

**AN ECONOMIC ANALYSIS OF BEEKEEPING
IN KANGRA DISTRICT OF
HIMACHAL PRADESH**

THESIS

BY

LALIT SHARMA

Submitted to



**HIMACHAL PRADESH KRISHI VISHVAVIDYALAYA
PALAMPUR -176 062 (H.P.) INDIA**

IN

**Partial Fulfillment of the requirements for the
degree of**

**MASTER OF SCIENCE IN AGRICULTURE
(Agricultural Economics)**

September, 1996

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ACKNOWLEDGEMENT

At the very outset I deem it my pride privilege in expressing my gratitude to Dr. S.K.Chauhan, Assistant Professor and Chairman of my Advisory Committee, who gave me superb guidance and enthusiastic spirit during the entire course of my study. His in-depth knowledge of subject and humanitarian character were always a moving force behind my all achievements.

I extend my heartfelt gratitude to Dr. Kamlesh Singh (Statistician), the member of my advisory committee, for their valuable help. I owe a deep sense of gratitude to the members of my advisory Committee Dr. R.K. Sharma, Professor and Dr.A.S.Saini, Professor, Department of Agricultural Economics, for their valuable comments and thoughtful suggestions that have added more flavour to this manuscript.

It is my privilege to extend due thanks to Dr. Parkash Mehta, Head, Department of Agricultural Economics for his valuable guidance during the entire course of my study.

I am highly thankful to the University authorities for providing me a financial assistance throughout the period of my study for the M.Sc.(Agri.) degree.

I shall be failing in my duty if I do not express my heartfelt thanks to grand parents namely Vaid Sh. Jagdamba Prasad Sharma jee, Smt. Shakuntla Sharma jee and Smt. Kamla Sharma jee for their constant encouragement and affection throughout my studies.

Besides, I would like to put on record my deep sense of gratitude to my respected parents and younger brother and sister for their lively sentiments, eternal affection and unflinching encouragement to accomplish the task with earnest efforts.

I owe the responsibility for all errors and omissions for this manuscript.

Lastly, I am thankful to Mr.Ramesh Bhadwal and Mrs.Suman Kaushik for nice computerisation of the manuscript with great care and patience.

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CERTIFICATE I

This is to certify that the thesis entitled, "AN ECONOMIC ANALYSIS OF BEEKEEPING IN KANGRA DISTRICT OF HIMACHAL PRADESH" submitted in partial fulfilment of the requirements for the award of the degree of Master of Science in Agriculture in the subject of Agricultural Economics of Himachal Pradesh Krishi Vishvavidyalaya, Palampur, is a record of bonafide research work carried out by Mr. Lalit Sharma son of Shri Hari Rattan Sharma under my supervision and that no part of this thesis has been submitted for any other degree.

The assistance and help received during the course of this investigation have been fully acknowledged.

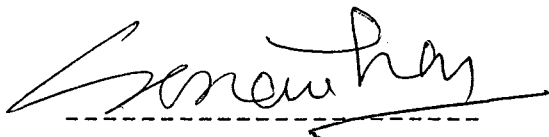


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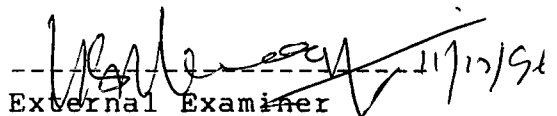
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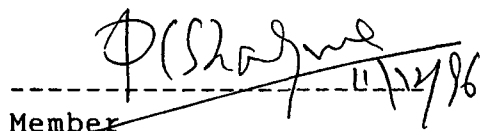
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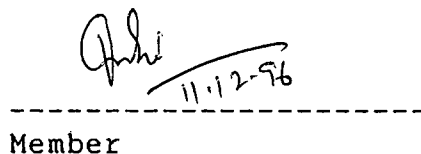
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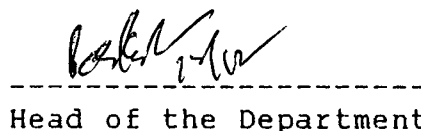
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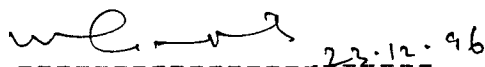
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INTRODUCTION

CHAPTER-I

INTRODUCTION

1.1 Beekeeping in the World

Beekeeping has been practised in many countries of the world since times immemorial. Honey bee originally belongs to the old world, that is, Europe, Africa and Asia and subsequently these spread to new world after 1638 in America, 1822 in Australia and 1842 in Newzealand. The real boost to scientific beekeeping took place with the discovery of moveable frame hive by L.L. Langstroth in 1851. During the next half century, that is, between 1850 to 1900, beekeeping exploded in the new world.

Today most of the countries practise beekeeping with the European honeybee (*Apis mellifera*) which surpasses the Asian honeybee (*Apis cerana*) in almost all the departments, including adjustments in all kinds of climatic conditions.

According to FAO statistics, Asia continued to be the world's major honey producer over a period of fifteen years (1980-94). Its share of 31.82 percent during 1980 in the world honey production declined marginally to 29.41 per cent

in 1994 (Appendix I). South America recorded the highest (4.21 per cent per annum) growth rate in honey production, however, the World honey production increased at the rate of 2.18 per cent per annum (Appendix II).

China was the largest producer (Appendix III) and exporter (Appendix IV) of honey in the world whereas Germany was the World's greatest honey importing country (Appendix V). However, among the continents, Europe was the major importer and Asia was the largest exporter of honey in the world during nineties (Appendix VI). The per capita honey consumption in Germany was about one kg per person per year as compared to only two to three gms in India.

As far as honey productivity is concerned, Australia is at the top in the world with an average yield of 41.09 kg per annum per colony (Appendix VII). The average yield of honey in China is 27.30 kg per colony per year whereas in India it is only 8.7kg per colony per year.

It is a matter of concern that India stood nowhere in the global bee trade map neither in the honey production and productivity nor among the major exporters inspite of the fact that it has a variety of bee fauna and a rich floral wealth.

1.2 Beekeeping in India - Past and Present

Beekeeping has been a centuries old practice in India. The mentions of beekeeping are found in the Indian epics like Vedas and Ramayana. The innovation of moveable frame hive in the west in 1850's ushered an era of revolution in the field of research in beekeeping. Some attempts were also made in India by the end of nineteenth century to keep bees in moveable frame hives but much emphasis was not given till the recommendation of Royal Commission on Agriculture (RCA) in 1928. During 1930's and 1940's some beekeeping stations were established in different parts of the country and research was initiated at places like Coimbatore, Pusa, Loyalpur and Nagrota Bagwan (H.P.).

After independence, Village Industries Board at state levels to promote cottage industries including beekeeping, were established. For co-ordination between the state boards, the Central Government established All India Khadi and Village Industries Board (KVIB) in 1953 which later became autonomous Khadi and Village Industries Commission (KVIC) in 1956. Earlier, a Bee Research Centre (BRC) was started at Mahabaleshwar in 1952 which was upgraded as Apicultural Research Laboratory in 1954. The work done by this laboratory provided a good base for KVIC to establish a

Central Bee Research and Training Institute (CBRTI) at Pune in 1962.

After eighties, CBRTI as well as State Agricultural Universities (SAUs) functioning under Indian Council of Agricultural Research (ICAR) have provided set up for honey bee research. The KVIC is responsible for taking beekeeping industry to the present height from a mere 0.80 thousand bee colonies in 1953-54 to 1,344.12 thousand colonies in 1991-92 and the honey production consequently increasing from 1.28 metric tonnes to 8,202.27 metric tonnes, respectively (Table 1.1).

Beekeeping in India is practised in about four lakh villages and provides part time employment to 2.26 lakh persons. Tamil Nadu was the leading state in India as far as number of bee colonies, beekeepers and honey production is concerned (Table 1.2). It is estimated that keeping in view the flora and fauna of our country there exist a potential of producing 6 lakh metric tonnes of honey (Dogra and Gupta, 1993).

The use of honey is of course well known. Bees wax has over 200 industrial uses. With all this potential, beekeeping as an agro-industry has still not been fully developed in our country perhaps due to lack of publicity

Table 1.1 Growth of beekeeping in India under KVIC

Year	Bee colonies (000' number)	Honey production (metric tonnes)	Average honey production (kg/colony)	Employment (FT + PT) in lakhs
1953-54	0.80	1.28	1.60	0.002
1955-56	15.57	21.00	1.35	0.05
1960-61	122.61	390.00	3.19	0.42
1963-64	164.60	713.00	4.33	0.57
1965-66	237.54	1,140.16	4.80	0.74
1972-73	523.56	2,883.99	5.51	N.A
1973-74	522.71	2,435.00	4.66	1.50
1977-78	635.98	3,497.07	5.50	N.A
1978-79	633.64	4,520.00	7.13	1.61
1980-81	717.58	5,030.62	7.01	N.A
1982-83	807.06	5,723.53	7.09	N.A
1984-85	868.00	5,507.36	6.34	2.02
1985-86	929.70	6,182.15	6.65	N.A
1990-91	1,061.84	9,290.00	8.75	2.47
1991-92	1,344.12	8,202.27	6.10	2.26

Source: Annual Reports of KVIC

Note: FT means full time, PT means part time and
N.A means not available.

Table 1.2 Statewise bee colonies, honey production and productivity in India (1991-92)

S. State No.	Bee colonies (ooo' number)	Bee keepers (Lakh number)	Production (000' kg)		Productivity (kg/colony)	
			Honey	Wax	Honey	Wax
1. Andhra Pradesh	22.01 (1.64)	0.06 (2.65)	98.10 (1.20)	0.88 (3.57)	4.46	0.04
2. Assam	57.07 (4.25)	0.28 (12.39)	388.41 (4.74)	0.78 (3.17)	6.81	0.01
3. Bihar	29.68 (2.21)	0.19 (8.41)	207.41 (2.53)	0.75 (3.04)	6.99	0.03
4. Himachal Pradesh	10.74 (0.80)	0.03 (1.33)	64.41 (0.79)	0.35 (1.42)	6.00	0.03
5. Karnataka	136.53 (10.16)	0.30 (13.27)	582.13 (7.10)	4.08 (16.56)	4.26	0.03
6. Kerala	242.54 (18.04)	0.15 (6.64)	1,963.82 (23.94)	11.84 (48.05)	8.10	0.05
7. Punjab	303.20 (22.56)	*	1,107.69 (13.50)	N.A	3.65	N.A
8. Tamil Nadu	303.37 (22.57)	0.53 (23.45)	2,379.55 (29.00)	4.45 (18.06)	7.84	0.01
9. Uttar Pradesh	26.02 (1.94)	0.07 (3.10)	105.85 (1.29)	N.A	4.07	N.A
10. West Bengal	63.09 (4.68)	0.17 (7.52)	488.53 (5.96)	0.05 (0.20)	7.74	N.A
11. Other States & U.T.'s	149.87 (11.15)	0.48 (21.24)	816.37 (9.95)	1.46 (5.93)	5.45	N.A
INDIA	1,344.12 (100)	2.26 (100)	8,202.27 (100)	24.64 (100)	6.10	0.02

Source: KVIC Annual Report 1991-92

Note: Figures in parentheses are percentages of total

* Means below 500

N.A. = Not Available

about the commercial and scientific uses of apicultural products. In addition, ignorance of export potential of apicultural products act as another constraint in the development of this agro industry.

In India three indigenous species namely *Apis florea* (the little bee), *Apis dorsata* (the wild bigger bee) and *Apis cerana indica* (the medium bee) are commonly found. *Apis mellifera*, a new one, was introduced and established in India in the sixties (1962-66) and has proved very useful for commercial beekeeping in north western states of the country. Beekeepers of *Apis mellifera* are harvesting four to five times more honey as compared to Indian honeybee (Anonymous, 1995).

Beekeeping not only generates honey and bees wax but also other by-products such as honey bee colonies, royal jelly, bee venom and bee pollens that generate handsome income. Bee products have many uses in food, medicine, pharmaceutical and cosmetic industry. Though, some research has been carried out on Indian honey and beeswax but bee venom, royal jelly, pollen and propolis are still at experimental stage. In addition to all this, honey bees have been very beneficial in enhancing the production of fruits, vegetables, oilseeds etc. through cross pollination.

1.3 Status of Beekeeping in Himachal Pradesh

Himachal Pradesh has diversity of bee flora and varied agro-climatic conditions and so this Himalayan state has enormous potentialities for profitable beekeeping. Modern bee keeping in the state was started during 1934 in Kullu and 1936 in Kangra valley. Himachal Pradesh took lead in introducing *Apis mellifera* for the first time in India during 1962-63. Migratory system of beekeeping was practised as early as 1952. Beekeepers in this state are still continuing with this practice and getting increased yield per bee colony per annum.

As a result, Himachal Pradesh has witnessed an increase in the honey production from 2.705MT in 1981-82 to 363.085MT in 1994-95 (Table 1.3). Honey production recorded a growth rate of 19.45 per cent per annum over this period (Table 1.4). Himachal Pradesh has the potential to accommodate 2 lakh bee colonies. Keeping in view the vast potential, the Horticulture Department of H.P. Government has divided Himachal Pradesh into two zones - East zone and West zone with headquarters at Shimla and Kangra, respectively. The east zone comprises eight districts of Shimla, Solan, Sirmour, Kinnaur, Bilaspur, Mandi, Kullu and Lahaul-Spiti whereas the west zone comprises four districts of Kangra,

Table 1.3 Trends of honey production in Himachal Pradesh
(MT)

Year	Government farms	Private farms	Total Produc- tion	Value in lakh Rs
1981-82	1.105 (40.85)	1.600 (59.15)	2.705 (100.00)	0.41
1982-83	1.917 (22.10)	6.758 (77.90)	8.675 (100.00)	2.17
1983-84	3.963 (26.49)	11.000 (73.51)	14.963 (100.00)	3.74
1984-85	2.854 (7.89)	33.300 (92.11)	36.154 (100.00)	9.04
1985-86	3.221 (7.16)	41.775 (92.84)	44.996 (100.00)	11.25
1986-87	7.982 (14.65)	46.515 (85.35)	55.497 (100.00)	13.62
1987-88	7.259 (20.77)	27.690 (79.23)	34.949 (100.00)	10.48
1988-89	13.122 (17.28)	62.827 (82.72)	75.949 (100.00)	22.78
1989-90	9.954 (7.42)	124.212 (92.58)	134.166 (100.00)	40.25
1990-91	11.907 (10.46)	101.936 (89.54)	113.843 (100.00)	34.15
1991-92	14.889 (9.82)	136.692 (90.18)	151.581 (100.00)	45.47
1992-93	14.401 (9.80)	132.560 (90.20)	146.961 (100.00)	50.58
1993-94	16.081 (5.66)	267.806 (94.34)	283.887 (100.00)	113.55
1994-95	8.494 (2.34)	354.91 (97.66)	363.085 (100.00)	145.23

Source: Directorate of Horticulture, Nauvihar, Shimla (HP)
Note: Figures in the parentheses are percentages of the
total

Table 4 Growth rate of honey production in Himachal Pradesh (1982-95)

Source of honey	Linear function			Exponential function			Best relation-ship	Growth rate (% p.a)
	a	b	r ²	Log a	Log b	r ²		
Private farms	-65.5720	22.7087*	0.7929	0.7395	0.1343*	0.8971	Exponential	36.26
		(3.3501)			(0.0131)			
Government farms	-65.9410	21.6422*	0.7644	0.5937	0.1443*	0.8765	Exponential	39.42
		(7.7240)			(0.0156)			
Total honey production	0.3690	1.0665*	0.7433	0.2288	0.0772*	0.7686	Exponential	19.45
		(0.1809)			(0.0122)			

Note: Figures in the parenthesis are standard errors.
 * indicate significant at 1 per cent level of probability

Hamirpur, Una and Chamba. Each district has been provided with a government beekeeping station. There are at present 47 stations functioning in various parts of the state.

The Horticulture Department has set up the honey grading, processing and agmarking laboratories at Hatkoti in Shimla district and at Chethru in Kangra district to facilitate private beekeepers to get their honey produce 'Agmarked' at a very nominal charge of 50 paise per pack of 500 or 1000 gms. Recently, the Agro Industries Corporation (AIC) of Himachal Pradesh has set up a honey processing plant at Kandrori in Kangra district with processing capacity of 250-300 kgs of honey per day.

In order to generate more employment for the educated unemployed youth, the department had targeted to achieve honey production of about 550 metric tonnes in 1999-2000. It intends to promote 500 beekeepers and raise 50,000 bee colonies by the end of century.

Before beekeeping is adopted as one of the occupations by the households, they are interested to know the investment pattern, income generated, the difference in income between stationary and migratory beekeepers, the cost of honey production and marketing, the various sources of marketing etc. Keeping this in view, the present study was designed to study following specific objectives:

1.4 Objectives

1. To study the socio-economic parameters of stationary and migratory beekeepers as well as to examine the establishment cost, economics of honey production and break-even number of stationary and migratory bee colonies.

2. to work out the marketing costs, margins and producers' share in the consumers' rupee of stationary and migratory beekeeping, and

3 to highlight the problems and constraints in the development of beekeeping.

