line class, Intermediate Beekeeping 201, suggests some excellent steps to follow when working with your state's apiary inspection programs. Lesson five states : All states have laws regarding apiary inspection. The regulatory body is usually the Department of Agriculture

S.J. Bhsal et al⁽⁶⁾ have reported that adoption of improved beekeeping practiced was compared between the mobilized (Pragati Nagar VDC) and non-mobilized (Market VDC) farmers groups (n=14 each VDC) of Nawalparasi district using semi structured questionnaire survey after introducing improved beekeeping practices during 2002/2003. Majority of the households (82.4%) from mobilized group practiced beekeeping enterprise of which 80.6% followed improved practices with adoption index of 77.44% while from non-mobilized group only with the adoption index of 58.73% Annual honey yield per colony was significant by higher among mobilized farmers group (25.68 earning NRs 25,657.14) than that of non-mobilized farmer group (15.6 kg earning N Rs. 10,364.29). Women involvement was low in enterprise development and adoption in both VDCs 31.8% and 50.0% in mobilized VDC; and 35.67% and 48.2% in non-mobilized VDC) therefore, transfer of improved technology to subsistence farmers emphasizing women through social mobilization could help generate income and alleviate poverty.

Objectives of the Study

The main objectives of this study are;

- To analyse the impact of beekeeping on the income of farmers.
- To find out the factors which affect the income in bee farming.

Hypothesis to be Tested

Following are the guided hypothesis of the study.

- The Apiculture does not lead to any significant impact on the income of the farmers.

Research Methodology

Following methodology has been adopted in the study:

Selection of the Study Area

Apiculture or beekeeping is an emerging industry in the country. It provides good employment opportunities to the farmers. Its main benefit is that a farmer can do this business along with agriculture. Agriculture provides the raw material i.e. nectar to bees which finally converts in honey. To study the beekeeping industry, we select the state Rajasthan for the study purposively. Rajasthan is basically an agricultural state where almost two-third part of the population depends on the primary sector for livelihood. There is a huge burden on agriculture sector where disguised unemployment appears. Many people are working in this sector but their marginal productivity is almost Zero. If we remove those people from agricultural works then the production of this sector does not decrease. Therefore there is an urgent need to divert these unemployed people to another sector to provide them employment. Apiculture provides employment to such people and it is beneficial for those people because here they can work and earn enough money with agriculture works. Thus apiculture diversifies or reduces the burden on agriculture. Thus apiculture plays an important role in providing employment to the people therefore it is very essential to trace out the progress of the beekeeping industry in the state. So Rajasthan is purposively selected for the study.

Rajasthan is mainly divided into seven divisions i.e Udaipur, Jaipur, Jodhpur, Bikaner, Bharatpur, Kota and Ajmer. We have select the Udaipur Division purposively for the study. There are 6 districts in Udaipur division named, Udaipur, Banswara, Rajsamand, Dungarpur, Chittorgarh and Pratapgarh. Almost two third Populations of these districts are tribal where agriculture is the main source of livelihood.

We have selected the Udaipur district purposively for the micro study of beekeeping. In Udaipur district beekeeping is gradually expanding and many peoples are engaged in this sector. Most of the population of the district is tribal therefore it is very important to analyze the role of beekeeping in the socio-economic development of the farmers of the Udaipur present study tries to do so.

Sample Design

Udaipur District is divided in 13 Tehsils. We have prepared a perfect list of farm families indulged in apiculture and beekeeping. Out of these farm facilities we have select a sample of 25 farm families who totally engaged in bee keeping industry on the basis of simple random sampling. Thus our sample consists of 25 respondents.

Collection of Data

Primary data relating to the study has been collected by the perfectly prepared schedule which is filled by the researcher. Data has been collected by the personal interview of the sampled respondents.

Use of Statistical Tools in the Study

Various statistical tools like average, percentage, growth rate, regression; correlation will be used to analyze the collected data. Hypothesis relating to the study will be tested by t- test.

Results and Discussion

Change the Income of Beekeepers

Here we have made an attempt to analyze the change in the income of beekeepers due to beekeeping. Following hypothesis has been adopted here ;

H₀ : There is no significant increase in the income of farmers due to bee keeping.

H_A : There is significant increase in the income of farmers due to bee keeping.

Here we taken the data of 25 beekeeper and calculated the income pre and post beekeeping. The test of statistical significance is done in following table;

Table 1: Increase in the Income of Beekeepers

Farmers	Income (In lakh)		D	S	t-value	p. Value
1	2	7	5	6.94	16.16	0.021
2	3	8	5			
3	2	6	4			
4	2	6	4			
5	1	4	3			
6	1	5	4			
7	2	7	5			
8	2	7	5			
9	2	7	5			
10	3	7	4			
11	4	8	4			
12	5	9	4			
13	4	8	4			
14	3	7	4			
15	2	7	5			
16	2	7	5			
17	2	7	5			
18	3	8	5			
19	4	8	4			
20	3	9	6			
21	4	8	4			
22	2	8	6			
23	3	7	4			
24	3	7	4			
25	3	7	4			

Here the calculated value of 't' is 16.16 while at 24 degree of freedom the table value of 't' is 2.064 at 5 percent level of significance. Since the calculated value of 't' is greater than the table value therefore our null hypothesis is rejected and it can be concluded that there is significant increase in the income of farmers due to beekeeping.

