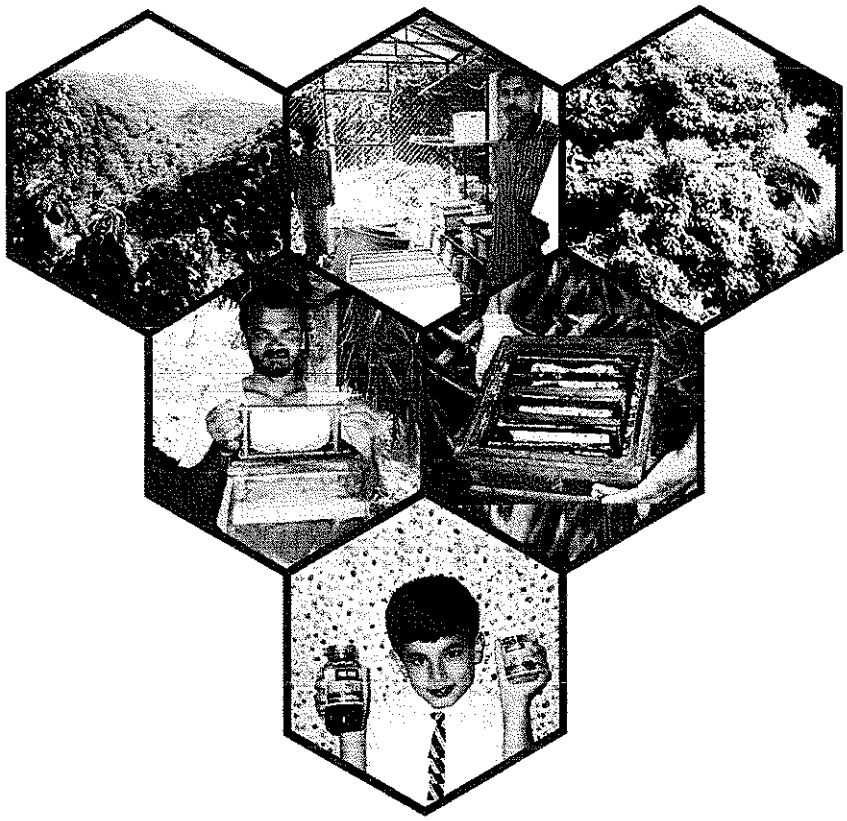
Performance and Problems of the Bee Keeping Industry in Karnataka

Technical Report No. 124



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Contents

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- The Honnavar Beekeepers' and Village Industries Cooperative Society Ltd., Honnavar,
- Siddapur Taluka Beekeepers' Cooperative Society, Ltd., Siddapur
- Kumta Beekeepers' and Rural Industires Cooperative Society, Ltd., Kumta
- The Ankola Beekeepers and Village Industries Cooperative Society Ltd., Ankola
- Sirsi-Yellapur Taluka Beekeepers' Cooperative Society Ltd., Sirsi
- Rural Industries Development Cooperative Society, Itagi, Siddapur and
- KVIC, Bengaluru

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1. Introduction

Among the class social insects, man has established a harmonious coexistence with honeybees. These insects have provided humanity with the very basis of civilization because of their highly evolved social behaviour and being the source of the earliest sweet food and trade commodity (Verma, 1990). Besides, honeybees provide free ecosystem services in the form of cross-pollination and propagation of several cultivated and wild plant species, thereby maintaining biological diversity. They, therefore, not only boost crop productivity but also help in the conservation of forests and grassland ecosystems and several botanical sources from extinction. The European honeybee *Apis mellifera* is a favourite model for studies on behaviour, neurobiology, ecology and evolution. The large body of knowledge that has accumulated on *A. mellifera*, on account of this has had considerable positive influence on management of *A. mellifera* for bee keeping in Europe, North America and Australia. Bee keeping and all aspects of it with *A. mellifera* has been studied in detail.

In contrast, almost nothing is known about these aspects of the Asian honey bee *Apis cerana*. Not much about the management practices with regard to *A. cerana* is known for bee keeping in India. More surprising is the fact that there does not even exist a good data base on the performance of the bee keeping industry over several years. Apiculture (beekeeping) has been linked closely with the cultural and natural heritage of the rural people (Verma, 1990). Apiculture offers specific advantages for developing sustainable agriculture. Honey is the sweetest, most nutritious natural food and has been eagerly sought (Mace, 1980). The most important aspect of beekeeping is that it is an important income generating activity especially for small and marginal farmers, landless and other weaker sections of the society living at or below subsistence level. Hive products such as honey, beeswax, royal jelly, pollen provide both nutritious food and cash income.