1.5 Scope of the Study

The literature available on economic aspects of beekeeping is scanty. It becomes, therefore, imperative to study the various economic parameters such as amount of investment needed to start with, cost of honey production on stationary and migratory conditions, marketing costs, margins, the producer's share in the consumer's rupee etc. related to this enterprise.

The study will be helpful and of practical value to beekeepers, marketing board, horticultural department, traders, policy makers, planners, financial institutions, researchers and extension workers to take appropriate steps and action to improve the yields of honey and ultimately to ameliorate the socio-economic conditions of beekeepers.

1.6 Organization of the Thesis

The thesis is organised into five chapters. Chapter one is devoted to the general outline of the study including beekeeping in the world, past and present of beekeeping in India, status of beekeeping in Himachal Pradesh and scope of study as well as the objectives. A deep insight into the status of beekeeping, major findings, research gaps and the changes that have taken place in beekeeping in India and abroad is gained through extensive review of literature in chapter two. Chapter three mainly describes the mode of investigation in terms of sampling design, data collection, analytical tools and other methods used to accomplish the objectives of the study. Chapter four is divided into different sections which outlines the economics of honey production, marketing of honey and the problems/constraints in the development of beekeeping in the study area. The summary and conclusions have been highlighted in Chapter five.



REVIEW OF LITERATURE

REVIEW OF LITERATURE

Scientific literature in the related field of study is of great importance in carrying out further research. In this chapter, efforts have been made to critically examine the literature on the subject in Himachal Pradesh, India and abroad. The literature reviewed has been presented under different sub - heads in chronological order.

2.1 Development of Beekeeping and Trends in Honey Production

Schneider (1970) found that there were 4.8 million colonies of bees in the USA, total honey production was valued at \$33.7 million, wax production at \$2.4 million, pollination services at \$7000 million, and production of package bees at \$4 million. A 1960 study showed that 94 per cent of bee-keepers were hobbyists, under 6 per cent were part-time commercial beekeepers and under 1 per cent full-time commercial beekeepers (owning over 400 colonies). Nevertheless the last two categories accounted for 80 per cent of the total honey production. Agricultural Statistics for 1969 showed a steady decline in numbers of colonies;

from 54,61,000 in 1954 to 47,70,000 in 1968. The decline may be due to rising production and labour costs, reduction in available forage for bees, and losses due to pesticide poisoning.

Taplin and Smallhorn's (1970) study of supply of honey in Australia examined that the industry has expanded consistently since the late 1930's and internal consumption doubled since 1952, exports reached a peak in 1961-62. In 1967-68, the average yield per hive was 55kg, whereas the total production was 19 thousand tonnes.

According to Blum (1972) the number of honeebec colonies had declined in recent years, mainly because of reduction in nectar sources. In 1970 there were 1,25,000 colonies in the province, yielding 49-77 lb honey/hive (22-35kg), which was more than 30 per cent below the Canadian average. The market was dominated by a few large packers, and the price was affected by the large quantities of honey produced by the Prairie provinces.

Pidek (1977) found that apaiaries in Poland were classified as A, B or C; types A and B had less than, and type C more than, 40 colonies. In type C, management was more intensive, and each colony needed an average of 13.6kg sugar and 4 sheets of foundation in one season; 8.8 man-hours per year were spent on each colony. In types A and B a

positive correlation was found between efficiency of management and size of apiary. Honey production in C apiaries ranged from 12.4 to 18.2kg per colony; for types A and B it was 6.5-9.4 and 5-11.8kg, respectively.

Shah(1980) concluded that the traditional beekeeping was more paying because of very nominal expenditure and attention involved, more so the skill of the beekeepers to manage their colonies. With the bee species available and the abundance of bee flora there were, however, very attractive chances for a substantial increase in the production with more attention in the field of research.

Sharma et al.(1980) stated that the Italian honeybee *Apis mellifera* was imported several times and after several years of concerted efforts, it was successfully established in Himachal Pradesh in early sixties only. Since then the colonies were constantly multiplied and supplied to private beekeepers in the state. This exotic bee was reported to be a superior performer than *Apis cerana* in areas where it was established. The authors also observed that in various apiaries of Kangra area, *Apis mellifera* gave 3-4 times more honey yield than *Apis cerana*. Its plus points over *Apis cerana* were longer foraging range, low sharing instinct and non-appearance of laying workers. But temperature seems to

be a limiting factor for its wide success as it has failed to avail autumn flow in colder areas of the state.

Singh (1980) in his study on beekeeping in Uttar Pradesh observed that the state had a host of useful bee flora. With over 45 lakh hectares under forest, orchards, vegetables and oilseed crops, the state of Uttar Pradesh had a potential for development of beekeeping. Main agency for the development of beekeeping in the state was the Department of Horticulture and Fruit Utilization, Govt. of U.P. Twelve districts of the state were covered under the programme. Uttar Pradesh Maunapal Sangha was an organisation of beekeepers and published a Hindi magazine on beekeeping.

Sharma and Thakur (1982) observed that under the floral and climatic conditions of Kangra valley, the Italian honey bee gave 3-4 times more honey as compared to Indian bee.

Melkania et al (1983) mentioned that the potential of beekeeping range between 6-10kg/hive/year in areas between 1,000-1,700m, 10-15 kg/hive/year between 1,700-2,100m and 12-16kg/hive/year in areas located between 2,100-2,700m. It is interesting to mention that with the existing crude technology of villagers in certain areas of Pithoragarh e.g., Sosa and Sirdan villages of Chaudans Valley, production of 20kg honey/hive/year have been recorded. This

indicates that there was a considerable potential of beekeeping even in areas around 2,700m elevation.

Pidek's (1983) survey of privately-owned apiaries showed that during this period in Poland average honey production fell from 8.25 to 6.75kg/colony. In apiaries with more than 40 colonies the average yield per colony was twice that obtained in apiaries with less than 10 colonies. Production costs rose 6-fold over the period, but the price of honey increased 5-fold.

Goyal (1990) observed that during 1990, there were 66,000 *Apis mellifera* colonies in India, of which 83 per cent were in Punjab. Annual honey production in the country from all these colonies was estimated to the tune of 560 mt, and in Punjab, it was 450 mt.

Dogra and Gupta's (1993) study of world scenario in beekeeping concluded that Europe consumed more honey than it produces and western Europe was the world's greatest honey importing region. They further observed that during 1989 for European Economic Community, the average yield per colony was minimum at Luxemburg (7.7kg/colony) and maximum at Denmark (35kg/colony). Australia recorded the highest honey yields in the world with an average of 40kg/colony. The study also found that China and Germany were the world's biggest exporter and importer of honey, respectively.

Mishra (1995) reported that beekeeping with Indian honeybees was virtually unknown in the states of Punjab and Haryana. Beekeeping with *Apis mellifera* was taken up in Punjab by the beekeepers in 1977. This industry grew very fast and in 1987 there were 68 thousand colonies giving 620 tonnes of honey. He further stated that beekeeping has also received boost in Himachal Pradesh, Jammu and Kashmir and Haryana where *Apis mellifera* was now used in commercial beekeeping.

Anonymous (1996) noted that the honey producers of Punjab had created a niche in the international market. The honey production with 1.25 lakh Italian honey bee colonies maintained by 12,500 aparians has touched the 2,200 mt mark. He further observed that a viable unit consisting of 100 colonies could fetch a monthly profit between Rs. 5,000 and Rs. 6,000. Two third of initial investment cost could be recovered within a year of undertaking this environment friendly enterprise.

Anonymous (1996) stated that despite a long tradition of beekeeping in India dating back to 2700 BC, our share with one million bee colonies in world honey production stood at a mere 0.6 per cent. However, China with 8.5 million bee colonies, accounted for 70 per cent of honey exports from Asia.

2.2 Economics of Honey Production and Marketing

Pidek (1975) in his study on operating efficiency in apiaries of different sizes concluded that a polish beekeeper with one colony worked 6-14 manhours for a honey production of 8-13kg i.e., 0.6-1.2 manhours/kg. The calculated theoretical working time for one colony producing over 20kg honey was 5.87 hours.

Mohammed (1984) observed that a net return per colony of TK 927/year (1983 prices) was possible once an apiary had been established.

Merle (1985) concluded that beekeeping for honey production was economic for those with 350-400 hives who manage their colonies intensively and marketed all possible hive products, and for those with more than 500 hives who sold their honey in bulk. It took 5-6 years for a beekeeping business to become viable.

Toit and Toit (1987) while using sample figures; comparative cost analyses of profitability were made for 5 hypothetical beekeeping enterprises: (A) 100 colonies, (B) as A but colonies were migrated, (C) 400 colonies, (D) as C but migrated, (E) as D but using different marketing techniques. In all the enterprises, labour and transport accounted for the largest part of the costs; constraints

common to all were the beekeepers knowledge, the limited numbers of profitable apiary sites and marketing outlets.

Justus's (1991) economic analysis of the beekeeping industry in Tamil Nadu showed that maximum profit per honey bee colony (303 rupees) was achieved by beekeepers with 230 colonies. Insurance, marketing, honey standards, and the support structure of the beekeeping industry were also studied.

Kitsopanidis et al (1992) observed that profitability could be more easily improved by increasing production per colony as well as the number of colonies in an apiary, rather than by cutting production costs. A major reason for this was that 60 per cent of the costs were fixed and therefore did not vary greatly with production per colony or apiary size.

A study by Dogra and Gupta (1993) revealed that migratory beekeepers of Himachal Pradesh extracted, on an average, 40kg honey per colony per annum from *Apis mellifera* honey bees. The migration had not only increased honey production but also saved sugar feeding. The authors also pointed out that besides problems peculiar to hills in the rearing of bees, the beekeepers were facing great problem of marketing of honey. The beehives cost of Rs.600 to Rs.650 per langstroth was beyond the means of economically poor

beekeepers. The authors also estimated that for pollination, Himachal Pradesh required two lakh bee colonies against only about 10,000 existing at present.

Singh (1993) examined that a beekeeper with an investment of Rs. 19,120 could get an income of Rs. 8,000 per year after taking care of recurring expenses of Rs. 950 per annum in Punjab. From this income a beekeeper could easily repay his loans within 4 years. The author, further, suggested that to get more income, the beekeepers must increase the number of colonies every year and in case the subsidy was increased to 50 per cent on equipment, the income would go a little higher. The author emphasized that for the landless and poor people in the villages, it would be necessary to provide 50 per cent subsidy if beekeeping was to give them an earlier return.

Chauhan and Sharma (1994) in their study on *Apis mellifera* bees rearing - a profitable venture, observed that bees rearing was a profitable enterprise both at stationary and migratory levels in Kangra Valley of Himachal Pradesh. Beekeepers could earn appreciable net returns to the tune of Rs. 381 and Rs. 817 per colony per annum from stationary and migratory beekeeping, respectively.

Gutierrez (1994) concluded that beekeeping is a feasible alternative for the rural sector and a modest sized

apiary in EI Paraiso has the potential to generate enough cash to significantly supplement a rural family's income. He further observed that beekeeping activities require low capital and is low labour intensive in nature. Besides, it is non-competitive with other agricultural crops and their practices.

Anonymous (1995) claimed that India has exported its first consignment of 500 mt of honey worth Rs. 2 crore to USA from Lalru in Punjab during December, 1995. However, he pointed out that until now India did not figure on the world honey market because India honey had not been able to satisfy the stringent international quality standards or compete in terms of price or volume required for export markets. He further advocated that beekeeping in addition to providing farmers with additional annual income of around Rs. 8,000 for a capital investment of Rs. 18,500 for 10 bee colonies also helped to increase the yields of the crops substantially through pollination.

Chauhan (1996) estimated the total investment for a bee colony to the order of Rs. 1,075 and Rs. 1,175 for stationary and migratory beekeeping in the hills of Himachal Pradesh. Transportation cost and human labour were the major items of variable cost. These costs jointly accounted for 28.34 and 54.53 per cent on stationary and migratory farms

respectively. On the basis of break even analysis he observed that more than 31 and 14 bee colonies must be reared by the beekeepers under stationary and migratory practices to earn profit.

2.3 Problems in Beekeeping Development

Nain (1973) observed that *Apis cerana indica* had got a bright future in India provided, the beekeepers were encouraged and financially helped by the Government and research on beekeeping was intensified. Our bees had a great potentiality and they might compete well with European bees. The author stressed that the full utilization and exploitation of our bees is urgently required.

Bhalla and Dhaliwal (1980) observed that there existed a great scope for development of beekeeping in India. Efforts should be made for serious extension work among the various sections of the society which might provide potential beekeepers. This should be supported by a strong research base to keep up the momentum of development. Existing research and training facilities at various institutions are required to be strengthened.

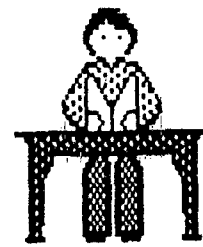
Mohana Rao et al. (1980) concluded that bee pollination resulted not only in yield increase of various oilseeds, but also improved their quality. By ensuring uniform maturity and early harvest, it proved useful to the farmer to raise

another crop. A planned bee pollination programme on a national scale significantly contributed in solving the problem of edible oil shortage in the country even at the existing level of land use for the oilseed crops.

Chahal (1993) highlighted that inspite of the efforts of some good honey traders the beekeepers experienced a great difficulty in disposing of their honey in Punjab as a result beekeeping got set back during the past 3-4 years. The author further mentioned that to solve honey marketing problems, The Punjab State Beekeeper Federation was constituted in November, 1991 with the help of KVIC by combining local 14 institutions of beekeepers spread in 9 districts of the state. The Federation purchased and marketed 40 tonnes of honey in the very first year which increased to 300 tonnes during 1993.

The foregoing review of earlies studies has been quite useful in providing a few methods and tools utilized in the present study. The studies reviewed in this chapter focussed attention mostly in one or two aspects of beekeeping in a particular area. There is, however, no systematic and scientific enquiry focussing attention on various aspects of beekeeping the results of which could be utilized for development, better planning and organization of beekeepers. This underlines the need for a comprehensive in-depth study

of beekeeping. The present study was therefore, undertaken to examine a few important aspects of beekeeping in Kangra district of Himachal Pradesh such as investment pattern, cost of honey production, marketed surplus of honey and various channels of honey marketing etc. on stationary and migratory beekeeping farms.



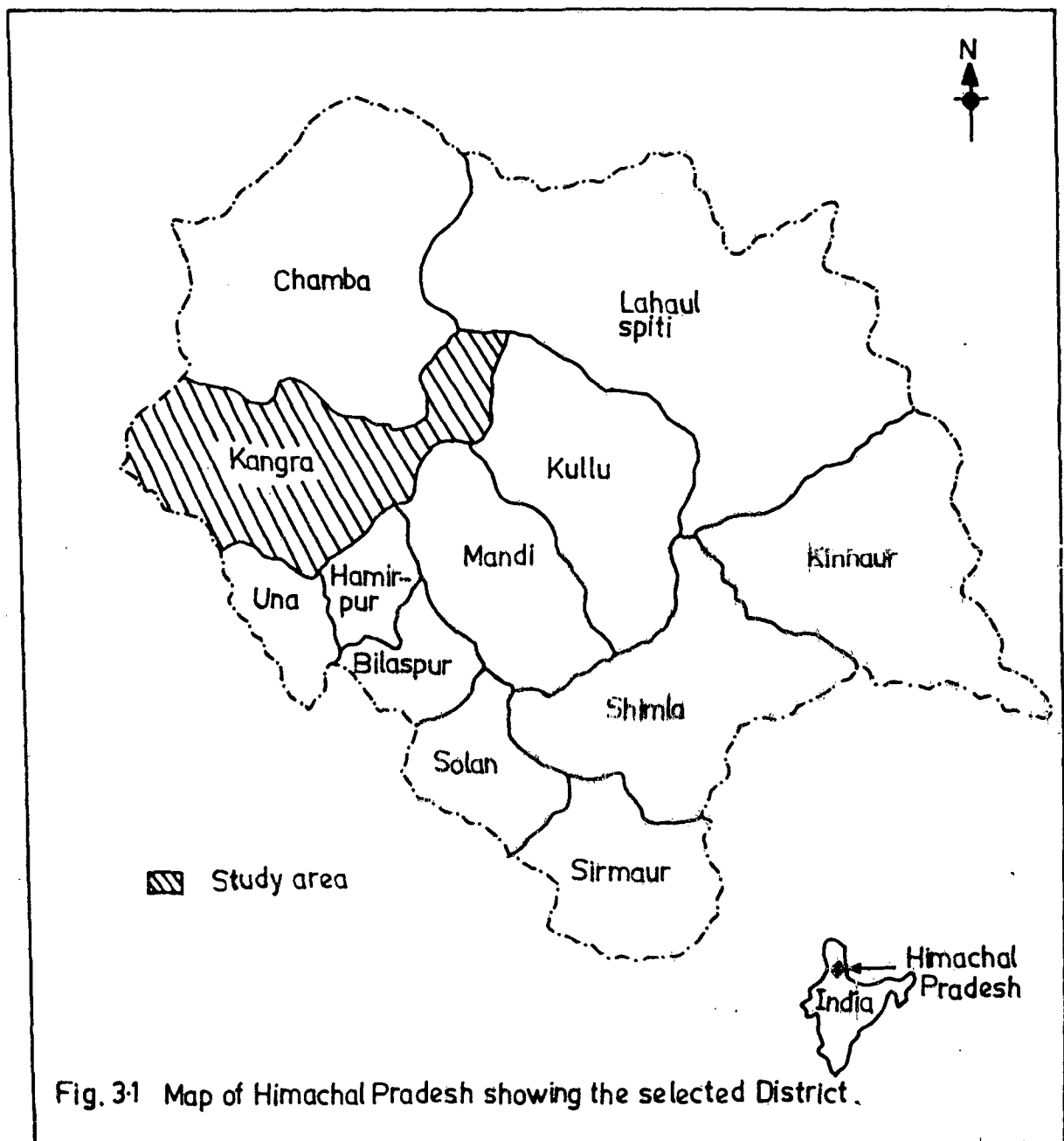
METHODOLOGY

METHODOLOGY

This chapter describes in detail the procedure of selection of study area, sampling design, data collection, analytical framework and the methods used for arriving at conclusions.