Factors of Income of Beekeepers

Many factors are determining the size income of beekeepers is many. Besides the potentials of prevailing sources of income. There are a number of other factors determining the income of the beekeepers. In any rational economic system, income is channelized into two routes, one is for the non productive purpose including consumption and other is for productive purposes through investments to make more income out of the existing sources or by creating new sources of income. In a bid to see the factors of household income the technique of multiple linear regressions has been used. The model equation is as follows:

$$Y_i = B_0 + B_1 X_1 + B_2 X_2 + B_3 X_3 + B_4 X_4 + B_5 X_5 + u$$

Where y = Beekeepers net income through all sources.

X₁ = Farm size in hectares.

X₂ = Family size (number)

X₃ = No. of bee farms

X₄ = Frequency of cropping on land

X₅ = No. of herd size

U_i – Error term

Following specification has been established here:

Y_i = It is a dependent variable which affect from all other explanatory variables.

X₁ = It is the farm in hectares. Higher the number of hectares of land, higher will be the agricultural production and income of the farmer will be increased.

X₂ = It is the family size in number. There is a negative relationship between the size of family and income of the beekeepers for consumption expenditure.

X₃ = Positive relationship has been established between the income of the consumer and number of crops on land. Higher the frequency higher will be the income of beekeepers.

X₅ = Positive relationship has been established between the number of herd/ cattle's and the income of beekeepers.

Following table shows the results of the model:

Table 2: Results of the Model

Variable	B	t-value	R ²	Adj.R ²	F. Value	P. Value
X ₁	.728	2.69*	.936	.921	9.28	.0021
X ₂	.562	3.21*				
X ₂	.689	4.28*				
X ₂	.412	4.16*				
X ₂	.581	2.98*				

Our model is found to be best fitted as the value of coefficient determination (R²) and adjusted coefficient of determination (R²) is quite high (.93 and .92). It means that 93 percent variation in the income of beekeepers can be explained by the explanatory variables.

Our null hypothesis that B=0 is rejected as the P. value is less than the level of significance is .05 and .01 It can be concluded that explanatory variables are significantly affecting the income of the beekeepers.

Policy Measures

- Project needs to be gender balanced because without the involvement of male it can't be successful;
- Technical assistance should be provided to 1 male member of the household for a sustainable development of beekeeping activities;

- Females should be targeted for other skilful trainings like handicrafts, baskets making, stitching and dying of cloths attires,
- That bee farmer in the study area should be given adequate training on rudiments of traditional bee farming using community based/ informal education. This will ensure proper understanding of modern equipments and adopt technology capable of increasing not only the profitability of the bee enterprise but also make efficient use of bee farming resources.
- Establishment of bee farmer's co-operative association for annexing financial aids, marketing information and inputs from government and non-government organizations through poverty alleviation Agencies.
- Creating a market channel that will take care of commensurate price for product of new beekeeping enterprise.

References

1. Dr. O.P. Choudhary, CCS Magazine Agricultural University, 2000, p. 8
2. Mikhail Mkilyaey, Glenn P. Jenkins, Richards R. Barichello Chambridge Resources Internation. Inc. Jel : D 13, D31, D 61, D 62, 2000.
3. NPCS Board of Consultants and Engineers, NPCS, 2000, p. 10
4. Naresh Pal, Daisy Thomas, International Apicultural congress, 2001, p. 620.
5. Lance Gegner, NCAT Agriculture specialist, April 2003, p. 46
6. S.J. Bhusal, R.B. Thapa, Journal Institute of Ag. and Animal Sciences, 2005, 26, p. 117.
7. K.H. Devkota, Journal Institute of Agriculture and Animal Sciences, 2006, p. 119.
8. Ramesh Lal, International Journal, Beekeeping, 2008, vol. 3, p. 68.
9. SavitriVerma, PKAttri Indian Journal of Traditional Knowledge Vol. 7, April 2008, 221.
10. SurojPokhrel, The Journal of Agricultural and Environment, 2009, 10, p. 39
11. K. Robison, An International Journal of Biological Research, 2009, p. 62
12. Attri, P.K.S. verma and Meenakshi T. Asian Journal Exp. Biol., SCI Vol.-1, 2010, p. 96
13. O.A. Lawal and A.D. Banjo, World Journal of Zoology, 2010, p. 137
14. Sanal Gupta, KishanSachdeva, RamashankarKushwaha, DU Journal of Undergraduate Research and Innovation, 2010, p. 365
15. Balraj Singh and Deepak Saxena, Indian Journal of Marketing, December 2010, p. 105.