2. Beekeeping in Karnataka

Karnataka, situated in south-west region of India has a total land area of 19.2 million hectares and 3.32 million hectares of forests. With good bee forage resources the natural forests in the state provides with an ideal habitat for bees. The western region of the state with rich natural forests and the eastern plains with intensive agriculture offer excellent conditions for apiculture. Obviously, honey and beeswax form an important minor forest produce or NTFP and generate revenue from the natural forests to the State. 80% of honey produced in Karnataka is collected mainly from wild colonies of rock bees by forest dwellers. However, bee keeping by bee keepers in the state also contributes substantially to the production of good quality honey and wax. Bee keeping was badly affected by outbreak of Thia-sac Brood Virus (TSBV) disease in 1991 and 80% of colonies were lost affecting the honey production to a very great extent (FAO).

In recent years, there has been serious attempts to develop bee keeping in the state by various government agencies. Beekeeping is being developed as an industry in the state by promoting it in all parts of the state. However, bee keeping faces many constraints such as lack of basic infrastructure, skilled manpower, effective extension and training, quality bee equipment, facility for research etc. The absence of a systematic data base on different aspects of bee keeping among others is also an important constraint in understanding the role of different factors in the development and promotion of bee keeping in the state. There were no serious efforts made to collect information regarding the present management practices of bee colonies and problems of beekeepers in Karnataka. Without much knowledge about management practices and problems facing the beekeepers one can do very little to improve the management practices of bee keeping.

Hence, a study was initiated in Uttara Kannada district of Karnataka with the main objective of developing a strong data base on various aspects of beekeeping industry that would subsequently be extended to other parts of Karnataka State. This study made an attempt to understand the performance of beekeeping industry and its problems.

3. Objectives

Following were the broad objectives of the study.

1. Identify the source of information on beekeeping and beekeepers in Uttara Kannada.
2. Collect data on different aspects of beekeeping from the Beekeepers' Cooperative Societies and other sources in the district and develop a data base on beekeeping.
3. Compile and computerise the data and carry out simple analysis to assess the performance of beekeeping in the district
4. Identify the problems facing the beekeeping, beekeepers and Beekeepers' Cooperative Societies
5. Suggest to bring in improvements in beekeeping for better production.

Map 1. Uttara Kannada District in Karnataka

4. Materials and Methods

Based on the experience from a preliminary survey in the district two separate questionnaires (Part A and Part B) were prepared for data collection. By using these questionnaires some of the basic information on Beekeepers' Societies and bee keeping in the region was collected from the officials of Beekeepers' Cooperative Societies. Part B of the questionnaire was used to gather specific information from Societies such as the memberships of the Societies, number of active bee keepers among the members, honey purchased and sold by Societies, number of bee boxes sold to beekeepers, training camps conducted, grant received from the government etc. Relevant information was also collected from Khadi and Village Industries Commission (KVIC), and few individual beekeepers on the beekeeping practices and problems faced by beekeepers and beekeeping. Data were computerised and tabulated. Simple statistical analysis was done to find out the trends in beekeeping and correlation between different factors involved in the development of beekeeping industry.

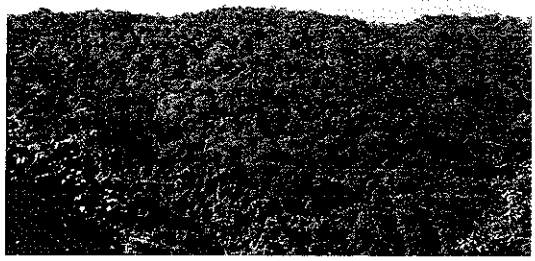
5. Beekeeping in Uttara Kannada

The Setting:

Uttara Kannada (13°52' to 15°31'N and 74°9' to 75°10'E) is a coastal district of Karnataka situated in the north western part of the state (Map 1). The district has lot of ecological significance with its location almost at the centre of Western Ghats, a biological diversity hotspot The district is divided in to characteristic four distinct regions depending on the physical features and natural resources available. They are Coastal region, Foothills of Western Ghats, Hilly region, and Eastern transition region. Uttara Kannada which is divided in to 11 taluks administratively has a total geographical area of 10,327 Km^2 with a population of 13,53,299 (2001 Census) and more than 3 lakh households in 1269 villages and 13 towns (Karnataka State Gazetteer Uttara Kannada district, 1986, Statistical Handbook of Uttara Kannada, 2006). The district has an undulating terrain with a long contiguous tract of tropical forests. 75% of the geographical area of the district is under forests with evergreen (14%), semievergreen (25%), moist deciduous (35%), dry deciduous (26%) and mangrove forests. These forests support a large member of flowering plants (>1700 species).

Annual precipitation in Uttara Kannada ranges from 1000 mm in the eastern transition area to 5000 mm on the crest line with an average rainfall of 2700 mm. The district is endowed with rich water resources having a good network of west flowing rivers and natural water bodies.

By utilising these available natural resources the people practice agriculture, horticulture, animal husbandry and forestry for their livelihood. A variety of crops such as paddy, pulses, arecanut, coconut, banana, cardamom, mango, cashew, guava, sapota, papaya etc are grown in an area of 1200 Km^2. Along with farming people practise many subsidiary income generating activities by acquiring special skills and generate additional income. Bee keeping is one of such activities in the district.