3.1 Selection of the Study Area:

Kangra district of Himachal Pradesh (Fig 3.1) was selected purposively for this study as this district has the largest number of beekeepers both stationary and migratory of the state. Secondly, in this district, beekeeping research station was established as early as in 1936 at Nagrota Bagwan. Thirdly, the headquarters of state's West Zone Beekeeping Development Office is situated at kangra. Fourthly, "Agmark" laboratory for honey testing and packing has been set up at Chathru near Dharamsala. Fifthly, the biggest honey processing plant of the state has been recently established at Kandrori near Pathankot. Lastly, Beekeeping Research Station of Himachal Pradesh Krishi Vishvavidyalaya is functioning at Nagrota Bagwan, aiming to



provide technical know-how to the bee keepers and evolve new techniques of beekeeping.

3.2 Sampling Design:

Two-stage random sampling technique with stratification at the second stage was adopted to select community development blocks and beekeepers (Fig 3.2).

3.3 Selection of Community Development Blocks:

In the first stage of sampling, a list of community development blocks falling in district Kangra was prepared with the help of District Rural Development Agency (DRDA) and District Statistical Officials of the district headquarters. A sample of four development blocks namely, Kangra, Nagrota Bagwan, Nurpur, and Rait was chosen at random for conducting the study.

3.4 Selection of Beekeepers:

A complete list of all the beekeepers (stationary and migratory) along with their number (size) of bee colonies in each sampled block was prepared with the help of officials of Khadi and Village Industries Board (KVIB), the West Zone Beekeeping Development Centre, Kangra and Kangra Valley Beekeepers' Cooperative Industrial Society Ltd., Ichhi.

A sample of 80 beekeepers (27 stationary and 23 migratory) was taken at random for selected blocks through proportional allocation. The selected beekeepers both

stationary and migratory were separately arranged in ascending order on the basis of number of bee colonies. Cube-root Cumulative Frequency ($F^{1/3}$) method of distribution was used to transform the beekeepers into two categories of small and large (Appendix VIII). The small size was estimated to be upto 60 bee colonies and large more than 60 bee colonies on stationary farms, however the corresponding figures for migratory farms were upto 100 and above 100, respectively. The complete sampling plan has been shown in Figure 3.2.

To examine the marketing cost, marketing margins and price-spread in the marketing of honey, data from 10 wholesalers/local traders, beekeepers' cooperative society, 10 retailers and 50 consumers were also collected on various aspects.

3.5 Sources of Data and their Collection:

In order to meet the objectives of study, the data were collected from primary and secondary sources.

3.5.1 Primary data:

The primary data were collected on following aspects:

Demographic particulars (population, age, caste, literacy and family composition) of beekeepers

Management aspects related to beekeeping such as rearing of beekeeping, handling, processing, storage and marketing of honey etc

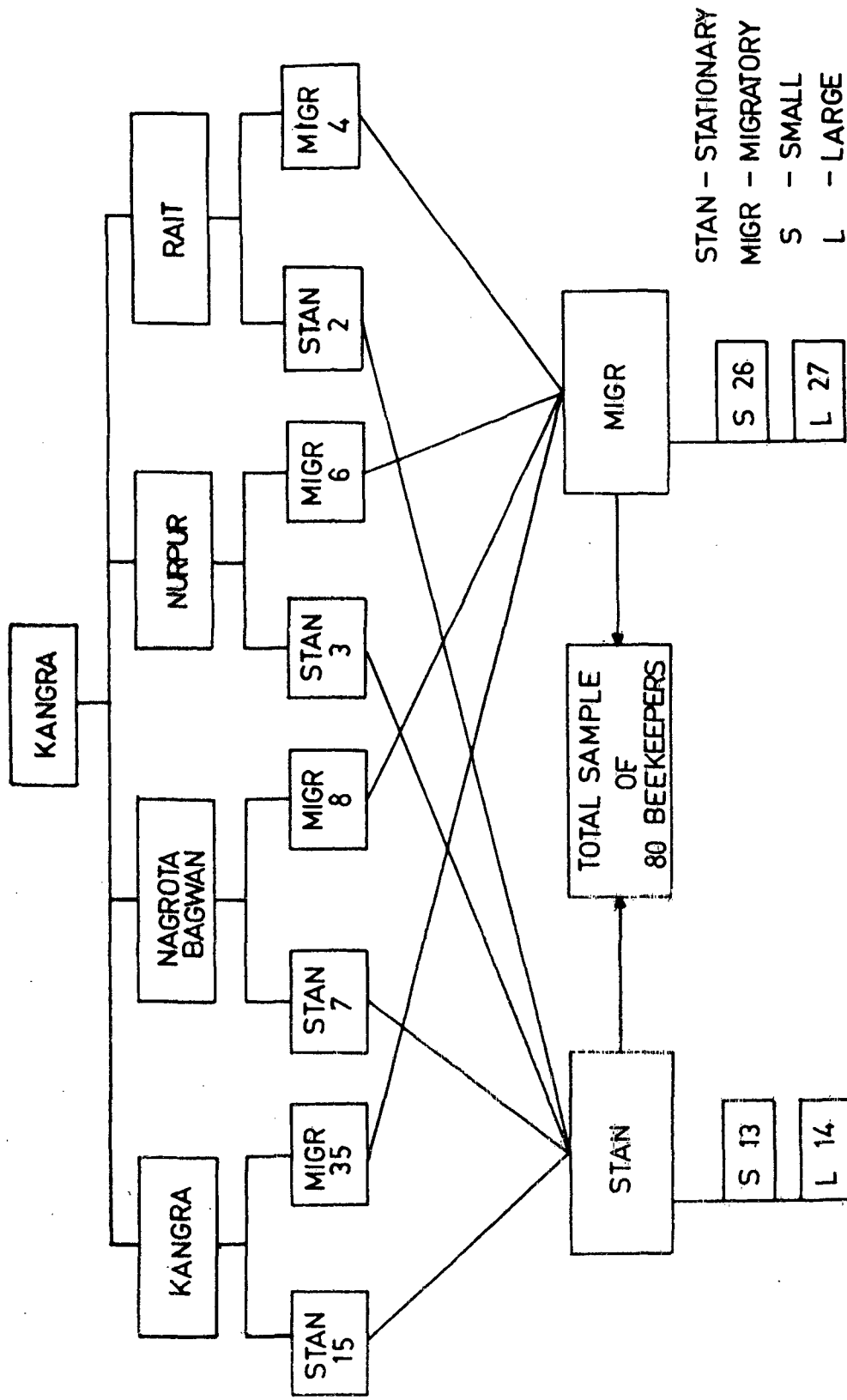


FIG. 3.2 :- DIAGRAM SHOWING THE SELECTION OF BEEKEEPERS.

- Farm inventory in terms of land, livestock and beekeeping
- Capital investment on tools, implements, equipments, machinery, other items needed for beekeeping
- Use of material inputs
- Utilization of labour for different operations
- Mode of beehives migration, season of migration, places of migration
- Expenditure incurred while migrating the domesticated bees
- Season wise and location wise honey production
- Sale and purchase of bee colonies
- Utilization pattern of honey production
- Marketable and marketed surplus of honey
- Marketing cost, price paid and/or received by different marketing agencies/consumers in the marketing of honey and other products
- Processing cost of honey/other products
- Channels of marketing
- Markets of honey utilization
- Input-output prices
- Borrowing of beekeepers
- Various sources of household income

3.5.2 Secondary data:

The secondary data were collected from the following sources on various aspects:

- I. Office of the Directorate of Horticulture, Government of Himachal Pradesh:

- Year wise honey production in the state
- Year wise value of honey produced

II. Offices of North and West Zone Beekeeping Development

Officers of H.P.:

- Year wise distribution of bee colonies to beekeepers
- Distribution of material inputs to beekeepers
- Training imparted to beekeepers

III. Offices of Khadi Gramoudyog:

- Year wise sale and purchase of honey
- Grants/subsidies provided to beekeepers
- Data on technical inputs and beehives distribution to beekeepers

IV. Office of the AGMARK Laboratory, Chathru (Dharamsala):

- Year wise and season wise purchase and bottling of honey
- Sale of bottled honey

V. Office of the Kangra Valley Beekeepers Industrial Society

Ltd, Ichhi:

- Year wise sale and purchase of honey
- Membership of the society
- Rules and regulations of the society

VI. Miscellaneous sources such as Books, Newspapers, Annual Reports etc.:

- Information on various aspects of beekeeping

3.6 The Techniques of Data Collection and Period of Study:

The survey method was used for the collection of data from the sample beekeepers selected for the study. Usually, the head of the family or adult or male or female members of the family who were taking decisions in the management of beekeeping were interviewed. Before starting the interview, the beekeepers were explained with the purpose of research and they were assured that the information given by them will be used for study purpose only. After this, the beekeepers were interviewed at their residences with the help of pre-tested schedules (Appendix IX) designed for the purpose of the study. The data were collected for agricultural year 1994-95.

3.7 Methods of Analyses:

The data collected during the period of enquiry were scrutinised, coded, tabulated and compiled systematically. Commensurate with the objectives of study, tabular analyses techniques were performed as the empirical tools in the present study.

These tools of economic analyses are presented and discussed in the sections that follow:

3.7.1 Tabular analyses:

In order to ascertain the socio-economic profile of selected beekeepers, tabular analysis technique was

employed. The detailed information was studied which is enlisted below:

- Occupation status of beekeepers
- Family size and sex wise distribution of sample population
- Education level of sample population
- Distribution of land holdings
- Cropping pattern and average yield of crops
- Average size of bee colonies and investment on machinery and equipment for beekeeping
- Production, sale and utilization pattern of apicultural products
- Market structure and price of honey
- Cost of production and profit per kg of honey

(I) Cost of honey production:

The following procedure was adopted for estimating cost per kg of honey produced by different groups of stationary and migratory beekeepers.

$$C H P = \frac{TFC + TVC}{KHP}$$

Where,

CHP = Cost of honey production per kg,

TVC = Total variable cost which included:

- (i) Cost of comb foundation sheets
- (ii) Cost of feed (sugar)
- (iii) Cost of chemicals
- (iv) Cost of labour (both hired and owned)

(v) Cost of transportation

(vi) Cost of miscellaneous items such as frame wire, rent paid while on migration, kerosene oil etc

TFC = Total fixed cost which included:

(i) Interest on the value of fixed capital, depreciation on equipment and machinery.

KHP = Kilograms of honey produced per year

Prevailing market prices of various inputs and outputs were used to work out costs and returns on bee farms. Cost and returns were estimated on per farm and per hundred bee colonies basis.

(II) Break even analysis:

The break even analysis was performed to determine the viable size (number) of bee colonies on different groups of stationally and migratory bee farms as follows:

$$BEP = \frac{TFC}{AHP - AVC}$$

Where, BEP is the break even point, TFC is total fixed cost of honey, AHP is the average honey price per kg and AVC is average variable cost of honey production.

3.7.2 Marketing cost, marketing margins and price-spread:

The price-spread was computed and studied by comparing prices, marketing costs and margins at successive levels of marketing in the marketing channels for honey. The actual

marketing cost, margin and price recieved by honey priducers have been calculated in the following manner;

$$TC = C_p + \sum_{i=1}^n Mc_i$$

Where,

TC included the total cost of honey marketing,

C_p shows cost incurred by the producer in marketing of his produce (honey), and

Mc_i was the marketing costs incurred by i^{th} middlemen.

$$A_m = P_m - (P_b + M_e)$$

Where,

A_m is the absolute margin of the middlemen or the traders,

P_m is the selling price of the traders,

M_e represents marketing costs of the traders.

The producers' share in the consumers' rupee which refers to how much price is actually received by the beekeepers for their produce out of the final price paid by consumers or charged by retailers was worked out as under:

$$PS = \frac{P_p}{P_r} \times 100$$

where,

PS is the producers' share in the consumers' rupee,

P_p is the producer's price for their produce, and

P_r is the price paid by the consumers or sale price of the retailers.

The marketing efficiency was worked out by employing the Shepherd's formula as follows:

Shepherd's Formula

$$ME = \frac{V - I}{I}$$

Where,

ME is the index of marketing efficiency,

V is the value of honey sold (consumer's price), and

I is the total marketing cost plus margins.

3.7.3 Constraints in beekeeping development:

The perceived problems and constraints observed on sample beekeeping farms were tabulated and percentages of farmers reporting the particular problem were worked out for different sizes of stationary and migratory beekeeping farms.

3.8 Difficulties and Limitations of the Study:

Generally cost accounting method of data collection is more reliable than any other method for estimation of different parameters. However, this method was not possible because of its own limitations, hence the data were collected on the basis of an oral enquiry. The accuracy of data, thus depends upon the memory of the respondents. Further, the data were collected at one visit from selected

beekeepers. Thus, it imposes a limitation on study and it is liable to affect the efficiency of estimates.

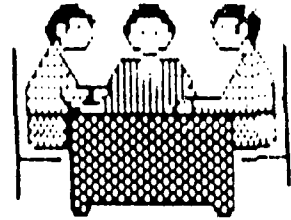
Efforts were made to treat the respondents politely and tactfully but even then they were suspicious of research worker, thinking the worker would be a government agent. They thought that information was being collected as the government has decided a new scheme to give aid to weaker sections. Therefore, every body was inclined to be disgruntled and under sizing himself. A few of the respondents were just literate and elderly, it was difficult to get answers from them. But, with the help of local youths of the villages, their hesitation in revealing the data was minimised.

3.9 Definitions Used in the Study:

3.9.1 Stationary beekeepers - The beekeepers who did not migrate their bee colonies outside the district and or state throughout the year, though local migration within a sphere of four-five kilometers took place.

3.9.2 Migratory beekeepers - These were the beekeepers who migrated their bee colonies to the higher hills (Rampur, Rohru etc.) of the state during rainy season, to the plains of Punjab and Haryana during winter season and back to home town (hills of Kangra Valley) during summer. The bee colonies were migrated by the beekeepers to different places

depending upon the availability of bee flora. A few bee colonies kept at home were considered in the category of migratory bees.



RESULTS AND DISCUSSION

CHAPTER-IV

RESULTS AND DISCUSSION

This chapter has been divided into different sections as per requirements of the objectives laid down in the study. To make a sound reasoning of results and to frame any policy for raising the living standard and the overall development, it is necessary to examine the existing social and economic status of the sample beekeepers. Therefore, in addition to achieve the objectives mentioned in the introduction, the objective of socio-economic characteristics of beekeepers was also met with. Different sections followed in this chapter are as follows:

4.1 Socio-economic characteristics of beekeepers

4.2 Economics of honey production

4.3 Economics of honey marketing, and

4.4 Constraints for beekeeping development.

4.1 Socio-Economic Characteristics of Beekeepers:

The decision-making process and profitabillity of beekeeping enterprise is greatly determined by socio-economic characteristics of beekeepers. The data collected

from 80 beekeepers (27 stationary and 53 migratory) spread over four community development blocks namely, Kangra, Nagrota Bagwan, Nurpur, and Rait and two farm-size categories (small and large) represented a cross-section of the beekeepers in Kangra district. An attempt has been made in this section to compare and contrast resource endowments of different categories of beekeepers in the district. The information relating to caste, major occupation, family size and composition, education, size of operational holding, distribution of animals, cropping pattern, crop yields as well as source wise distribution of gross household income has been analysed and is discussed in sub-sections that follows:

4.1.1 Caste-wise distribution:

Table 4.1 gives an information on caste-wise distribution of respondents in the study area. It is evident from the table that beekeeping was more popular among Chaudharies followed by Rajputs in both the categories i.e on stationary and migratory beekeeping farms.

The proportion of Chaudharies and Rajputs on all the stationary farms was as high as 59.25 and 25.93 per cent, respectively. The corresponding figures for all the migratory farms were estimated to be 54.72 and 33.97 per cent, respectively. Beekeeping was also found to be

Table 4.1 Caste-wise distribution of sample beekeepers

Caste	(Number)					
	Stationary			Migratory		
	Small	Large	Total	Small	Large	Total
Rajput	6 (46.15)	1 (7.14)	7 (25.93)	9 (34.61)	9 (33.34)	18 (33.97)
Brahmin	-	2 (14.29)	2 (7.41)	1 (3.25)	1 (3.70)	2 (3.77)
Mahajan (Sood, Gupta etc.)	-	-	-	1 (3.85)	1 (3.70)	2 (3.77)
Chaudhary	6 (46.15)	10 (71.43)	16 (59.25)	13 (50.00)	16 (59.26)	29 (54.72)
Scheduled Caste	1 (7.70)	1 (7.14)	2 (7.41)	2 (7.69)	-	2 (3.77)
Total	13 (100)	14 (100)	27 (100)	26 (100)	27 (100)	53 (100)

Figures in parentheses indicate percentages of total

prevalent among Brahmins, Mahajans and few scheduled caste families of Draie, Jheewar and Julah.

