

**ORIGINAL ARTICLE**

Mountain Hills Beekeeping and Its Economic Efficiency of District Chamba (Himachal Pradesh)

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ABSTRACT

Traditional beekeeping with Apis cerana is shown to be more economical than with exotic bee, Apis mellifera. Ten Apis cerana colonies required capital investment of Rs. 119.70, whereas for keeping with 46.25 Apis mellifera colonies it was Rs. 31152.05 (i.e. Rs. 6735.50 for 10 colonies). Beekeeping with Apis cerana required less investment than with Apis mellifera. Beekeeping with A. cerana is more suitable for subsistence for marginal area, whereas beekeeping with A. mellifera is more suited for commercial beekeeping for high potential beekeeping areas with abundant bee flora and monocultures for migratory beekeeping. Although ratio of profit /income to production cost is much higher with A. cerana beekeeping but total/absolute annual profit /income with A. mellifera are comparatively much higher. The magnitude of beekeeping with Apis cerana may decrease but beekeeping with Apis mellifera can never take its place in Chamba district of H.P. especially for maintaining the traditional heritage of the tribal hilly area.

KEY WORDS: *Apis cerana, A. mellifera*

INTRODUCTION

Beekeeping which is a forest and horti-agriculture based industry can play an important role in the development of hilly areas, as it increases economy without changing environmental balance. As a cottage industry it is an important income generating activity for the rural people of hills [1-2]. Success of beekeeping depends upon some basic factors such as suitable climatic conditions, bee forage, bee management and bee breeding. The combinations of these factors lead to better honey and beeswax production [3]. Beside better strains of bees and their appropriate management, production of honey also depends upon the bee floral resources available with in the flight range of bees. Various climatic and ecological factors also affect the production and availability of nectar to the honeybees. Thus, abundance and richness of nectar and pollen resources around an apiary is quite important for the success of beekeeping in an area [4-5]. Pollen is practically the sole source of proteins, lipids, minerals and vitamins that are needed by the honey bees for the production of larval food and for the development of newly emerged bees. Whereas the nectar a source of energy is rewarded to the bees in return for their indispensable services in cross pollination [6]. Very little efforts have, however, been made so far to quantify the income and employment contributions of beekeeping in North India, where this enterprise is becoming popular in rural area. Besides illustrating income and employment benefits of beekeeping, it is also necessary to quantify contribution of important inputs, such as number of hives, colony strength (number of frames / per hive) and labour days employed in increasing the honey production per year.

MATERIALS AND METHODS

The studies were made during 2001-2004, in order to know the current status of several traditional beekeeping technologies in district Chamba. These studies were mainly based on household survey of beekeepers for which a representative sample of farmers with different socioeconomic background was selected from different villages of district Chamba (Himachal Pradesh). A total of 201 households were interviewed in seven blocks of district Chamba. Minimum five villages surveyed in each Block and each village surveyed with minimum five household. The average size of landholdings was 1.62 ha although a large number of holdings were less than 1 ha. The main agricultural crops are wheat, maize and rice. At higher elevation, crops such as buckwheat, barley and potatoes were grown in place of rice.

Site selection / Sample collection

For the selection of sample of traditional beekeeping practices in different parts the district Chamba. The criteria for the selection of appropriate study sites were remote areas of district, where farmers were experiencing productivity problems. Farmers were trying to improve productivity by various ways and means. These were a partner institution willing and interested to carry out the survey and assistances in this area. Keeping these criteria in mind and through meeting with farmers and local leaders, government officials and agricultural extension workers we selected the district Chamba to conduct case studies on traditional beekeeping techniques and related problems. For production function and comparison, some private aeries and horticulture center were chosen.

Field survey and statistical analysis

The data prepared for the present study is primary as well as secondary in nature. Primary data was collected with the help of a questionnaire prepared for this purpose, and final questionnaire was prepared related to socioeconomic condition of the beekeepers. Primary data was collected after discussing the questionnaire with various beekeepers in different parts of the district based on their personal interviews. Data so collected was statistically analyzed and inferences were drawn. Informations were taken on following aspects: socioeconomic profile, education status, occupations, and technologies contents: colony age, occupancy rate, honey production, constraints.

The questionnaire was pre-tested on (10% of sample size) respondents in Tissa area. As a result of the pre-testing necessary revision of the questionnaire was done.