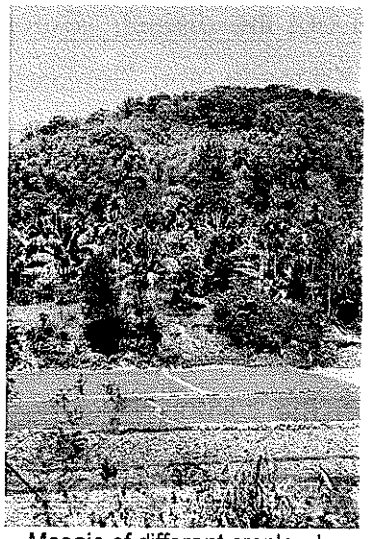
Evergreen forest Uttara Kannada, representing rich bee forage of the district

Rivers providing perennial water resource

Extensive crop lands

Grass land in a forest region

Cultivated crops



Mosaic of different croplands

Diverse landscapes of Uttara Kannada

5.2. Bee Resources in Uttara Kannada District:

Uttara Kannada with a rich diverse plant population, a variety of cultivated crops, good water resource and good weather provides excellent conditions for bee keeping. Therefore, people have been practising bee keeping since many decades. The district has been classified as a major beekeeping region in Karnataka (Rajagopal. D. et al, 1999). Today, bee keeping is being practised in all parts of the district and particularly in hilly region of the district it has become an important subsidiary activity.

Mainly four species of honey bees are present in Uttara Kannada. They are *Apis dorsata, A. cerana, A. florea, and Trigona* iridipennis (Karnataka State Gazetteer Uttara Kannada district, 1986). *A. dorsata* is the source of substantial quantity of honey and beeswax which in turn form major constituents of minor forest produce produced in Uttara Kannada (see section for details). *A. florea* is not widely used for beekeeping and honey. *Trigona* sp., happens to be a source of small quantity but a very special honey with medicinal value and is domesticated in wooden logs, mud pots etc in many households of the district. *A. cerana* is the only species used in beekeeping through out the district. European species, A. mellifera was introduced in Uttara Kannada and Beekeepers' Cooperative Societies tried to promote beekeeping with A. mellifera in the district and a few individual beekeepers also tried to maintain A. mellifera colonies in 1999 and 2000 without any major success.

5.3. Development of Beekeeping in Uttara Kannada:

In the beginning of the 19th century bee keeping was practised by people in isolated cases. It was a small household activity. Bees were collected from forests and hived in hollow cut stems of trees and mud pots and were kept on the walls in the backyard of their houses. These colonies were nurtured during rainy season and honey was extracted from them in the summer.

It is understood by available sources that the development activities related to beekeeping in Uttara Kannada were initiated in 1930s. The development and popularisation of beekeeping in Uttara Kannada was much influenced by the similar activities initiated in then neighbouring district

Dakshina Kannada. Modern beekeeping was introduced in this district in 1939 by the All India Village Industries Corporation (Karnataka State Gazetteer Uttara Kannada district, 1986). The first sign of development and organised effort in beekeeping were seen with the establishment of taluka level Beekeepers' Cooperative Societies in Uttara Kannada in 1941. Since then, different government as well as semi-government agencies assisted beekeeping to grow in the district.

5.3.1. Beekeepers' Cooperative Societies In Uttara Kannada:

Beekeepers' Cooperative Societies formed at taluka level have been working for promotion and development of beekeeping with their diverse activities related to beekeeping They arrange for supply of bee equipment to beekeepers, training programme, and more importantly marketing of honey and wax produced by beekeepers.

The first Beekeepers' Cooperative Society was established in Uttara Kannada at Honnavar in 1941. Six Societies have been formed so far in Uttara Kannada and registered under Cooperative Society Act. (for details see Section 6)

5.3.2. Khadi and Village Industry Commission (KVIC)/Khadi and Village Industry Board (KVIB):

After independence, the Government of India took a policy decision to revive various traditional industries and an All India Khadi and Village Industries Board was constituted to undertake this work. The task of development of beekeeping industry was also entrusted to this Board.

This Board was later reconstituted in 1956 as Khadi and Village Industries Commission (KVIC), a statutory body under the Ministry of Industry. It was only after the establishment of KVIC at the National level, and Khadi and Village Industries Board in State level, the beekeeping Industry received serious attention for its development in a coordinated manner throughout the country.