4.1.2 Occupational status of sample households:

The occupational distribution of sample households is presented in Table 4.2. It is evident from the table that agriculture was found to be the major occupation of stationary and migratory beekeepers. However, beekeeping was reported to be the major occupation by 3.70 per cent stationary and 20.75 per cent migratory beekeepers in the study area. Service in public and private sector and other non-farm sectors like pension and business were the other major occupations of sample households in the study area. Thus, it can be concluded from the table that the agriculture was the major occupation of the beekeepers in the Kangra district of Himachal Pradesh. The proportion of these farmers was estimated to be 37.04 per cent and 73.59 per cent on stationary and migratory bee farms.

4.1.3 Family size and composition:

The composition and size of family are the important factors that affect the size of beekeeping enterprise which is, though, less labour intensive. The size of family is an important socio-economic factor as well as an indicator of overall development. The family size in respect of sampled farms of Kangra district is summarized in Table 4.3. It can

Table 4.2 Main occupation-wise distribution of sample beekeepers

Occupation	(Number)					
	Stationary			Migratory		
	Small	Large	Total	Small	Large	Total
Agriculture	-	10 (71.43)	10 (37.04)	19 (73.08)	20 (74.07)	39 (73.59)
Beekeeping	-	1 (7.14)	1 (3.70)	4 (15.38)	7 (25.93)	11 (20.75)
Service	4 (30.77)	3 (21.43)	7 (25.93)	2 (7.69)	-	2 (3.77)
Others (Pension, Business Tailoring etc.)	9 (69.23)	-	9 (33.33)	1 (3.85)	-	1 (1.89)
Total	13 (100)	14 (100)	27 (100)	26 (100)	27 (100)	53 (100)

Figures in parentheses indicate percentages of total

Table 4.3 Age-wise distribution of sample beekeepers

Age Interval (years)	(Number)					
	Stationary			Migratory		
	Small	Large	Total	Small	Large	Total
Upto 10	11 (17.19)	20 (28.98)	31 (23.31)	33 (24.26)	22 (15.07)	55 (19.50)
11-25	17 (26.56)	12 (17.39)	29 (21.80)	21 (15.44)	44 (30.14)	65 (23.05)
26-40	18 (28.12)	18 (26.09)	36 (27.07)	40 (29.41)	44 (30.14)	84 (29.79)
41-60	16 (25.00)	16 (23.19)	32 (24.06)	37 (27.21)	28 (19.18)	5 (23.05)
Above 60	2 (3.13)	3 (4.35)	5 (3.76)	5 (3.68)	8 (5.47)	13 (4.61)
Total Population	64 (100)	69 (100)	133 (100)	136 (100)	146 (100)	282 (100)
Total males	32 (50.00)	33 (47.83)	65 (48.87)	65 (47.79)	70 (47.95)	135 (47.87)
Total females	32 (50.00)	36 (52.17)	68 (51.13)	71 (52.21)	76 (52.05)	147 (52.13)
Average family size	4.92	4.93	4.93	5.23	5.41	5.32
Sex ratio (Females/1000 males)	1000	1091	1046	1092	1086	1089

Figures in parentheses indicate percentages of total

be seen from the table that the total sample population on stationary and migratory farms was 133 and 282 respectively. Majority of the population on sample farms under both categories fell in the age group of 26-40 years. The proportion of population below 10 years of age was 23.31 and 19.50 per cent on stationary and migratory sample farms, respectively. The proportion of sample population above 60 years of age was as low as 3.76 and 4.61 per cent on stationary and migratory farms, respectively.

One of the interesting feature of this table is that females outnumbered males on both the categories of stationary and migratory beekeeping farms. The sex ratio was estimated to be 1046 and 1089 females per thousand males on stationary and migratory beekeeping farms, respectively. These results were found to be in conformity to the population for Kangra district as a whole (males 48.38 per cent and females 51.62 per cent and sex ratio 1067 females per 1000 males for 1991 census). It is also evident from the table that the average family size varied from 4.93 persons on stationary to 5.32 persons on migratory bee farms.

4.1.4 Education level of farm population:

The percentage of population in different age groups is presented in Table 4.4. It can be seen from the table that proportion of non-school going population was higher (9.78

Table 4.4 Education-wise distribution of sample beekeepers

Education	(Number)					
	Stationary			Migratory		
	Small	Large	Total	Small	Large	Total
Non school going	3 (4.69)	10 (14.49)	13 (9.78)	11 (8.09)	10 (6.85)	21 (7.45)
Illiterate	9 (14.06)	13 (18.84)	22 (16.54)	28 (20.59)	18 (12.33)	46 (16.31)
Primary	13 (20.31)	12 (17.39)	25 (18.80)	26 (19.12)	20 (13.70)	46 (16.31)
Middle	15 (23.44)	19 (27.54)	34 (25.56)	33 (24.26)	43 (29.45)	76 (26.95)
Matric	15 (23.44)	9 (13.04)	24 (18.05)	21 (15.44)	38 (26.03)	59 (20.92)
Senior Secorndary	8 (12.50)	3 (4.35)	11 (8.27)	12 (8.82)	12 (8.22)	24 (8.51)
Graduate	1 (1.56)	1 (1.45)	2 (1.50)	5 (3.68)	5 (3.42)	10 (3.55)
Post Graduate	-	1 (1.45)	1 (0.75)	-	-	-
Professional Education	-	1 (1.45)	1 (0.75)	-	-	-
Total	64 (100)	69 (100)	133 (100)	136 (100)	146 (100)	282 (100)

Figures in parentheses indicate percentages of total

per cent) on stationary farms than the migratory farms (7.45 per cent). The proportion of illiterate population was also found to be of similar order. Post graduation and professional education was found to be the highest education among stationary beekeepers population. The overall literacy was found to be higher (76.24 per cent) among migratory beekeepers population than the stationary ones (73.68 per cent). A perusal of Table 4.4 shows that majority (25.56 per cent on stationary and 26.95 per cent on migratory) of the sample population had middle standard education in the study area.

4.1.5 Size of land-holdings:

Land is a main resource base of the farmers in the production process. Thus keeping-in-view the significance of land resources, the average size of land holding, wasteland, grassland etc. are presented in Table 4.5. It can be seen from the table that the average size of operational holdings on stationary and migratory farms was 0.150 hectare and 0.193 hectare, respectively. The overall size of total land holdings was 0.184 hectare on stationary farms and 0.204 hectare on migratory farms in the study area. The size of holdings did not follow any specific trend to the size of bee colonies under both stationary and migratory conditions/situations of bee farms.

Table 4.5 Distribution of land holding on sample farms

Particulars	(Ha/Farm)					
	Stationary			Migratory		
	Small	Large	Average	Small	Large	Average
Operational land	0.141	0.157	0.150	0.195	0.191	0.193
Grassland	0.006	-	0.002	0.001	-	0.001
Fallow land	0.015	0.005	0.010	-	0.002	0.001
Waste land	0.028	0.017	0.022	0.006	0.0012	0.009
Total land holding	0.190	0.179	0.184	0.202	0.205	0.204

4.1.6 Composition of livestock population:

The composition of livestock and their average number according to farm size groups are shown in Table 4.6. The average number of total livestock per household was worked out to be 1.42 on stationary and 1.92 on migratory beekeeping farms. The average size of bullocks, cows, buffaloes, young stock and sheep was below one for all categories of stationary and migratory beekeepers. This indicated that livestock rearing was not very popular among the beekeepers of the study area. The other reasons for lower number of livestock may be because of smaller size of land holdings.

4.1.7 Cropping pattern and average yield of crops:

The information pertaining to the cropping pattern prevailing on sample farms in different size groups of stationary and migratory beekeepers is presented in Table 4.7. It can be observed from the table that maize and paddy were the only crops grown during kharif season. Between these crops, paddy was most important (having 33.11 per cent cropped area) on stationary farms, however, maize (having 32.12 per cent cropped area) was more important on migratory farms. As far as rabi crops are concerned, only wheat and berseem were grown by the sample of beekeepers. Wheat dominated the cropping pattern on stationary and migratory

Table 4.6 Composition of livestock population on sample farms

Type of livestock	(Number/Farm)					
	Stationary			Migratory		
	Small	Large	Average	Small	Large	Average
Bullocks	0.15	0.14	0.15	0.23	0.07	0.15
Cows						
In milk	0.23	0.07	0.15	0.15	0.15	0.15
Dry	0.31	0.14	0.22	0.31	0.30	0.30
Buffaloes						
In milk	0.31	0.29	0.30	0.31	0.19	0.25
Dry	0.23	0.29	0.26	0.27	0.19	0.23
Young stock						
Cows	0.08	-	0.04	0.12	0.11	0.11
Buffaloes	0.01	-	0.04	0.19	0.11	0.15
Sheep	0.54	-	0.26	0.73	0.44	0.58
Total Livestock	1.86	0.93	1.42	2.31	1.56	1.92

Table 4.7 Cropping pattern on sample farms

Particulars	(Ha/Farm)					
	Stationary			Migratory		
	Small	Large	Average	Small	Large	Average
<u>Kharif crops</u>	0.141 (50.00)	0.157 (50.16)	0.149 (49.83)	0.195 (50.00)	0.191 (50.00)	0.193 (50.00)
i) Maize	0.046 (16.31)	0.054 (17.25)	0.050 (16.72)	0.104 (26.67)	0.143 (37.43)	0.124 (32.12)
ii) Paddy	0.095 (33.69)	0.103 (32.91)	0.099 (33.11)	0.091 (23.33)	0.048 (12.57)	0.069 (17.88)
<u>Rabi crops</u>	0.141 (50.00)	0.156 (49.84)	0.150 (50.17)	0.195 (50.00)	0.191 (50.00)	0.193 (50.00)
i) Wheat	0.141 (50.00)	0.148 (47.28)	0.145 (48.50)	0.187 (47.95)	0.191 (50.00)	0.189 (48.96)
ii) Berseem	-	0.008 (2.56)	0.005 (1.67)	0.008 (2.05)	-	0.004 (1.04)
Total cropped area	0.282 (100)	0.313 (100)	0.299 (100)	0.390 (100)	0.382 (100)	0.386 (100)
Cropping Intensity (%)	200.00	199.36	199.33	200.00	200.00	200.00

Figures in parentheses indicate percentages of total cropped area

beekeeping farms accounting for more than 48 per cent of total cropped area. The cropping intensity was as high as 199.33 and 200 per cent on stationary and migratory farms, respectively. This high intensity again may be because of the small size of land holdings on beekeeping farms.

The average yield of different crops obtained by sample beekeepers in the study area are presented in Table 4.8. The average yield of all the cereals except for maize were found to be higher than the state averages. Similar results were obtained by Gupta, 1992. The average yield of wheat was the highest (33.58 q/ha) among the crops grown on sample farms. Paddy was next important crop in terms of its yield per unit on the sample farms.

4.2 Economics of Honey Production

4.2.1 Average size of bee colonies:

Table 4.9 gives an information about the survey of beekeeping farms, number of bee colonies, their range as well as average size of bee colonies possessed by sample beekeepers in the study area. It is evident from the table that in all, 27 stationary consisting of 13 small and 14 large and 53 migratory including 26 small and 27 large were interviewed for conducting the study. The total number of bee colonies possessed by all the stationary and migratory beekeeping farms was 1,657 and 5,357 respectively. The

Table 4.8 Average yield (q/ha) of agricultural crops on the sample farms

Crops	Stationary			Migratory		
	Small	Large	Average	Small	Large	Average
Maize	19.33	15.13	16.99	16.03	15.37	15.64
Paddy	24.84	23.96	24.37	15.68	23.52	18.43
Wheat	33.70	33.17	33.42	33.13	34.30	33.73

Table 4.9 Different parameters of sample bee farms

Particulars	Stationary			Migratory		
	Small	Large	Total	Small	Large	Total
Number of farms surveyed	13	14	27	26	27	53
Total number of bee colonies	555	1102	1657	2080	3295	5375
Average size of colonies	43	79	61	80	122	101
Minimum size or number of colonies	25	62	25	44	105	44
Maximum size or number of colonies	60	120	120	100	150	150
Standard error	10.16	15.79	22.55	16.67	12.71	25.84
Coefficient of variation (%)	23.80	20.06	36.75	20.84	10.42	25.48

average size of bee colonies under stationary situation ranged from 43 on small to 79 on large bee farms, thus giving an overall average of 61 bee colonies. The average size of bee colonies on migratory beekeeping farms was found to be 80 on small and 122 on large farms, thus giving an overall average of 101 bee colonies. The range of bee colonies on stationary and migratory bee farms was estimated to be 25-120 and 44-150, respectively. The figures for coefficient of variation showed less variability on migratory farms than the stationary ones for both the categories i.e. small and large.

4.2.2 Investment pattern:

The pattern of investment on fixed assets is an indicator of income generating capacity of beekeepers. The total investment on farm tools and equipments meant for beekeeping according to farm size category of stationary and migratory beekeepers is presented in Table 4.10. From this table, it is evident that the total investment on beekeeping was found to be increasing due to increase in size of holding (bee colonies) on stationary and migratory beekeeping farms. However, the overall average investment on stationary and migratory bee farms was worked out to the order of Rs 44,503 and Rs 64,963 respectively.

Table 4.10 Investment (Rs/farm) on farm tools and equipments for beekeeping on sample farms

Particulars	Stationary			Migratory		
	Small	Large	Average	Small	Large	Average
Bee hive with 10 frames	29250 (92.38)	52818 (93.60)	41470 (93.18)	59885 (93.51)	61737 (93.75)	60828 (93.63)
Hive stand	912 (2.88)	1620 (2.87)	1279 (2.87)	1754 (2.74)	2701 (4.10)	2237 (3.44)
Bee veil, bee brush, bee gloves	91 (0.29)	112 (0.20)	102 (0.23)	123 (0.19)	111 (0.17)	116 (0.18)
Bee smoker, hive tool, uncapping knife	113 (0.36)	124 (0.22)	119 (0.27)	199 (0.31)	134 (0.21)	166 (0.26)
Uncapping tray	-	37 (0.07)	19 (0.04)	116 (0.18)	111 (0.17)	113 (0.17)
Feeders	8 (0.03)	13 (0.02)	11 (0.03)	60 (0.09)	20 (0.03)	40 (0.06)
Honey extractor (hand operated)	765 (2.42)	711 (1.26)	737 (1.66)	1091 (1.70)	78 (0.12)	575 (0.89)
Honey extractor (electric operated)	-	214 (0.38)	111 (0.25)	-	-	-
G.I. Tub, buckets	161 (0.50)	239 (0.42)	201 (0.45)	312 (0.49)	292 (0.44)	302 (0.47)
Kerosene oil stove	172 (0.54)	168 (0.30)	170 (0.38)	217 (0.34)	190 (0.29)	203 (0.31)
Miscellaneous (Ant protector, queen excluder, frame wire etc.)	190 (0.60)	370 (0.66)	284 (0.64)	287 (0.45)	476 (0.72)	383 (0.59)
Total investment	31662 (100)	56426 (100)	44503 (100)	64044 (100)	65850 (100)	64963 (100)
Investment/ colony	736	714	730	801	540	643

Figures in parentheses indicate percentages of total

As far as individual items are concerned, bee-hives with 10 frames was the major item of investment as it alone accounted for 93.18 per cent and 93.63 per cent of the total investment on stationary and migratory beekeeping farms. Hivestand with 2.87 per cent and 3.44 per cent of the total investment was the next important item of investment under stationary and migratory situations, respectively.

It can be noticed from Table 4.10 that the investment per colony decreased with the increase in the size of holdings (bee colonies) on stationary as well as on migratory beekeeping farms. The reason for this can be cited as the economies of scale. The overall average investment per colony was estimated at Rs 730 on stationary and Rs 643 on migratory bee farms.

4.2.3 Cost of honey production:

Economic analysis of an enterprise is essential to examine its economic viability in different resource situations. Therefore, data on cost and returns for different categories of beekeeping (stationary and migratory) households were analysed and the results are presented in Table 4.11 and 4.12.