The secondary data (honey production) was collected from different agencies like Directorate of Horticulture, Directorate of Agro-industry, Khadi and village industries commission (KVIC) and Central Bee Research and Training Institute (CBRTI). Elaborate interactions were made with the district and state level officials of beekeeping department of government of H.P.

RESULTS AND DISCUSSION

Economic efficiency of modern beekeeping with *A. mellifera* in district Chamba was carried out using data from 20 apiaries in the season 2001-2004. One beekeeper manages could on an average 46.25 (hives) colonies per apiary. Research on traditional beekeeping with *A. cerana* was carried out on 201 households in the same season. One household on an average managed 2.46 colonies with a maximum 10 colonies per household (Table 1.).

To find out the economic efficiency of these two systems, production costs, gross production value, production cost per unit are the major indicator. In Modern Beekeeping equipment cost contains beehives, honey extractor, bee Veil etc. but in case of Traditional Beekeeping no such type of equipment are used. They used only local and household manmade things, such as cavity in wall, log hive (from tree trunk) discarded packing boxes (used) in place of beehives. Sugar feeding is a necessity of Modern system in winter and monsoon season but in case of beekeeping with *Apis cerana* feeding is not required because they can survive easily as they are native of this area and is spend thrifty. No transportation (seasonal migration) is required in Traditional system because they have fixed frame / combs with in hive or boxes. Beekeepers of Chamba district

migrate their Modern Beekeeping colonies for seasonal migration in winter and monsoon to Punjab, Haryana and Rajasthan which requires lots of investment. Further, 1.5 days/ hive per year labour is required for managing 10 hives in Traditional system of beekeeping. Whereas one person is engaged for 5 month and 15 days for managing a modern apiary (46.25 hives) with *A. mellifera*. Total days of laborer per hive for Modern Beekeeping required on an average are 3.56 days per hive / year @ 70 Rs per day. Total capital interest is @ 14 % interest on production cost of both systems.

Table 1. Economic efficiency of Modern beekeeping with *A. mellifera* Linn. and Traditional beekeeping with *A. cerana* F. in district Chamba (H.P.) during 2001-2004

S. No.	Indicators	Beekeeping System with	
		Modern beekeeping(46.25 <i>A. mellifera</i> colonies)	Traditional beekeeping(10 <i>A. cerana</i> colonies)
1.	Production Cost		
	Equipment	3839.5	-
	Bee feeds	2300	-
	Transportation	12925	-
	Labour	11550	105.0
	Capital interest@14%	537.53	14.70
	Total	31152.03	119.70
2.	Gross Production values		
	Honey	70554.375	5839.27
	Beeswax	537.53	90
	Total	71,359.12	5,929.27
3.	Profit (a)	40,207.09 (Rs.869.4/colony)	5,809.57(Rs.580.9/colony)
4.	Income (b)	51,757.09	5,823.97
5.	Production cost per unit(c)		
	Per Kg of honey	36.99	1.71
	Per hive	673.55	11.97
6.	Ratio of Total Production value to Total Production cost	2.29	48.78
7.	Ratio of Profit to Total Production cost	1.29	48.53
8.	Ratio of Income toTotal Production cost	1.66	48.65
9.	Annual honey yield	18 kg/ hive	6.89 kg/ hive
a.	Profit = Total production value – total production cost		
b.	Income = Profit + labour cost		
c.	Production cost per unit was calculated according to the formula:		
	Total production cost		
	Production cost per kg honey =X+Y		
	Where X = total amount of honey harvested		
	Y = Value of other products equivalent to Y kg of honey using the exchange ratio at the time of surge		