KVIB is a State agency concerned with development of beekeeping and it started functioning in 1953. The central agency concerned with development of beekeeping is KVIC. The real impetus to beekeepers in Uttara

Kannada came when Khadi and Village Industries Commission recognised beekeeping as an important rural economic activity and decided to support it in 1954 by providing financial and technical assistance to beekeepers and beekeepers' societies. KVIC opened Beekeeping Area Office in Sirsi in 1958 and later at Kumta in 1967 and appointed Beekeeping Superintendents as main staff. Field-men were appointed at taluka level and at a time 8 to 10 field men worked in Uttara Kannada in 1950s and 1960s. Substations were established at Panchayath level on the basis of availability of bee flora and on the recommendations from the Beekeeping Superintendents. People were given training by these field-men to acquire technical skills and knowledge on beekeeping. This made beekeeping to spread to major part of the district. However, beekeepers were not provided with assistance continuously on a long term basis. The main objective of the substation was to motivate and make a beekeeper self reliant. By 1989 the last two area offices were closed and the posts of field men were also discontinued.

However, KVIC continues even now to support beekeeping activities through Beekeepers' Societies by organising training programmes, supply of bee boxes and other bee equipment to beekeepers on subsidised cost.

5.3.3. Bee keeping in Government Programmes:

State Government through its Departments is making all effort to develop beekeeping in the district. Before 1963 bee keeping was under agriculture department. In 1963, beekeeping was transferred to Commerce and Industries Department treating it as a village industry. Bee keeping was provided with financial support from Non-plan expenditure till 1975. That was one of the reasons for its slow growth. After 1975, it has been supported under both Plan and Non-plan expenditure. Beekeeping was supported in Uttara Kannada by the Government under the following development programmes.

1) Annual Plan: Under this programme, training on beekeeping and bee equipment were given at subsidised costs to rural educated youths.
2) Western Ghats Development Programme: Training on beekeeping and bee equipment were provided to Beekeepers under this programme.

3) Tribal Development Programme: In this, youths of tribal community are given training on beekeeping.
4) Special Component Programmes for SC and ST
5) TRYSEM (Rural Development)
6) RIP and RAP

Training schools, nurseries, demonstration centres were established in Uttara Kannada under these development programmes over the years. Under Integrated Development of Western Ghats Region Programme , six beekeeping centres were established at Ankola, Kumta, Honnavar, Sirsi, Yellapur and Siddapur (Karnataka State Gazetteer Uttara Kannada District, 1986)

5.3.3.1. Department of Commerce and Industry (DIC):

Since beekeeping has been treated as a cottage industry, it was included in the programme of DIC. DIC supported beekeeping activities by giving subsidy to beekeepers through respective Societies towards the purchase of bee boxes, honey extractors and other bee equipment such as queen gates, queen separators, supers etc. It also supported Societies to conduct training programmes for new beekeepers. DIC even encouraged the trainees to become members of Societies by paying towards their membership fee. DIC supported beekeeping till 1987. After the formation of Zilla Parishath (now known as Zilla Panchayath) the development programmes on beekeeping were transferred to Khadhi and Village Industries (KVI) which was formed under Zilla Panchayath. However, DIC organised training programmes for beekeepers through Societies and other Voluntary Organisations during 2000-01 and 2001-02 in all eleven taluks of the district.

5.3.3.2. Khadi and Village Industries (KVI):

Khadi and Village Industries (KVI) was established under Zilla Panchayath in 1987 and was given the responsibility of developing bee keeping activity in the district. KVI with one Beekeeper Assistant in each taluk took up mainly creating awareness among the people about bee keeping and imparting techniques of beekeeping, management of bees, extraction of honey, wax etc to people through training programmes. Also, people were

selected by KVI and sent for higher training in beekeeping at The Beekeeping Training Centre, Bhagamandal in Kodagu. It also gave 50% subsidy to trained people for buying bee boxes and bee colonies. Zilla Panchayath in its annual budget allocated funds towards the development of bee keeping in the district. KVI did carry out its activities well till 1993. From 1993 onwards in Uttara Kannda bee keeping suffered a set back and activity slowed down mainly because of the TSBV disease outbreak in some parts of the district. Subsequently, the activities of KVI were also reduced to just providing training with the help of only three beekeeping assistants in the entire district. KVI was functioning till 2003. The Government has decided to withdraw beekeeping development programme from KVI (DD, KVI, Karwar, personal communication, 2004).

5.3.3.3. Support to Beekeeping under National Horticulture Mission and Suvarnabhoomi Programme:

Since the support to beekeeping activities withdrawn from KVI beekeeping is being supported under the National Horticulture Mission at the national level and under Suvarnabhoomi programme at the state level.

In Uttara Kannada, National Horticulture Mission was started in 2004-05 and development programme for beekeeping activities was initiated in 2006-07. Under the development programme subsidies are given towards the purchase of bee box along with bee colony, extractors. Also subsidy is given for bee breeding. Support is also given to small and marginal farmers for taking up bee keeping.

FAO Assistance:

On the request of Government of Karnataka, FAO had provided support under the Technical Cooperation Programme for a period of eighteen months from December 1996. The project was executed by the Karnataka State Directorate of Industries and Commerce.