An examination of Table 4.11 reveals that the total cost of honey production per farm on stationary farms was Rs 12,172 for small and Rs 19,738 for large size bee farms,

Table 4.11 Cost of honey production (Rs/Farm)

Items	Stationary			Migratory		
	Small	Large	Overall	Small	Large	Overall
Total fixed cost (TFC)	3407 (27.99)	6004 (30.42)	4753 (29.53)	6820 (26.37)	6996 (22.83)	6910 (24.42)
i)Interest on fixed capital @ 10% p.a.	3166 (26.01)	5643 (28.59)	4450 (27.65)	6404 (24.76)	6585 (21.49)	6496 (22.96)
ii)Depreciation on equipment & machinery @ 10%	241 (1.98)	361 (1.83)	303 (1.88)	416 (1.61)	411 (1.34)	414 (1.46)
Total variable cost (TVC)	8765 (72.01)	13734 (69.58)	11342 (70.47)	19045 (73.63)	23645 (77.17)	21389 (75.58)
i)Comb foundation sheets	2045 (16.80)	3559 (18.03)	2830 (17.58)	3560 (13.76)	4508 (14.71)	4043 (14.29)
ii)Feed (sugar)	4963 (40.77)	7903 (40.04)	6487 (46.30)	5326 (20.59)	8109 (26.46)	6744 (23.83)
iii)Chemicals	27 (0.22)	77 (0.39)	53 (0.33)	123 (0.48)	224 (0.73)	175 (0.62)
iv)Labour	1123 (9.23)	1171 (5.93)	1148 (7.13)	1446 (5.59)	1376 (4.49)	1410 (4.98)
v)Transportation (cost)	-	-	-	7396 (28.59)	7826 (25.55)	7615 (26.91)
vi)Miscellaneous expenses	190 (1.56)	370 (1.88)	284 (1.76)	287 (1.11)	476 (1.55)	383 (1.35)
vii)Interest on working capital @10% p.a. for 6 months	417 (3.43)	654 (3.31)	540 (3.37)	907 (3.51)	1126 (3.68)	1019 (3.60)
Total cost (TC)	12172 (100)	19738 (100)	16095 (100)	25865 (100)	30641 (100)	28299 (100)

Figures in parentheses indicate percentages of total

Table 4.12 Cost and returns of honey production (Rs/Farm)

Items	Stationary			Migratory		
	Small	Large	Overall	Small	Large	Overall
Total cost (TFC)	12172	19738	16095	25865	30641	28299
Total gross returns (TGR)	25320 (100)	43710 (100)	35400 (100)	110370 (100)	155160 (100)	133020 (100)
i) Honey production	19500 (77.01)	34170 (78.17)	27120 (76.61)	96870 (87.77)	135120 (87.08)	116340 (87.46)
ii) Bee wax production	780 (3.08)	1380 (3.16)	1080 (3.05)	3900 (3.53)	5400 (3.48)	4680 (3.52)
iii) Sale of bee colonies	5040 (19.91)	8160 (18.67)	7200 (20.34)	9600 (8.70)	14640 (9.44)	12000 (9.02)
Net returns over total variable cost	16555	29976	24058	91325	131515	111631
Net returns over total cost	13148	23972	19305	84505	124519	104721
Cost of honey production (Rs/kg)	18.73	17.33	17.80	8.01	6.80	7.30

Figures in parentheses indicate percentages of total

thus giving an overall average of Rs 16,095. Of the total cost on overall stationary farms, total fixed cost and total variable cost accounted for 29.53 and 70.47 per cent, respectively. Similarly on migratory bee farms, the total cost of honey production per farm was estimated at Rs 25,865 on small, Rs 30,641 on large and Rs 28,299 on overall migratory farms. The proportion of total fixed cost and total variable cost in the total cost of honey production on all migratory farms was 24.42 and 75.58, respectively. A perusal of Table 4.11 shows that total costs increased with the increase in size of bee colonies under both stationary and migratory situations. Among the total variable cost on stationary bee farms, feed (sugar) alone accounted for 40.30 per cent of the total cost. Comb foundation sheet with 17.58 per cent was the next important item of expenditure on stationary bee farms. On migratory bee farms, transportation cost during migration was the highest (26.91 per cent) followed by feed (sugar). The expenditure on comb foundation sheets on these farms was estimated to be 14.29 per cent of the total cost.

As far as the gross returns from beekeeping is concerned, honey, beeswax and sale of bee colonies were the important sources of income while calculating cost and returns of honey production. The total gross returns per

farm from beekeeping were found to be increasing with the increase in size of bee colonies. The total gross returns per farm were worked out to be Rs 35,400 and Rs 1,33,020 on stationary and migratory bee farms, respectively. In the total gross returns, the contribution of honey production was the highest on different farm sizes of stationary and migratory beekeepers (76.61 per cent on stationary and 87.46 per cent on migratory bee farms). Sale of bee colonies was the next important item of total gross returns as its share in the gross returns was 20.34 per cent and 9.02 per cent on stationary and migratory bee farms, respectively. The share of beeswax production in total gross returns was more than 3 per cent on stationary as well as migratory bee farms. Net returns over total cost were estimated to be Rs 19,305 and Rs 1,04,721 on stationary and migratory bee farms. Net returns over total cost were found to increasing with increase in size of bee colonies which may be because of economies of scale and better techniques of beekeeping. As far as cost of honey production is concerned, it was Rs 17.80 per kg on stationary and Rs 7.30 per kg on migratory bee farms. It can be concluded from this table that the cost of honey production per kg of honey on migratory bee farms was very low in comparison to stationary bee farms.

To have a clear-cut picture of the cost and returns of honey production, the calculation were also made on per hundred bee colonies basis and the results are given in Table 4.13 and 4.14. The total fixed cost of honey production per hundred colonies was less (Rs 6,841) on migratory farms than the stationary one (Rs 7,795). However, total variable cost and total cost per hundred colonies was of reverse order on stationary and migratory bee farms because transportation cost was one of the main component of total variable cost on migratory bee farms which was not present on stationary bee farms. As far as feed (sugar) is concerned, its cost per hundred colonies was the highest (Rs 10,639) on stationary bee farms in comparison to Rs 6,676 on migratory bee farms. It can be concluded from Table 4.13 that total cost of honey production per hundred bee colonies was more (Rs 28,016) on migratory bee farms than stationary ones (Rs 26,396). The total gross return per hundred colonies on stationary and migratory bee farms were estimated at Rs 58,056 and Rs 1,31,690 on stationary and migratory bee farms, respectively. This indicated that not only the costs per hundred colonies were the highest on migratory bee farms but the gross returns were also the highest. Similarly, net returns over total cost per hundred

Table 4.13 Cost of honey production (Rs/100 colonies)

Items	Stationary			Migratory		
	Small	Large	Overall	Small	Large	Overall
Total fixed cost (TFC)	7938 (27.99)	7625 (30.42)	7795 (29.53)	8525 (26.37)	5737 (22.83)	6841 (24.42)
i)Interest on fixed capital @ 10% p.a.	7377 (26.01)	7167 (28.59)	7298 (27.65)	8005 (24.76)	5400 (21.49)	643 (22.96)
ii)Deprecia- tion on equipment & machinery @ 10%	561 (1.98)	458 (1.83)	497 (1.88)	520 (1.61)	337 (1.34)	410 1.46)
Total variable cost (TVC)	20422 (72.01)	17442 (69.58)	18601 (70.47)	23806 (73.63)	19389 (77.17)	21175 (75.58)
i)Comb foundation sheets	4765 (16.80)	4520 (18.03)	4641 (17.58)	4450 (13.76)	3697 (14.71)	4003 (14.29)
ii)Feed (sugar)	11564 (40.77)	10037 (40.04)	10639 (40.30)	6657 (20.59)	6649 (26.46)	6676 (23.83)
iii)Chemicals	63 (0.22)	98 (0.39)	87 (0.33)	154 (0.48)	184 (0.73)	173 (0.62)
iv)Labour	2616 (9.23)	1487 (5.93)	1882 (7.13)	1807 (5.59)	1128 (4.49)	1396 (4.98)
v)Trans- portation (cost)	-	-	-	9245 (28.59)	6418 (25.55)	7539 (26.91)
vi)Miscellan- eous expenses	443 (1.56)	470 (1.88)	466 (1.76)	359 (1.11)	390 (1.55)	379 (1.35)
vii)Interest on working capital @10% p.a. for 6 months	971 (3.43)	830 (3.31)	886 (3.37)	1134 (3.51)	923 (3.68)	1009 (3.60)
Total cost (TC)	28361 (100)	25067 (100)	26396 (100)	32331 (100)	25126 (100)	28016 (100)

Figures in parentheses indicate percentages of total

Table 4.14 Cost and returns of honey production (Rs/100 colonies)

Items	Stationary			Migratory		
	Small	Large	Overall	Small	Large	Overall
Total cost (TC)	28361	25067	26396	32331	25126	28016
Total gross returns (TGR)	58996 (100)	55512 (100)	58056 (100)	137963 (100)	127231 (100)	131699 (100)
i) Honey production	45435 (77.01)	43396 (78.17)	44477 (76.61)	121088 (87.77)	110798 (87.08)	115177 (87.46)
ii) Bee wax production	1818 (3.08)	1753 (3.16)	1771 (3.05)	4875 (3.53)	4428 (3.48)	4633 (3.52)
iii) Sale of bee colonies	11743 (19.91)	10363 (18.67)	11808 (20.34)	12000 (8.70)	12005 (9.44)	11880 (9.02)
Net returns over total variable cost	30635	30445	31660	105632	102105	103674
Net returns over total cost	38574	38070	39455	114157	107842	110515
Cost of honey production (Rs/kg)	18.73	17.33	17.80	8.01	6.80	7.30

Figures in parentheses indicate percentages of total

colonies were also highest (Rs 1,03,674) on migratory bee farms than Rs 31,660 on stationary one.

4.2.4 Break-even output:

The break-even analysis was performed to depict the average number of bee colonies at which no profit-no loss situation prevails and to know about the viable size of bee colonies to be maintained on different categories of stationary and migratory bee farms. It is evident from Table 4.15 that the break-even number of bee colonies increased with increase in size of holdings. The break-even number of bee colonies on small and large bee farms of stationary beekeepers was worked out to be 14 and 23, respectively, thus giving an overall average of 18 bee colonies for stationary beekeepers. The corresponding figures for migratory farms were 7 on small and 8 on large bee farms showing an overall average of 7 bee colonies. It can be concluded from Table 4.15 that break-even number of bee colonies for migratory bee farms was quite a small than the stationary ones mainly because of their higher annual average honey yield per colony. It can be concluded from this table that different categories of stationary and migratory bee farms must rear more than the break-even number of colonies specified against the categories to earn profit.

Table 4.15 Break-even number of bee colonies on sample farms

Items	Stationary			Migratory		
	Small	Large	Average	Small	Large	Average
Honey production (Kg)	650.00	1139.28	903.70	3228.85	4503.70	3878.30
Total fixed cost (Rs)	3407	6004	4753	6820	6996	6910
Total variable cost (Rs)	8765	13734	11342	19045	23645	21389
Average variable cost (Rs)	13.48	12.05	12.55	5.90	5.25	5.52
Price per kg of honey (Rs)	30.00	30.00	30.00	30.00	30.00	30.00
Break-even point (No. of colonies)	14	23	18	7	8	7

4.2.5 Production and disposal of honey:

The production and disposal of honey on different farm sizes of stationary and migratory beekeepers was analysed and results are presented in Table 4.16. The examination of this table shows that the total honey production per farm increased due to increase in size of holding. The average annual honey production per farm was estimated at 903.70 kg and 3,878.30 kg on stationary and migratory bee farms, respectively. In the study area, the beekeepers took two crops of honey during spring (Feb-March) and summer (June-July) seasons. The annual honey production per farm on stationary bee farms was more (51.23 per cent) in spring season than summer (48.77 per cent). However, reverse trend was noticed on migratory bee farms. The proportion of honey kept for self-consumption varied from 1.39 per cent of total honey production on stationary to 0.33 per cent on migratory bee farms. The per capita consumption of honey on sample farms was worked out to 2.539 and 2.383 kgs per annum on stationary and migratory bee farms, respectively.

The marketed surplus of honey on stationary and migratory beekeeping farms was 94.81 per cent and 99.08 per cent of total honey production, respectively, thereby showing that beekeeping was more commercialized on migratory farms. The marketed surplus of honey increased due to

Table 4.16 Production and disposal of honey on sample bee farms

Particulars	(Kg/Farm)					
	Stationary			Migratory		
	Small	Large	Overall	Small	Large	Overall
Total production	650.00 (100)	1139.28 (100)	903.70 (100)	3228.85 (100)	4503.70 (100)	3878.30 (100)
i) Spring	311.54 (47.93)	603.57 (52.98)	462.96 (51.23)	1484.62 (45.98)	2081.48 (46.22)	1788.68 (46.12)
ii) Summer	338.46 (52.07)	535.71 (47.02)	440.74 (48.77)	1744.23 (54.02)	2422.22 (53.78)	2089.62 (53.88)
Kept for home consumption	13.46 (2.07)	11.64 (1.02)	12.52 (1.39)	13.85 (0.43)	11.56 (0.26)	12.68 (0.33)
Meant for gift	29.62 (4.56)	38.71 (3.40)	34.33 (3.80)	24.54 (0.76)	21.55 (0.48)	23.02 (0.59)
Marketed surplus	606.92 (93.37)	1088.93 (95.58)	856.85 (94.81)	3190.46 (98.81)	4470.59 (99.26)	3842.60 (99.08)
Average honey yield (kg/colony)	15.23	14.47	14.73	40.36	36.90	38.24
Per capita honey consumption (Kg)	2.740	2.361	2.539	2.648	2.137	2.383

Figures in parentheses indicate percentages of total

increase in size of holdings. Further examination of Table 4.16 shows that average honey yields per colony decreased due to increase in size of holding. The average honey yield per colony per annum was worked out to be 14.73 and 38.24kg on stationary and migratory bee farms, respectively. It shows that the average honey yield per colony on migratory bee farms was more than twice the average honey yield per colony on stationary bee farms. The reason for higher yield of honey per colony on migratory farms was availability of abundance of bee flora while on migration. However, the stationary beekeepers faced difficulty of bee flora during rainy season due to high rainfall. Besides, the winter spell followed by autumn was of longer duration in the study area.

As far as mode of marketed surplus of honey on sample farms is concerned, it is evident from Table 4.17 that 17 per cent of total marketed surplus was directly sold to beekeepers' cooperative society on stationary farms. However, the proportion of such honey on migratory farms was 36.16 per cent. A larger part of total marketed surplus of honey was disposed-off through wholesalers under both the situations of stationary and migratory bee farms. The proportion of marketed surplus of honey sold through wholesalers was 77.55 and 63.39 per cent on stationary and migratory bee farms, respectively.

Table 4.17 Mode of marketed surplus of honey on sample bee farms

(Kg/Farm)						
Particulars	Stationary			Migratory		
	Small	Large	Overall	Small	Large	Overall
Direct sale to consumers		88.93 (8.17)	46.11 (5.38)	-	-	-
Direct sale to Beekeeper's society	173.07 (28.52)	121.43 (11.15)	146.30 (17.07)	1393.65 (43.68)	1419.44 (31.75)	1406.79 (36.61)
Direct sale to whole-salers	433.85 (71.48)	878.57 (80.68)	664.44 (77.55)	1796.81 (56.32)	3051.15 (68.25)	2435.81 (63.39)
Total marketed surplus	606.92 (100)	1088.93 (100)	856.85 (100)	3190.46 (100)	4470.59 (100)	3842.60 (100)

Figures in parentheses indicate percentages of total

4.2.6 Source wise household income:

The relative contribution of different components of gross farm income across farm size categories on stationary and migratory bee farms is depicted in Table 4.18. It is evident from the table that beekeeping was the important source of household income on different categories of bee farms in the study area. The income from beekeeping was found increasing with the increase in size of apiaries. The gross annual income from beekeeping varied from Rs 25,320 on small farms to Rs 43,710 on large farms of stationary beekeepers, thus giving an overall average of Rs 35,400. The corresponding figures for small and large category of migratory beekeepers were Rs 1,10,370 and Rs 1,55,160, respectively, giving an overall average of Rs 1,33,020. The share of agriculture to total gross household income varied from 4.35 per cent on stationary farms to 2.33 per cent on migratory farms. The contribution of dairying to annual gross household income was estimated to the extent of 1.28 per cent on stationary and below 1.00 per cent on migratory bee farms. Service/pension and trade were noticed to be the other important sources of household income on stationary bee farms accounting for about 35 per cent of gross household income. The contribution of these sources on migratory farms was about 8 per cent of gross household

Table 4.18 Source-wise distribution of gross household income on samle bee farms

Particulars	(Rs/Farm)					
	Stationary			Migratory		
	Small	Large	Overall	Small	Large	Overall
Agriculture	2957 (4.43)	3013 (4.34)	2986 (4.35)	3390 (2.61)	3580 (2.12)	3487 (2.33)
Beekeeping	25320 (37.97)	43710 (63.02)	35400 (51.59)	110370 (84.90)	155160 (91.90)	133020 (88.90)
Dairy	979 (1.47)	778 (1.12)	875 (1.28)	957 (0.74)	652 (0.39)	826 (0.55)
Service/ Pension	13108 (19.66)	13071 (18.85)	13089 (19.08)	9731 (7.49)	6667 (3.95)	8170 (5.46)
Trade/ Shop	17631 (26.44)	5357 (7.72)	11267 (16.42)	5077 (3.91)	2333 (1.38)	3679 (2.46)
Tailoring, blacksmithy, Pottery etc.	4154 (6.23)	-	2000 (2.91)	-	444 (0.26)	226 (0.15)
Off-farm labour	2538 (3.80)	-	1222 (1.78)	462 (0.35)	-	226 (0.15)
Others	-	3429 (4.95)	1778 (2.59)	-	-	-
Total	66687 (100)	69358 (100)	68617 (100)	129987 (100)	168836 (100)	149634 (100)
Per capita income	13554	14069	13918	24854	31208	28127

Figures in parentheses indicate percentages of total

income. Tailoring, blacksmithy, pottery and off-farm labour were observed to be another important sources of gross household income on the beekeeping farms in the study area.