Traditional beekeeping with *Apis cerana* was shown to be more economical then beekeeping with *Apis mellifera*. We calculated that 10 *Apis cerana* colonies (total capital investment just Rs.119.70) would show higher ratio of economic benefit over keeping 46.25 colonies of *Apis mellifera* colonies (total capital investment Rs. 31152.05, i.e. Rs. 6735.5 for 10 colonies). Therefore, beekeeping with 10 *Apis cerana* colonies seems to be economically better then

beekeeping with 46.25(hives) *Apis mellifera* colonies. *Apis cerana* beekeepers can begin with only a few colonies. Even under low input condition they can be developed to 10 -50 colonies. With *Apis mellifera* it is not feasible to have a low input and small number of colonies because there will not be sufficient income to cover overheads like apiary /colony migrations. Bees suitable for commercial /migratory mode, beekeeping with *A. mellifera* gave higher annual profit of Rs. 869.40/colony as against Rs. 580.90/colony with *A. cerana*. Beekeeping with *Apis cerana* is however, less prone to risks than with *Apis mellifera*. Under adverse climatic condition, poor forage etc. *Apis cerana* beekeepers had minimal loss as compared to *Apis mellifera* beekeepers. *A. cerana* has been well adapted to the native flora and can take advantage of early honey flows. *Apis cerana* seems to have more diversity in the local region (than *Apis mellifera*) which allows for diverse proliferation through breeding. This helps in creating a buffer for future disease and pest problems.

The number of colonies which can be managed by one labourer is higher in *Apis mellifera* than *Apis cerana* beekeeping. For *Apis cerana* a worker spent just 1.5 day per colonies, whereas 165 days per Apiary (46.25 colonies) in one season were spent in *Apis mellifera* colony. Because traditional beekeeping with *Apis cerana* system, due to fixed nature of combs there is no need to give extra attention to hives. This system has been passing on from generation to generation since long time. So, every person of the family knows how to care for it. Especially in study area of Chamba, the Land of God Shiva, people worship to the native bees as 'Gunn' (Soldiers) of God Shiva. These people are strict follower of their grandparents. So, they, give full respect and worship to Native (*Apis cerana*) bees.

By comparison the production cost per kg of honey in both systems, comes under Rs.36.99 in Modern system, whereas just Rs.1.71 in case of Traditional system. Production cost per hive in modern system was Rs.673.55 and in traditional system 11.97 Rs. When we see the ratio of profit, income and production value against production cost they are highly significant (30 % more beneficial in Traditional over modern system in all studied parameter). However, if the total /absolute annual income/ profit is considered there is no match of beekeeping with *A. mellifera* by *A. cerana* beekeeping. *Apis cerana* colonies would survive any where in district Chamba because they are native to the area. *Apis mellifera* colonies were needed to be kept in suitable forage area (needed migration) and required considerable management and investment. *Apis mellifera* beekeeping is usually a full time profession, whereas for *Apis cerana* beekeeping the activities can remain optional. One beekeeper working full time can become rich with *Apis mellifera*, while another working with *A. cerana* can obtain a useful sideline income. Magnitude Beekeeping with *Apis cerana* may decrease but *Apis mellifera* beekeeping can never take its place in this hill region. To conserve regional heritage of the hilly tribals, this is a serious ecological and environmental danger. Beekeeping with *Apis cerana* should be encouraged in marginal areas for rural households with low investment capacity. *Apis mellifera* on the other hand should be introduced for commercial beekeeping to high potential beekeeping zones or for individuals who can invest larger sums on its distance migration.

Compared to Modern Beekeeping these Traditional systems of Beekeeping have the following advantages in the context of the life and customs of the rural and tribal populations of Chamba region.

- 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 suitable temperature.
- The designs of the hives are very simple here only other consideration is the volume of the bee cluster to be accommodated.
- There is no input in the form of sugar feeding, comb foundations and chemicals etc.
- Management of colonies is minimal and consisted of arrangements of attraction of swarms and harvesting of honey.

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

Integration of the traditional method with the modern concept of movable frames would add to the ease of management operations in the field making the modernized wall hive an eco-friendly, readily acceptable, economically viable and environmentally sustainable technique for the future. The agro-climatic condition of district Chamba is good for the growth of Traditional beekeeping with *A. cerana*, which is its live heritage. Traditional hives, in shape and their location are solid and significantly safe element of environment for this indigenous bee fauna. For centuries, they have been taking care of *Apis cerana* bees in the way, which came down from their forefathers. It would be unwise to neglect indigenous technology knowledge (ITK) in the process of modernization and wise protection of Chamba's heritage is an absolute necessity for conservation of *A. cerana* beekeeping. In the process of improving tourism in Chamba valley, the traditional image of villages should not be changed. Wall hives, are besides all economic relation, the important decorative motif of almost every house. For anyone in this hill region, it is hard to imagine settlement without such elements.

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