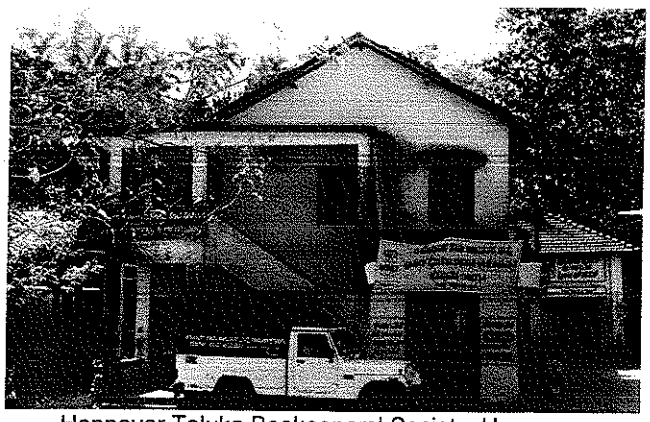
The main objectives were to promote the development of sustainable apiculture in Karnataka State particularly as a source of income generation amongst landless families; to ensure pollination for improved production of

fruits and vegetable; and to ensure continued populations of indigenous economically significant honey bee species, *A. cerana* and *A. dorsata*

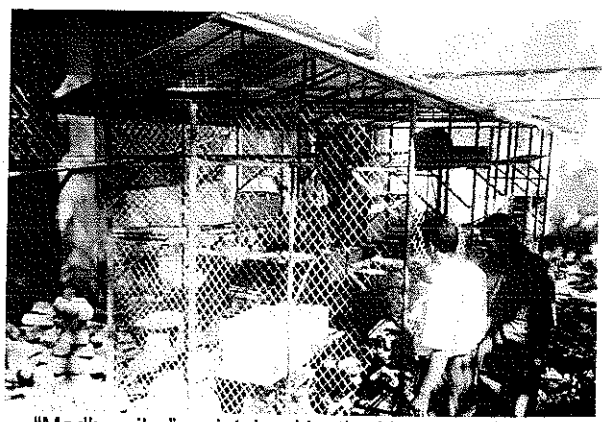
The FAO Project accomplished tasks like providing skill training to staff, strengthening of Apiculture Extension Service in the State, establishment of functioning demonstration apiaries, research in different aspects of bee keeping, and on Thai-sac brood disease.

6. Beekeepers' Cooperative Societies of Uttara Kannada

Special feature of bee keeping in Karnataka is that most of beekeeping development programmes are implemented through Beekeepers' Cooperative Societies with great success. In the past, bee keeping was being practised under unpredictable conditions and was more difficult than agriculture. Beekeepers, mostly small farmers or landless faced problems in getting a good price for honey that they collected with great difficulty. They also lacked proper information and training on bee keeping, better equipment and marketing facilities etc., Many beekeepers in 1930s thought that better economic returns to their extraordinary skills and hard work were only possible by an organised effort by all involved in beekeeping. Further, they thought that an organised environment was only possible on a co-operative basis. This led the way for establishment of Beekeepers' Cooperative Societies. The first Beekeepers' Cooperative Society was established at Honnavar in 1941 with its jurisdiction over entire Honnavar taluka (Annual Report of Honnavar Beekeepers' Society). Subsequently, societies were established in Kumta, Ankola, Sirsi, Siddapur between 1945 and 1951 and in 1985 at Itagi in Siddapur taluka which started its work on beekeeping in 1990. Beekeepers' Societies played a major role in the development of Beekeeping in Uttara Kannada by popularising and promoting it in their respective taluks.