A close examination of Tabel 4.18 shows that the annual total gross household income on stationary and migratory beekeeping farms was assessed to the order of Rs 68,617 and Rs 1,49,634, respectively. The per capita income on these farms was worked out to Rs 13,918 and Rs 28,127, respectively, thus showing high economic status of the beekeepers in the study area.

4.3 Economics of Honey Marketing

The final objective of every commercial activity is to ensure adequate market for its products and services. Marketing ensures the revenue from the activity, hence it is given top most importance. Beekeeping is an unorganised activity facing many marketing problems. The beekeepers have no organised marketing mechanism to establish direct realtion with consumers. Further demand for honey is not of that type as in case of vegetables, milk, fish, eggs etc. mainly because of general unawareness among the users. The people of our country still regard honey as a medicine and do not consider it a part of daily food intake as it is in the western countries like Germany and USA. Thus the beekeepers of the area are mostly/solely dependent on the

middlemen who further sell it to the pharmaceutical firms like Hamdard, Dabur, Vaidyanath, Zhandu etc. These factors pave the way for middlemen having complete hold over the beekeepers in marketing activities. At the time of investigation, the reports of unsold honey were also noticed due to lack of demand. Since marketing aspect is an important factor and is vitally related to the socio-economic conditions of beekeepers community. Thus, during the course of the field work of the survey this aspect was also examined and the information on marketing infrastructure such as place/mode of marketing, the agencies involved in marketing, marketing costs, price paid and or received by the middlemen was also collected.

4.3.1 Intermediaries and their role:

The Beekeepers' Co-operative Industrial Society Ltd., Ichhi, wholesalers and retailers were the main intermediaries involved in the marketing of honey in the study area.

I. The Kangra Valley Beekeepers Co-operative Industrial Society Ltd., Ichhi.

The Kangra Valley Beekeepers Cooperative Industrial Society Ltd. Ichhi, P.O. Ichhi, Tehsil and District Kangra (H.P.) was registered on 13th March, 1973 with a membership of 24 members. At the time of registration, the area of operation of the society was Rait and Kangra Blocks, but

later on, the area of operation of the society was extended to whole of District Kangra by amendment in by laws dated 20.4.1990. At present the membership of the society is 148 + 1 Govt.

i) Main objectives of the society:

The main object of the society is to promote the economic interests of its members by making arrangement for the sale of honey procured from the individual members. The society also make arrangements for the supply of bee colonies, bee hives, bee equipments etc. to its members. It also provides loans to the beekeepers on their demands. The society keeps only 2 per cent commission on the sale of honey procured from its members.

ii) Working capital position of the society:

It is the unique kind of society in the Northern India and the society has made progress steadily since its registration. The progress regarding increase in business and working capital made during the last five years by the society is given in Table 4.19.

It is clear from the table that membership, share capital of members as well as of government increased over the years. Besides, the value of sale of honey, undistributed profits and profits for the years also showed a magnificent increase over years. However, the advancement

Table 4.19. Working capital position of the society

Sr. No.	Particulars	1991-92	1992-93	1993-94	1994-95	1995-96
1.	Membership	122+1	142+1	147+1	147+1	148+1
2.	Share capital of members	24592	27,607	30,204	30,204	30,704
3.	Share capital of HP Govt.	10,000	10,000	68,000	68,000	85,000
4.	Deposits with Banks	350,933	254,882	1014997	323,652	188,306
5.	Loans to members	31,410	19,995	17,395	20,928	20,928
6.	Sale of Honey	9,22,085	658,698	15,25,914	14,87,075	13,53,106
7.	Un-distributed profits	72,604	87,197	108,087	146,648	200,607
8.	Profit for the year	14,593	20,890	38,562	53,959	NA

Source: Audit report of Beekeeper's Co-operative Industrial Society Ltd, Ichhi (1995-96)

of loans to the members decreased from Rs 31,410 in 1991-92 to Rs 20,928 in 1995-96.

iii) Role of ICDP Kangra:

Keeping in view the potential to develop agro based industry and to provide remunerative price of honey to the producers, the Integrated Cooperative Development Project, Kangra District has taken the initiative to grant financial assistance to the society for establishment of processing plant and working capital for expansion of its business. The society has been provided the following assistance under the I.C.D.P. scheme:-

- | | |
|--|----------------------|
| 1. Loan for construction of building and processing plant, during the year 1992-93 | Rs. 1,85,000-00 |
| 2. Margin money for expansion of business activities | |
| i) 1992-93 | Rs. 58,000-00 |
| ii) 1994-95 | Rs. <u>17,000.00</u> |
| | Rs. 75,000.00 |

The building of the society is complete and the honey processing plant would be installed shortly. With the establishment of honey plant, the members of the society would be getting better remunerative price of honey produced by them.

II Wholesaler/Contractor

The wholesalers/contractors made pre-harvest contracts with the beekeepers and collected the honey from beekeepers

of the study area. After incurring costs on packing, transportation, storage etc. they sold it to retailers at distant markets within and outside the state.

III) Retailer

The retailers purchased the honey from the wholesalers and then sold directly to the consumers,

4.3.2 Channels of honey marketing:

Marketing channel is a route through which the commodity passes from producers to ultimate consumers. The main marketing channels of honey were identified on the basis of honey sold by the beekeepers in various markets within and outside the state. Most of the beekeepers sold their honey through wholesalers/contractors and beekeepers co-operative society. Direct sale of honey to consumers was very small on stationary and migratory situations.

The prevailing marketing channels alongwith percentage of the beekeepers and sale of honey identified in each channel in honey trade are shown in Table 4.20, Fig 4.1 and Fig 4.2. It is evident from the table that on stationary farms about four per cent of the beekeepers directly sold about five per cent of total honey to consumers. Channels II (Beekeeper → Wholesaler → Retailer → Consumer) was found to be the most important channel of honey marketing on stationary beekeeping farms because 74.08 per cent of the

Table 4.20. Channels of honey marketing in the study area

Category/ Channel No	Channel	Beekeepers (Number)	Honey marketed (kg)
<u>Stationary</u>			
Channel-I	Beekeeper → Consumer	1 (3.70)	1245 (5.38)
Channel-II	Beekeeper → Wholesaler → Retailer → Consumer	20 (74.08)	17940 (77.55)
Channel-III	Beekeeper → Beekeeper's Cooperative Society → Wholesaler → Retailer → Consumer	6 (22.22)	3950 17.07)
<u>Migratory</u>			
Channel-I	Beekeeper → Beekeeper's Cooperative Society → Wholesaler → Retailer → Consumer	20 (37.74)	74560 (36.61)
Channel-II	Beekeeper → Wholesaler → Retailer → Consumer	33 (62.26)	129098 (63.39)

Figures in parentheses indicate percentage of total
beekeepers and honey marketed in each category

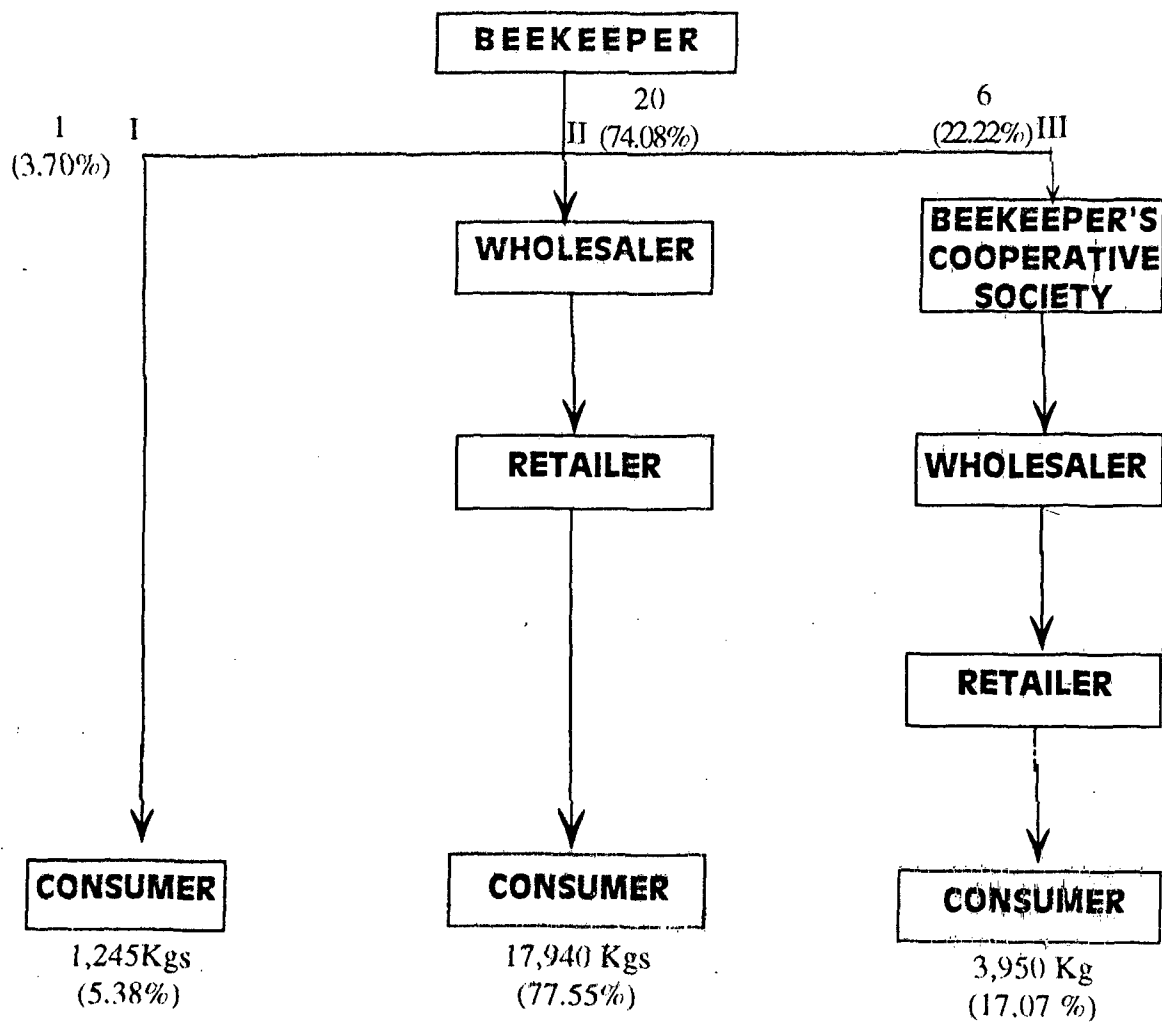


FIG. 4.1 Marketing channels of honey on stationary farms

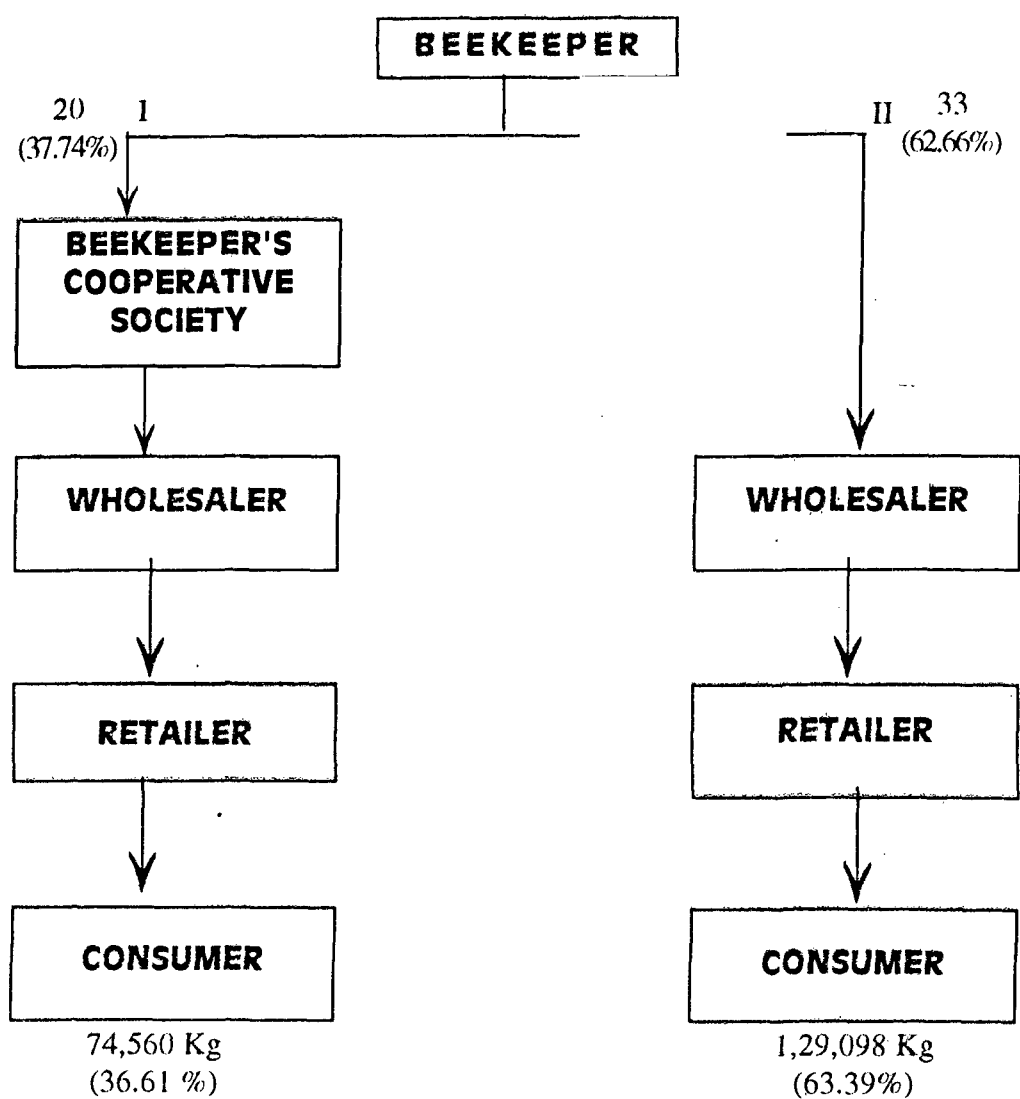


FIG. 4.2 Marketing channels of honey on migratory farms

beekeepers sold 77.55 per cent of honey through this channel. The other important channel of honey marketing on stationary beekeeping was Beekeeper → Beekeepers' Co-operative Society → Wholesaler → Retailer → Consumer (Fig 4.1). This channel was availed of by 22.22 per cent of the beekeepers and the proportion of honey sold through this channel was estimated at 17.07.

Further examination of Table 4.20 shows that channel II (Beekeeper → Wholesaler → Retailer → Consumer) was important channel of honey marketing on migratory beekeeping farms. This channel alone accounted for 63.39 per cent of the honey marketing and 62.26 per cent of the beekeepers. Beekeeper → Wholesaler → Retailer → Consumer was the second important channel of honey marketing (Fig 4.2). The percentage of beekeepers and honey sold through this channel was worked out to 37.74 and 36.61 per cent, respectively.

It can be concluded from the table that major part of honey sale to consumers took place through wholesalers who purchased honey from beekeepers.

4.3.3 Marketing costs, marketing margins and price-spread:

Marketing costs refers to the actual expenses incurred by the beekeepers and other intermediaries in bringing honey and services. Marketing margins refers to the difference between the price paid and received by a specific agency

during movement of the honey from the apiarist to the consumer.

The price-spread refers to the difference between the price paid by the consumer and the price received by the beekeeper (producer) for an equivalent quantity of honey. This spread consisted of marketing costs and margins of the intermediaries, which ultimately determined the overall effectiveness of a marketing system. The parameters related to economics of marketing were estimated separately for stationary and migratory beekeepers and the results are shown in Table 4.21 and 4.22, respectively.

A summary of marketing parameters including marketing efficiency index have been presented in Table 4.23.

Table 4.21 shows that producers' share in consumers' rupees was the highest (97.07 per cent) in channel I though this channel was not the important one because only 5.38 per cent of the honey was sold through this channel. In channel II, the producers' share in consumers' rupee was found to be 61.70 per cent which was the highest among the important channels of honey marketing. The margin of the wholesaler was estimated to be 2.13 per cent of the consumers' rupee and costs incurred by wholesalers were 29.82 per cent of consumers' rupee. Similarly, the marketing cost and margin

Table 4.21 Marketing costs, margins and price spread in the marketing of honey on stationery farms

Items of cost	Channel I		Channel II		Channel III	
	Rs/kg	% of total	Rs/kg	% of total	Rs/kg	% of total
Net price received by beekeeper	29.12	97.07	29.00	61.70	28.90	58.98
Costs incurred by beekeeper						
i) Wastage/spoilage	0.28	0.93	0.40	0.85	0.50	1.02
ii) Commission to society	0.60	2.00	0.60	1.28	0.60	1.22
Beekeeper's sale or Society's purchase price	-	-	-	-	30.00	61.22
Costs incurred by society						
i) Labour, postage etc.	-	-	-	-	0.20	0.41
ii) Storage	-	-	-	-	0.50	1.02
Society's net margin	-	-	-	-	0.30	0.61
Society's sale or Wholesalers purchase price	-	-	30.00	63.83	31.00	63.26
Costs incurred by wholesaler						
I) Packing & labelling	-	-	10.00	21.28	11.00	22.45
ii) Labour	-	-	1.00	2.13	1.00	2.04
iii) Losses	-	-	2.00	4.26	1.50	3.06
iv) Storage	-	-	1.00	2.13	1.00	2.04
Wholesaler's net margin	-	-	1.00	2.13	1.50	3.06
Wholesaler's sale or retailer's purchase price	-	-	45.00	95.74	47.00	95.92
Costs incurred by retailer						
i) Labour	-	-	0.50	1.06	0.50	1.02
ii) Others (storage, rent of shop etc.)	-	-	0.50	1.06	0.50	1.02
Retailer's net margin	-	-	1.00	2.13	1.00	2.04
Retailer's sale or consumer's purchase price	30.00	100.00	47.00	100.00	49.00	100.00

of the retailer were found to be 2.12 per cent and 2.13 per cent of the consumers' rupee.

In channel III, producers' share in the consumers' rupee was found to be 58.98 per cent. The costs incurred by the co-operative society were 1.43 per cent of the consumers' rupee, however, its net margins were only 0.61 per cent of the consumers' rupee. In the same channel, the marketing costs and margins of the wholesalers were to the tune of 29.59 and 3.06 per cent of the consumers' rupee. Similarly, the marketing cost and margins of retailers in channel III were found to be 2.04 and 2.04 per cent of the consumers' rupee.

Table 4.22 shows the details of marketing costs, margins and price-spread in the marketing of honey on migratory bee farms. It is evident from the table that producers' share in consumers' rupee through channel-I was assessed at 57.00 per cent. Marketing cost of the society and wholesaler was 1.20 and 31.00 per cent of the consumers' rupee. Marketing margin earned by the wholesaler came to be 3.00 per cent of the consumers' rupee. Retailer's marketing cost and margin were found to be 2.00 per cent each of the consumers' rupee, respectively. The producers' share in the consumers' rupee through channel-II was little bit lower (56.86 per cent) than channel-I, though the former

Table 4.22 Marketing costs, margins and price spread in the marketing of honey on migratory farms

Items of cost	Channel I		Channel II	
	Rs/kg	% of total	Rs/kg	% of total
Net price received by beekeeper	28.50	57.00	29.00	56.86
Costs incurred by beekeeper				
i) Wastage/spoilage	0.30	0.60	0.40	0.78
ii) Transportation	0.60	1.20	0.50	0.98
iii) Commission to society	0.60	1.20	0.60	1.18
Beekeeper's sale or Society's purchase price	30.00	60.00	-	-
Costs incurred by society				
i) Labour, postage etc.	0.10	0.20	-	-
ii) Storage	0.50	1.00	-	-
Society's net margin	0.40	0.80	-	-
Society's sale or Wholesalers purchase price	31.00	62.00	30.50	59.80
Costs incurred by wholesaler				
i) Packing, labelling	11.00	22.00	12.00	23.53
ii) Labour	2.00	4.00	2.50	4.90
iii) Losses	1.50	3.00	1.50	2.94
iv) Storage	1.00	2.00	1.00	1.96
Wholesaler's net margin	1.50	3.00	1.50	2.94
Wholesaler's sale or retailer's purchase price	48.00	96.00	49.00	96.08
Costs incurred by retailer				
i) Labour	0.50	1.00	0.50	0.98
ii) Breakage/spoilage	-	-	0.20	0.39
ii) Others (storage, rent of shop etc.)	0.50	1.00	0.30	0.59
Retailer's net margin	1.00	2.00	1.00	1.96
Retailer's sale or consumer's purchase price	50.00	100.00	51.00	100.00

evolved 63.39 per cent of honey sale. The marketing cost and margins of wholesaler were found to be 33.33 per cent and 2.94 per cent of the consumers' rupee. Similarly, retailers marketing costs and margins were worked out to be 1.96 per cent each of the consumers' rupee, respectively.

A summary of marketing costs, margins, price-spread and marketing efficiency for stationary and migratory beekeeping is shown in Table 4.23. It is clear from the table that net price received by beekeepers varied from Rs 28.90 per kg in channel-III to Rs 29.12 per kg in channel-I on stationary bee farms, however, it was Rs 28.50 per kg in channel-I and Rs 29.00 per kg in channel-II on migratory bee farms.

Beekeepers (producers') share in the consumers' rupee was the highest (97.07 per cent) in channel-I of stationary bee farms but this was not the important channel from the honey sale point of view. Channel II of stationary and migratory bee farms was observed to be the important channel of honey marketing in the study area. The producers' share in the consumers' rupee in this channel was 61.70 per cent and 56.86 per cent on stationary and migratory bee farms, respectively. The marketing cost in channel II of the stationary and migratory beekeeping was 34.04 and 38.24 per cent of the consumers' rupee, respectively. Similarly the marketing margins in this channel were found to be Rs 2.00

Table 4.23 Marketing costs, marketing margins and price spread
in the marketing of honey through various channels

Particulars	(Rs/kg)				
	Stationary			Migratory	
	Channel I	Channel II	Channel III	Channel I	Channel II
Net price received by the beekeeper	29.12 (97.07)	29.00 (61.70)	28.90 (58.98)	28.50 (57.00)	29.00 (56.86)
Marketing cost	0.88 (2.93)	16.00 (34.04)	17.30 (35.31)	18.60 (37.20)	19.50 (38.24)
Net marketing margin	-	2.00 (4.26)	2.80 (5.71)	2.90 (5.80)	2.50 (4.90)
Consumer's price	30.00 (100)	47.00 (100)	49.00 (100)	50.00 (100)	51.00 (100)
Marketing efficiency	33.09	1.61	1.44	1.33	1.32

Figures in parentheses indicate percentages of consumer's rupee

(4.26 per cent) and Rs 2.50 (4.90 per cent) per kg on stationary and migratory bee farms, respectively. The price paid by the consumers varied from Rs 30.00 per kg in channel I of stationary farms to Rs 51.00 per kg in channel II of migratory farms.

A close examination of Table 4.23 shows that channel II on both stationary and migratory beekeeping was the most efficient based on Shepherd's efficiency index which was 1.61 and 1.33 on stationary and migratory bee farms, respectively.

4.4 Constraints for Beekeeping Development

Beekeeping as a business has to cope with a number of problems in different stages of production process. Such problems are wide and varied in nature. These problems may be broadly classified as: i) Production, ii) Management, iii) Marketing, iv) Health care, v) Social, vi) Environmental, vii) Institutional, viii) Technical and so forth.

4.4.1 Problems for beekeeping development

In this section, an attempt has been made to study the problems related to production and institutions. A close look at Table 4.24 reveals that among the problems faced by beekeepers, lack of marketing facilities for sale of honey was the foremost problem in study area as it was reported by

Table 4.24 Problems for beekeeping development on sample farms

Problems	(Multiple percentage)					
	Stationary			Migratory		
	Small	Large	Overall	Small	Large	Overall
Availability of beehives at high prices	38.46	28.57	33.33	46.15	40.74	43.40
Non-availability of equipments for beekeeping	38.46	57.14	48.15	65.38	48.15	56.60
Lack of technical knowhow	23.08	14.29	18.52	-	3.70	1.89
High incidence of insect-pest	53.85	21.43	37.04	38.46	33.33	35.85
High incidence of diseases	-	-	-	15.38	11.11	13.21
Non-availability of skilled labour	76.92	57.14	66.67	80.77	59.26	69.81
High wage rates for labour	-	14.29	7.41	15.38	37.04	26.42
High transportation cost	-	-	-	61.54	62.96	62.26
Lack of facilities for sale of apicultural products	92.31	92.86	92.59	73.08	70.37	71.70

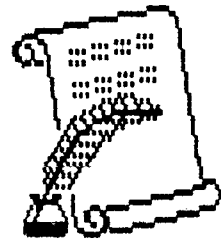
92.59 per cent stationary and 71.70 per cent migratory beekeepers in the study area. Non availability of skilled labour for beekeeping operations was found to be the second important problem of study area under both the stationary and migratory situations. High transportation cost for migrating bees from one place to another for availing of the facilities of bee flora at higher hills, mid hills and plains was reported another important problem of migratory beekeepers.

Non-availability of equipments for beekeeping, costlier beehives, lack of technical know-how, high incidence of insect-pest and diseases were also reported to be the serious problems for the development of beekeeping in the study area.

4.4.2 Use of information sources for beekeeping development

During the survey of beekeepers, an attempt was also made to gather the information on the sources used by the beekeepers regarding beekeeping activities. The response of beekeepers has been appended in the Table 4.25. It is evident from the table that radio and television were the most common source of information utilised by the beekeepers under both stationary and migratory situations. The percentage of beekeepers who utilized the services of radio and television was 66.67 per cent on stationary and 75.47

per cent on migratory bee farms. Newspaper was the second important source of information used by beekeepers. Friends/relatives and beekeeping research development station were another source of information for carrying out beekeeping activities in the study area.



SUMMARY AND CONCLUSIONS

SUMMARY AND CONCLUSIONS

5.1 Introduction:

Beekeeping has been practised in many countries of the world since times immemorial. Honeybee originally belongs to the old world, that is, Europe, Africa and Asia and subsequently these spread to new world after 1638 in America, 1882 in Australia and 1842 in New Zealand. The real boost to scientific beekeeping took place with the discovery of moveable frame hive by L.L. Langstroth in 1851. During the next half century, that is between 1850 to 1900, beekeeping exploded in the new world.

In India, beekeeping has been a centuries old practice. The mentions of beekeeping are found in the Indian epics like Vedas and Ramayana. Beekeeping in India is practised in about four lakh villages and provides part time employment to 2.26 lakh persons. Beekeeping not only generates honey and bees wax but also other by products such as honey bee colonies, royal jelly, bee venom and bee pollens that generate handsome income. Bee products have many uses in

food, medicine, pharmaceutical and cosmetic industry. Though, some research has been carried out on Indian honey and beeswax but bee venom, royal jelly, pollen and propolis are still at experimental stage. In addition to all this, honey bees have been very beneficial in enhancing the production of fruits, vegetables, oilseeds etc. through cross pollination. Beekeeping development in India took place in the late fifties and early sixties after the establishment of Khadi and Village Industries Commission (KVIC) in 1956 and Central Bee Research and Training Institute (CBRTI) in 1962. The KVIC is responsible for taking beekeeping industry to the present height from a mere 0.80 thousand bee colonies in 1953-54 to 1344.12 thousand colonies in 1991-92 and the honey production consequently increasing from 1.28 metric tonnes to 8,202.27 metric tonnes, respectively.

Himachal Pradesh has diversity of bee flora and varied agro-climatic conditions and so this Himalayan State has enormous potentialities for the profitable beekeeping. Modern beekeeping in Kangra valley was started in 1936. Migratory system of beekeeping was practised as early as 1952. Beekeepers in this State are still continuing with this practice and getting increased yield per bee colony per annum. Honey production in Himachal Pradesh increased from

2.705 metric tonnes in 1981-82 to 383.085 metric tonnes in 1994-95, thus showing a growth rate of 19.45 per cent per annum.

Before beekeeping is adopted as one of the occupations by the households, they are interested to know the investment pattern, income generated, the difference in income between stationary and migratory beekeepers, the cost of honey production and marketing, the various sources of marketing etc. Keeping this in view, the present study was designed to study the following specific objectives:

5.2 Objectives:

i) To study the socio economic parameters of stationary and migratory beekeepers as well as to examine the establishment cost, economics of honey production and break-even number of stationary and migratory bee colonies,

ii) to work out the marketing costs, margins and producers' share in the consumers' rupee of stationary and migratory beekeeping, and

iii) to highlight the problems and constraints in the development of beekeeping.

5.3 Data Base and Methodology:

The study was conducted in Kangra district of Himachal Pradesh. A two-stage random sampling technique with

stratification at the second stage was adopted to select the community development blocks and beekeepers. A sample of four development blocks namely, Kangra, Nagrota Bagwan, Nurpur, and Rait was chosen at random for conducting the study.

A sample of 80 beekeepers (27 stationary and 53 migratory) was taken at random from selected blocks through proportional allocation. The selected beekeepers both stationary and migratory were separately arranged in ascending order on the basis of number of bee colonies. Cube-root Cumulative Frequency (F)^{1/3} method of distribution was used to transform the beekeepers into two categories of small and large.

In order to meet the objectives of study, the data were collected from primary and secondary sources for the agricultural year 1994-95. Tabular analysis technique was followed to meet the objectives. To arrive at the objective of marketing costs, margins and price-spread data were collected from wholesalers, beekeepers' co-operative society, retailers and consumers.

5.4 Main Findings:

1. Beekeeping avocation was found to be more popular among Choudharies (59.25 per cent stationary and 54.72 per

cent migratory) followed by Rajputs (25.93 per cent stationary and 33.97 per cent migratory) in the study area.

2. The females outnumbered males on both stationary and migratory bee farms in the study area. The average size of family was worked out to be 4.93 and 5.32 persons on the stationary and migratory bee farms in the study area. Majority of the sample population of stationary and migratory bee farms fell in the age group of 26-40 years.

3. Literacy was found to be of the higher order among stationary bee farms population than the migratory one in the study area.

4. Majority of the sample population had middle standard education on different categories of the stationary and migratory bee farms.

5. The average size of the total land holdings was found to be 0.184 hectare on stationary and 0.204 hectare on the migratory bee farms.

6. The total number of livestock per farm was below two animals on stationary as well as on migratory bee farms.

7. Maize, paddy and wheat were found to be the important crops grown on the sample bee farms of the study area. The average yields of these crops except for maize were higher than the state average yields.

8. The average size of the bee colonies on the stationary and migratory farms was found to be 61 and 101 respectively. The minimum and maximum number of bee colonies possessed by stationary and migratory apiarists ranged between 25-120 and 44-150 respectively.

9. As far as the farm-wise investment on beekeeping is concerned, it was estimated to the order of Rs.44,503 and Rs.64,963 on stationary and migratory farms respectively. Among the various items of investment, beehive with ten frames was the most important item on all categories of stationary and migratory farms. The investment on beehive with ten frames was as high as 93 and 94 per cent of the total investment on stationary and migratory farms, respectively. The investment per colony in the study area was estimated at Rs.730 and Rs.643 on stationary and migratory farms, respectively.

10. The total cost of honey production on stationary and migratory farms was Rs.26,396 and Rs.28,016 per hundred colonies, respectively. The corresponding figures for net returns over variable costs were Rs. 39,455 and Rs.1,10,515 respectively. Among the variable costs, feed (sugar) accounted for the highest cost on stationary bee farms whereas transportation cost was the highest on migratory bee farms.

11. The cost of honey production on stationary and migratory farms was to the order of Rs.17.80 and Rs.7.30 per kg., respectively.

12. The break-even number of bee colonies for the stationary and migratory farms was estimated at 18 and 7 respectively.

13. The average honey production per bee colony was 14.73 and 38.24 kgs on the stationary and migratory farms respectively. The marketed surplus of honey production was 856.85 and 3842.60 kgs. per farm on the stationary and migratory farms, respectively.

14. Beekeeping was found to be the important source of gross household income in the study area as it alone accounted for 51.59 per cent and 88.90 per cent of total gross household income on stationary and migratory bee farms, respectively. The per capita income from all sources was estimated at Rs 13,918 and Rs.28,127 on stationary and migratory sample bee farms, respectively.

15. Beekeeper → wholesaler → retailer → consumer, was found to be the important channel for honey marketing on migratory bee farms (62.62 per cent of bee keepers sold 63.39 per cent of total honey through this channel). The same channel was found to be popular on the stationary bee farms.

Through this channel, 77.55 per cent of the total honey was marketed by 74.08 per cent bee keepers.

16. Beekeeper - wholesaler - retailer - consumer was the most important marketing channel of the honey marketing in the study area. The producers' share in the consumers' rupee was as high as 54.34 per cent and 45.31 per cent under stationary and migratory conditions, respectively.

17. Among the problems faced by beekeepers, lack of marketing facilities for sale of honey was the foremost problem in study area as it was reported by 92.59 per cent stationary and 71.70 per cent migratory beekeepers in the study area. Non-availability of skilled labour for beekeeping operations was found to be the second important problem of study area under both the stationary and migratory situations.

5.5 Suggestions/Policy Implications:

1. Suitable marketing facilities should be developed for sale of honey in the study area. This will further promote the development of beekeeping in the study area.

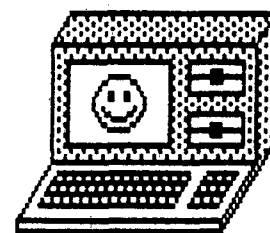
2. The unit cost of the honey production was less on migratory bee farms, therefore, migratory beekeeping should be encouraged in the study area.