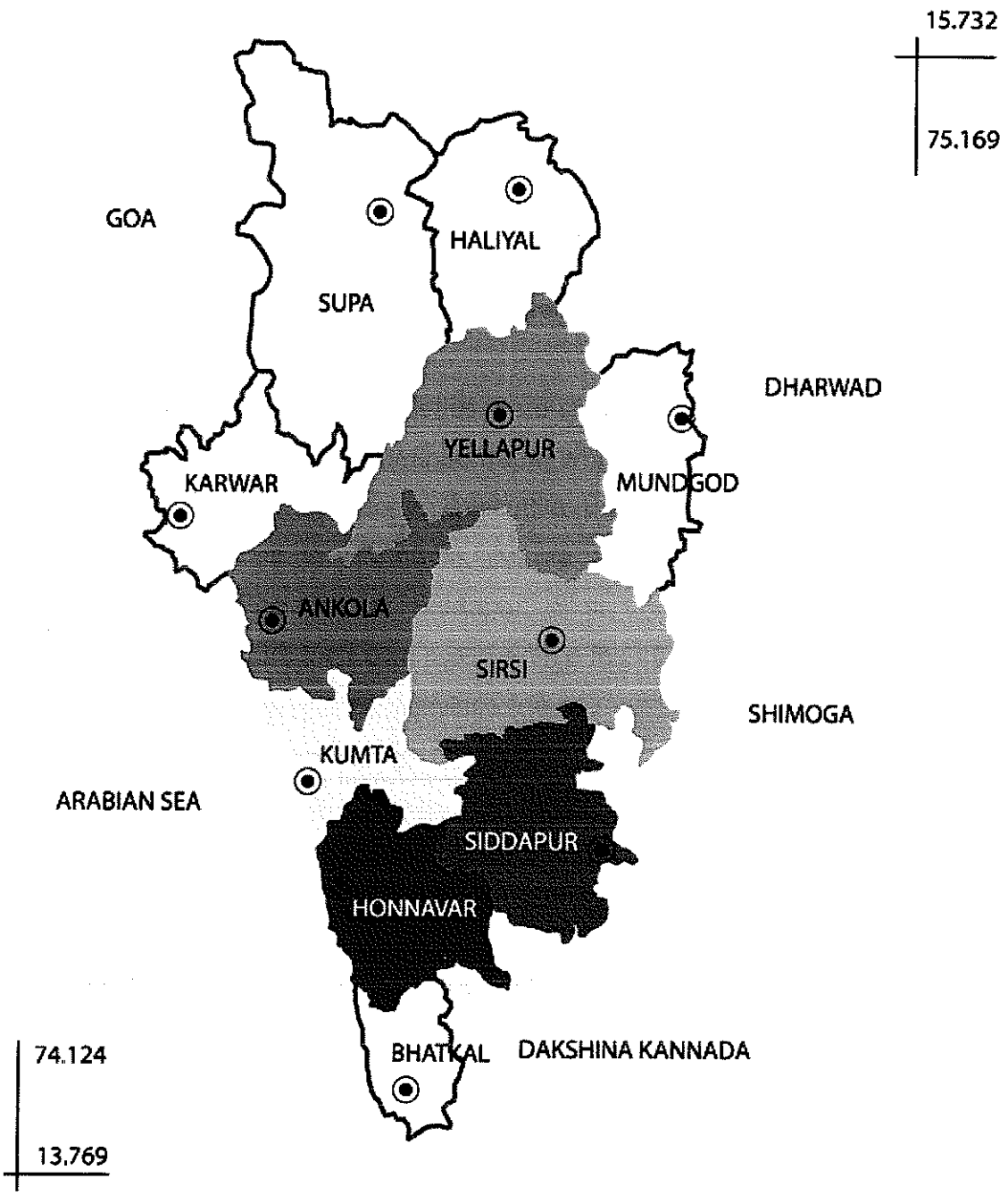
Honnavar Taluka Beekeepers' Society, Honnavar



"Madhugriha" maintained by the Honnavar Society

Honnavar Taluka Beekeepers society, Honnavar

Six Beekeepers' Cooperative Societies cover six of the 11 talukas of Uttara Kannada (Map 2). Society boundaries are distinct but are not directly related with administrative taluka boundaries. The societies studied here are at Honnavar, Ankola, Kumta, Sirsi-Yellapur, Siddapur, and Itagi. A profile of all Beekeepers' Cooperative Societies in Uttara Kannada is given in Table 1.



Map 2. Taluks with Beekeepers' Cooperative Societies in Uttara Kannada District

Table 1:

Profile of Beekeepers' Cooperative Societies in Uttara Kannada

S.N.	Name of Society	Year of Establishment	Number of Employees	Taluka covered	Number of villages covered
1	The Honnavar Beekeepers' and Village Industries Cooperative Society Ltd., Honnavar	1941	4	Honnavar	97
2	Kumta Beekeepers' and Rural Industires Cooperative Society, Ltd., Kumta	1945	2	Kumta	128
3	The Ankola Beekeepers and Village Industries Cooperative Society Ltd., Ankola	1946	2	Ankola	65
4	Siddapur Taluka Beekeepers' Cooperative Society, Ltd., Siddapur	1949	1	Siddapur	196
5	Sirsi-Yellapur Taluka Beekeepers' Cooperative Society, Ltd., Sirsi	1951	1	Sirsi and Yellapur	200
6	Rural Industries Development Cooperative Society, Itagi, Siddapur	1985	2	Siddapur taluka (only area of four Gram Panchayaths in south-western part of taluka)	42

6.1. Objectives / Goals of Societies:

Beekeepers developed very elaborate bye-law of their Societies. Byelaws contain the objectives, the details of memberships, working of societies, and arrangement of their own for raising funds, enrolment of memberships etc. The main objectives of the Societies are -

1) To develop beekeeping on scientific lines as a profitable cottage industry
2) To find out markets for bee hive honey, beeswax etc., produced by members and non-members.
3) To strengthen and disseminate bee keeping by forming local clubs or branches of society in other places of the taluka.
4) To sell or loan to members bee equipment such as bee hives, extractors, smokers etc.,
5) To develop among members thrift, self-help and co-operation.

Beekeepers' Co-operative Societies were registered under Bombay Co-operative Societies Act 1925. They have definite frame work for their working and all Societies have a Chairman, General Body, Executive Body, a Secretary and other office bearers. The Societies in Honnavar, Kumta and Ankola have their own office buildings whereas Societies at Siddapur, Sirsi and Itagi are housed in rented buildings. Societies have their own membership fee structure. A beekeeper can enrol himself as a member by paying entrance fee or membership fee for registration and by purchasing Society's share of a minimum amount. A resident of a taluka even if he is not a beekeeper can become a member of the Beekeepers' Society of that taluka. The fee and share are recently restructured. In almost all societies a member has to pay Rs. Five as membership fee and purchase shares of Rs. 100 of the Society. In Kumta, the member has to purchase shares of Rs. 50 only. Each Society has its jurisdiction of work in all villages of their respective taluka. Beekeepers' Society at Sirsi covers the villages in Sirsi and Yellapur taluka. Number of villages covered by each society ranges from 65 in case of Ankola Society to 200 in Sirsi-Yellapur Society. Society at Itagi has its jurisdiction only over 42 villages of four Gram Panchayaths located in the south-western part of Siddapur taluka.

Main activities of Societies comprise of

1) Purchase and selling of bee products - honey, wax produced by members
2) Supply of bee equipment on concession rate to members

3) Extend technical knowledge and help to beekeepers

4) Organise awareness and training programmes

5) Act as link between Government and other development agencies and bee keepers

The member beekeepers are entitled to sell honey and wax that they produce to Society and also are entitled to various benefits through various development programmes given to beekeepers by development agencies through Societies. Societies extend all assistance to their members to start and develop beekeeping. Societies facilitate and help beekeepers in getting assistance for their members and for the development of Societies from Government, KVIC/KVIB etc. They supply all types of bee equipment to their beekeepers.

Societies, apart from working for their members purchase bee products from non-members also and sell bee equipment to them.

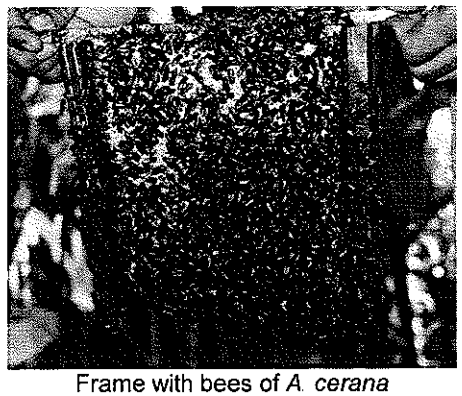
Very recently the Societies have expanded their productive and profitable activities in order to enhance their financial turn-over. They have taken up processing and marketing of other forest products such as kokum (as in Itagi Society), marketing 'khadi' products (as in Honnavar Society).

Every year, Societies prepare annual reports. These annual reports are created for their own internal accounts as well as for members of the society. We have found that these Annual Reports are prepared quite meticulously, and reflect society activities accurately. The reports contain information such as number of members, quantity of honey purchased and sold during the year, financial transaction, supply of bee equipment to beekeepers etc.

7. Features of Bee keeping in Uttara Kannada

Bee keeping is practised mainly with honey bee species of *Apis cerana*. Farmers along with their main occupation, practise beekeeping. Therefore, most of the beekeepers do not maintain a large number of colonies. Number of colonies maintained by beekeepers vary to a large extent presenting a very diverse picture of beekeeping in Uttara Kannada. Generally, beekeepers in Uttara Kannada maintain about 3-5 colonies. However, there are a few beekeepers maintaining more than 10 and up to 50 colonies. After the spread of TSBV disease in Uttara Kannada in 1994 the average number of colonies maintained by beekeepers had come down drastically. However, in most villages beekeeping is improving since the intensity of disease is reduced. Beekeepers use wooden boxes of both local and ISI types with movable frames. Bee boxes are mostly sedentary and people use all types of places for keeping bee boxes. Bee boxes are kept in the veranda, on the roof, in the kitchen garden, in the backyard of the house, suspended from the roof, in areca garden and so on. Migratory bee keeping is rarely practised. In the coastal region, beekeepers from interior villages bring their colonies to town area during winter to make use of flowering trees of *antuvala* or soapnut, *Sapindus emarginatus* which are present in good numbers in the area around towns like Honnavar, Ankola and Kumta. Afterwards, the colonies are taken back to their villages. Bee colonies of beekeepers in coastal region are migrated to interior forest villages in summer months. Bee keeping season starts mostly after the monsoon ie., in October and it attains its peak towards the end of summer. Thus, main activity of bee keeping is restricted to about eight months of the year. Honey is the major product, that is produced and marketed by bee keepers though bee wax is also produced by them. Honey extraction from colonies takes place from December to May and is most concentrated in summer months of March, April and May. On an average, a colony produces 10 to 12 Kg of honey and a well managed colony produces up to 20 Kg of honey in a year. Honey, mainly extracted from the hives by using honey extractors is sieved or strained, processed to some extent and is stored in bottles and plastic cans.