3. The cost of transportation on migrating bee colonies was too high, thus government should provide good transportation facilities to beekeepers at cheaper/subsidized rates in the study area.

4. In order to give a fillip to the beekeeping activity on modern scientific lines, the state government must launch a comprehensive programme under which bee colonies, beehives, bee appliances etc., should be made available to the beekeepers on subsidized rates at par with other agricultural inputs. Besides, efforts should be made to provide these inputs in the local markets.

5. Beekeepers should be educated/trained to harvest other apicultural products like royal jelly, pollen, propolis and bee venom which are valuable products. For this purpose training courses should be arranged to the interested beekeepers and educated youths free of cost.

6. Beekeepers of the study area earned quite a handsome amount from this activity. Therefore, the government must take up generic promotion of honey not only as a vital health food but also as an important agro-industry. Beekeeping has to be taken as a serious activity as floriculture, aquaculture and horticulture.



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APPENDIX - I

Trends of honey production (000 MT) in the world (1980-94)

S.No. Continent/ Country	1980	1985	1990	1991	1992	1993	1994	Growth rate (%p.a.)
1. Africa	93.84 (9.22)	97.29 (9.66)	107.85 (8.91)	111.36 (9.37)	118.27 (10.09)	122.77 (10.30)	124.60 (10.85)	2.14
2. North Central America	195.93 (19.25)	198.68 (19.75)	210.75 (17.42)	218.15 (18.36)	216.54 (18.47)	219.82 (18.44)	216.66 (18.87)	0.96
3. South America	51.10 (5.02)	62.33 (6.19)	77.58 (6.41)	78.43 (6.60)	87.67 (7.48)	88.25 (7.41)	89.35 (7.78)	4.21
4. Asia	312.50 (30.70)	236.19 (23.44)	304.68 (25.18)	330.21 (27.79)	328.87 (28.06)	325.78 (27.33)	337.53 (29.41)	3.59
i) China	264.50 (25.98)	173.40 (17.21)	183.00 (15.13)	196.20 (16.51)	183.18 (15.63)	180.90 (15.18)	191.10 (16.65)	-
ii) India	N.A -	50.00 (4.96)	50.50 (4.17)	50.50 (4.25)	51.00 (4.35)	51.00 (4.28)	51.10 (4.45)	0.16
5. Europe	132.05 (12.97)	167.57 (16.64)	202.52 (16.74)	177.42 (14.93)	169.14 (14.43)	177.84 (14.92)	182.45 (15.89)	2.19
6. Oceania	32.63 (3.20)	35.11 (3.48)	36.52 (3.02)	32.73 (2.75)	29.15 (2.48)	30.27 (2.54)	30.36 (2.65)	-
7. USSR (Combined)	200.00 (19.64)	210.00 (20.84)	270.00 (22.32)	240.00 (20.20)	222.59 (18.99)	227.13 (19.06)	167.05 (14.55)	-
World	1018.04 (100)	1007.47 (100)	1209.90 (100)	1188.30 (100)	1172.23 (100)	1191.86 (100)	1148.00 (100)	2.18

Figures in parentheses are percentages of the total.

APPENDIX - II

Linear and exponential trends of honey production in the world (1980-94)

S.No. Continent/ Country	Linear			Exponential			Best relation- ship	Growth rate (% p.a.)
	a	b	r ² x100	Log a	Log b	r ² x100		
1. Africa	86.6428	2.2434* (0.2478)	86.31	1.9434	0.0092* (0.0009)	86.98	Exponential	2.14
2. North Central America	187.9043	1.9582* (0.8942)	26.95	2.2719	0.0044* (0.0020)	26.78	Linear	0.96
3. South America	45.1716	2.8685* (0.3495)	83.83	1.6799	0.0181* (0.0024)	81.40	Linear	4.21
4. Asia	197.8101	9.9513* (2.5084)	54.77	2.2928	0.0174* (0.0047)	51.74	Linear	3.59
i) China	154.1507	2.2770 (2.2422)	7.35	2.1612	0.0082 (0.0054)	14.85	-	-
ii) India	50.1547	0.0818* (0.0034)	17.83	1.7003	0.0007* (0.0003)	21.57	Exponential	0.16
5. Europe	139.8988	3.4533* (0.7196)	63.92	2.1459	0.0094* (0.0020)	64.02	Exponential	2.19
6. Oceania	31.3353	0.1493 (0.2617)	2.44	1.4907	0.0023 (0.0035)	3.08	-	-
7. USSR (Combined)	186.6014	2.4396 (1.5252)	16.44	2.2732	0.0047 (0.0031)	14.86	-	-
World	875.1770	23.0630* (2.8259)	83.67	2.9461	0.0096* (0.0012)	82.86	Linear	2.18

Figures in parentheses are standard errors.

* indicate significant at 5 per cent level of probability.

APPENDIX III

Honey production in the first ten important countries of the world (1994)

S.No.	Country	Honey production (000'MT)	Per cent of total	Per cent Cumulative
1.	China	191.10	16.65	16.65
2.	USA	98.50	8.58	25.23
3.	Mexico	62.68	5.46	30.69
4.	Ukraine*	62.05	5.41	36.10
5.	Turkey	60.00	5.23	41.33
6.	Russian Fed*	55.00	4.79	46.12
7.	Argentina	53.60	4.67	50.79
8.	India	51.10	4.45	55.24
9.	Belarus*	50.00	4.36	59.60
10.	Canada	33.00	2.87	62.47
World Total		1148.00	-	-

* Belongs to former USSR and their total share is 167.05 thousand metric tonnes comprising 14.56 per cent of world honey production

APPENDIX IV

First ten major exporting countries of the world (1993)

S.No.	Country	Honey export (000'MT)	Per cent of export	Per cent cumulative
1.	China	96.60	33.73	3.73
2.	Argentina	54.99	19.20	52.93
3.	Mexico	35.99	12.57	65.50
4.	Germany	13.80	4.82	70.32
5.	Hungary	13.57	4.74	75.06
6.	Australia	9.11	3.18	78.24
7.	Canada	8.27	2.89	81.13
8.	Uruguay	6.29	2.20	83.33
9.	USA	4.20	1.47	84.80
10.	Spain	4.18	1.46	86.26
World Total		286.35	-	-

APPENDIX V

First ten major honey importing countries of the world (1993)

S.No.	Country	Honey imports (000'MT)	Per cent of imports	Per cent Cumulative
1.	Germany	80.52	28.68	28.68
2.	USA	60.62	21.59	50.27
3.	Japan	36.18	12.88	63.15
4.	UK	18.01	6.41	69.56
5.	Spain	11.32	4.03	73.59
6.	Saudi Arabia	4.00	1.42	75.01
7.	China	2.66	0.95	75.96
8.	Bolivia	1.70	0.60	76.56
9.	Canada	1.49	0.53	77.09
10.	South Africa	0.40	0.14	77.23
World Total		280.78	-	-

APPENDIX - VI

Trends of import-export of honey in the world									
S.No. Continent		1980		1985		1990		(10 ³ MT)	
		-----		-----		-----		-----	
		Import	Export	Import	Export	Import	Export	Import	Export
		-----	-----	-----	-----	-----	-----	-----	-----
1. Africa		0.31 (0.16)	0.05 (0.02)	0.62 (0.22)	0.12 (0.04)	0.40 (0.14)	0.17 (0.06)	1.12 (0.40)	0.28 (0.10)
2. North Central America		22.97 (11.74)	67.54 (32.68)	63.06 (22.88)	79.05 (29.24)	36.28 (12.34)	69.07 (23.29)	62.73 (22.34)	56.27 (19.65)
3. South America		0.36 (13.75)	25.23 (23.52)	0.42 (13.86)	43.10 (17.37)	2.86 (27.47)	45.22 (31.92)	2.15 (19.48)	62.78 (36.84)
4. Asia		26.90 (0.18)	48.60 (12.21)	38.21 (0.15)	46.95 (15.94)	80.79 (0.97)	94.65 (15.25)	54.70 (0.77)	105.48 (21.92)
5. Europe		144.97 (74.09)	39.24 (18.99)	172.85 (62.71)	58.88 (21.78)	172.87 (58.78)	56.90 (19.19)	159.93 (56.96)	50.44 (17.61)
6. Oceania		0.15 (0.08)	13.47 (6.53)	0.19 (0.07)	19.54 (7.23)*	0.09 (0.03)	13.82 (4.66)	0.16 (0.05)	11.10 (3.88)
7. USSR (Combined)		-	12.51 (6.05)	0.30 (0.11)	22.70 (8.40)	0.80 (0.27)	16.69 (5.63)	-	-
World		195.66 (100)	206.64 (100)	275.65 (100)	270.34 (100)	294.09 (100)	296.52 (100)	280.79 (100)	286.35 (100)

Figures in parentheses are percentages of the total

APPENDIX VII

Production and productivity of honey in first ten countries of the world (1994)

S.No.	Country	No. of bee colonies (million)	Honey production (000' MT)	Yield (kg/colony)
1.	Australia	0.55	22.60	41.09
2.	Denmark	0.21	7.98	38.00
3.	Newzealand	0.20	7.10	35.50
4.	USA	3.20	98.50	30.78
5.	China	7.00	191.10	27.30
6.	Mexico	2.45	62.68	25.58
7.	Portugal	0.25	4.20	16.80
8.	Spain	1.70	26.50	15.58
9.	France	1.30	18.00	13.85
10.	Germany	1.90	23.00	12.10

Source: FAO Production Yearbook, 1994

Report on First National Conference on Beekeeping,
NHB, Gurgaon and Bee World

APPENDIX VIII

Classification of sample beekeepers using cube-root cumulative frequency method

Class- interval (No. of colonies)	Frequency of beekeepers (F)	Cube- root freq- uency ($\sqrt[3]{F}$)	Cumulative of cube- root frequency	Category of beekeepers
Stationary				
Upto 40	5	1.71	1.71	Small
41-60	8	2.00	3.71	Small
61-80	8	2.00	5.71	Large
81-100	5	1.71	7.42	Large
>100	1	1.00	8.42	Large
Migratory				
Upto 6	4	1.59	1.59	Small
61-80	4	1.59	3.18	Small
81-100	18	2.62	5.80	Small
101-120	14	2.41	8.21	Large
121-140	11	2.22	10.43	Large
>140	2	1.26	11.69	Large

APPENDIX- IX

Schedule for household data collection

Code no.....
Category

I. BEEKEEPER'S GENERAL INFORMATION

- | | |
|--|---|
| 1. Name of the beekeeper | : Sh. |
| 2. Father's name | : Sh. |
| 3. Age (in years) | : |
| 4. Qualification | : |
| 5. Caste | : |
| 6. Occupation | : i) Main
ii) Subsidiary |
| 7. Village | Tehsil |
| 8. Block | District |
| 9. Member of beekeeper's
co-operative society | Yes/No |
| 10. Year of starting beekeeping | |
| 11. Number of bee colonies | : At start
: At present |
| 12. Date of survey | : |
| 13. Signature of interviewer | : |
| 14. Signature of supervisor | : |
| 15. Places of migration with
number of colonies | : |
| 16. Average distance covered
(in kms) | : |

II. INVESTMENT OF FARM TOOLS AND EQUIPMENT REGARDING BEEKEEPING

Sr. No.	Items	Number	Year of purchase	Value (Rs)	
				Purchased	Present
1.	Beehive with 10 frames				
3.	<u>Hive stand</u>				
	i) Wooden				
	ii) Iron				
4.	Bee veil				
5.	Bee brush or hair brush				
6.	Bee gloves				
7.	Bee suit				
8.	Bee smoker				
9.	Bee escape				
10.	Hive tool				
11.	Uncapping knife				
12.	Uncapping trays				
13.	Feeders				
14.	Supers				
15.	Honey extractor				
	i) Electric				
	ii) Hand operated				
16.	Wax melting tank				
17.	Frames				
18.	Brood chamber				

19. Honey storage drums/
tins or plastic barrels
or bottles

20. G.I.tub

21. Buckets

22. Ant protector

- i) Earthern
- ii) Aluminium

23. Kerosene oil stove

24. Weighing balance

25. Measuring weights

26. Wasp trap*

27. Hesian cloth

28. Winter packing**

29. Comb foundation sheets

30. Miscellenous items
(Queen excluder, frame
wire etc.)

* Average life

** Average life

III. COST OF HONEY PRODUCTION

Sr. No.	Items of cost	Stationary		Migratory	
		Qty.	Value	Qty.	Value
1.	No. of bee colonies				
2.	Comb foundation sheets				
3.	Hesion cloth				
4.	Winter packing				
5.	Insecticides/pesticides (Sulphur + Formic acid)				

6. Feeds (sugar)

7. Human labour (Hrs/day)

i) Daily watch and ward	M F
ii) Predator protection	M F
iii) Extraction of honey	M F
iv) Migration of colonies	M F
v) Other (feeding etc.)	M F

8. Transportation* cost including packing material during migration

9. Lodging charges

10. Others (specify)

* Details regarding migration

i) Where migrated	-----
ii) Distance (Km)	-----
iii) Method of transportation	-----
iv) Hire in place	-----
v) Time spent at migratory place	-----
vi) Whether same place over years or changing	-----
vii) Backward journey cost	-----
viii) Self transport or hired labour	-----
ix) Any other	-----

W. Production and pattern of disposal of bee products

S.No. Item	Production (Kg)				Self consumption (Kg)	Gift (Kg) to other products (Kg)	Sold (marketed surplus)						Unsold (Kg) if any	Wastage (Kg)
	-----						-----							
	Spring	Summer	Autumn	Total			DSC	DSR	DSBC	DSH	DSW	Others		
							Q	V	Q	V	Q	V	Q	V

1. Honey

2. Wax

3. Propolis

4. Royal Jelly

5. Venom

6. New colonies

DSC = Direct sale to consumers
DSR = Direct sale to retailer
DSBC = Direct sale to beekeepers co-ops.
DSH = Direct sale to hotels
DSW = Direct sale to wholesalers
Q = Quantity
V = Value

V. MARKETING COSTS AND PRICE SPREAD

(Rs/Kg)

Sr. No.	Items of cost	Channel				
		I	II	III	IV	V
1.	Net price received by beekeeper					
2.	Cost incurred by beekeeper					
	i) Wastage/spoilage					
	ii) Processing/packing					
	iii) Transportation					
	iv) Commission to society					
3.	Sale price of beekeeper or purchase price of wholesaler					
4.	Cost incurred by wholesaler					
	i) Packing					
	ii) Labour					
	iii) Storage					
	iv) Loading and unloading					
	v) Others if any					
5.	Sale price of wholesaler/ purchase price of retailer					
	i) Rent of shop					
	ii) Storage					
	iii) Labour					
	iv) Spoilage/wastage					
	v) Others					
6.	Sale price of retailer or consumer's price					

VI. GENERAL INFORMATION ON BEEKEEPING

1. Did you get any training before starting : Yes/No
beekeeping
If 'Yes' then name from whom or from where
and period -----
2. Did you get any advice on improved bee- : Yes/No
keeping practices
If 'Yes' then from whom -----
3. Occurrence of common predators on the farm (give name):

i) ii)
iii) iv)
4. Does your family take honey daily: : Yes/No

If 'Yes' how much per day
If 'No' specify reasons
5. Have you ever migrated your bee colony? : Yes/No

If 'Yes'
Do you continue? : Yes/No

If 'No' Why did you stop?
6. Occurrence of common diseases on the farm (give name)

i) ii)
iii) iv)
7. Why migration is not performed by stationary beekeepers:
(Indicate reasons)

i) Sufficient flora
ii) Higher transportation cost
iii) No agreement with anyone for shifting
iv) Number of colonies is small
v) Incidence of diseases is higher at other places
vi) Any other

VII. GENERAL PROBLEMS REGARDING BEEKEEPING

I. Social problems:

- | | |
|-------------------------------|-----------|
| i) Bees sting the trespassers | ii) |
| iii) | iv) |

II. Production problems

- i) Costlier beehives
- ii) Lack of awareness
- iii) Lack of extension facilities
- iv) Non availability of bee colonies
- v) Non availability of equipments needed for bees rearing
- vi) Lack of technology
- vii) Higher incidence of diseases
- viii) Insect pest attack is higher
- ix) Non-availability of skilled labour
- x) Availability of labour at higher wages

III: Institutional problems

- i) Lack of remunerative prices for honey
- ii) Delayed payments to beekeepers by the middlemen/co-operative society
- iii) Lack of marketing facilities for the sale of honey and wax
- iv) Lack of credit facilities
- v) Transportation costs are very high

VI. Other problems (specify if any)

- | | |
|------------|-----------|
| i) | ii) |
| iii) | iv) |
| v) | |

VIII. SUGGESTIONS FOR THE DEVELOPMENT OF BEEKEEPING

- 1.
- 2.
- 3.
- 4.
- 5.

APPENDIX- X

Prices of inputs and outputs of study area (1994-95)

Sr.No.	Item	Unit	Rupees
1.	Wheat	Quintal	380
2.	Paddy	Quintal	360
3.	Maize	Quintal	310
4.	Cow milk	Litre	9
5.	Buffalo milk	Litre	10
6.	Sugar	Kg	14.50
7.	Beeswax	Kg	60
8.	Human labour	Per day	30
9.	Honey	Kg	30