Colony of *Trigona* sp., in a wooden box



Frame with bees of *A. cerana*

A colony of *A. cerana* housed in a tree log

Frame with bees of *A. mellifera*

Boxes, bees, and beekeepers

Honey is consumed at home, but a major portion is marketed by beekeepers. Beekeepers sell most of their bee products to Societies and an equal quantity especially of honey is sold also to buyers directly or through private shops.

Colony absconding, predation by birds, hornet wasps, ants and lizards etc and the diseases like Thai-sac Brood Virus disease are the major problems with bee keeping in Uttara Kannada.

With 75% of its geographical area covered with rich forests and presence of bee population through out, entire Uttara Kannada is favourable for beekeeping. Therefore, beekeeping has spread to all parts of the district. However, it is more prevalent in some taluks. In these taluks, there are some villages known for better performance and some are identified as areas with low performance in bee keeping. Following are few of such villages / areas identified by Beekeepers' Societies in their respective taluks for better performance of beekeeping.

Ankola: Sunkasala, Adlur, Hillur, Achave, Mastikatta, Ramanaguli, Gullapur, Avarsa

Honnavar: Gundabala, Mugva, Hadinbal,Kadtoka, Manki, Magod, Tolsani

Kumta: Nagur, Angadibail, Badal, Katgal, Yana, Brahmur, Bellangi

Siddapur: Mavinagundi, Dodmane, Hulimane, Kyadgi, Bilegod, Udolli

Sirsi taluk: Devimane, Kasage, Teppar, Bandal, Vatgar, Vanalli

Yellapur taluk: Manchikeri, Chavatti, Hittalli, Tolgodu, Shimbalgar

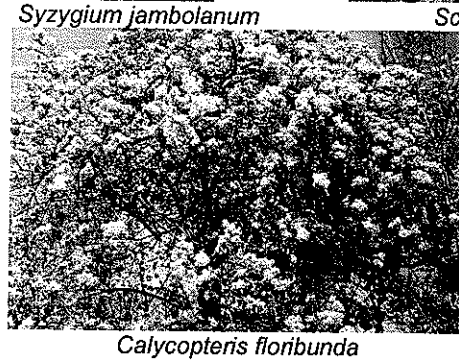
The coastal villages of Honnavar, Kumta and Ankola taluks, eastern parts of Sirsi, Siddapur and Yellapur taluks are some of less performing areas in the district according to Societies.

The main sources of nectar and pollen for bees in Uttara Kannada are flowers in natural forests though a reasonable contribution is also from horticulture and agriculture crops. Bee flora in the district is abundant. It includes a large number of flowering trees, shrubs and grass that form the main composition of natural vegetation and are present through out the district. Some of the important plants that form bee flora in natural forests of Uttara Kannada are *Schleichera trijuga, Calycopteris floribunda, Terminalia tomentosa, Terminalia bellirica, Mangifera indica, Syzygium jambolananum, Syzyzium caryophyllatum, Lagerstroemia lanceolata, Acacia concinna, Caryota urens, Bassia latifolia, Ochrocarpus longifolius, Mimusops elangi, Schefflera venulosa, Vitex altissima, Ziziphus rugosa, Holigarna arnottiana, Moringa pterygosperma, Strobilanthes barbatus, Sapindus emarginatus, etc. Anacardium occidentale, Musa paradisiaca (banana), Areca catechu (areca), Cocos nucifera(coconut), Elettaria cardamomum* (cardamom) etc and a host of various field crops constitute bee flora in cultivated lands.

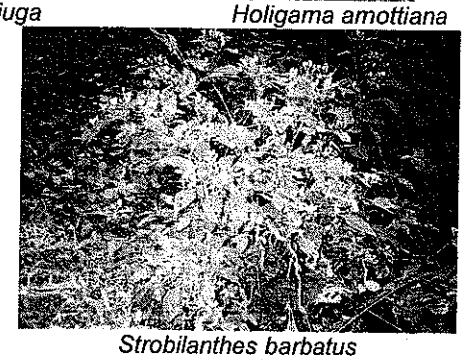
Syzygium jambolanum

Schleichera trijuga

Holigama amottiana



Calycopteris floribunda



Strobilanthes barbatus

Schefflera venulosa

Cocos nucifera (Coconut)

Mangifera indica

Gliricidia sepium

Some of the important plants that form bee flora

Despite all these resources, bee keeping in the district has been a household level activity and has not developed into a major (or commercial) activity. In most cases, technical knowledge of beekeeping is inherited by the younger generation from their father and elders Thus, it is seen that youngsters acquire limited knowledge on beekeeping based on their own experience in beekeeping.

8. Present Scenario

To understand the present status of bee keeping in the district as the first step towards developing the database, data and information were collected from Beekeepers' Cooperative Societies in Uttara Kannada and other sources. We tried to understand different aspects of beekeeping in Uttara Kannada and correlate the performance and development of beekeeping with different factors. Data collected from the Societies included number of villages involved in beekeeping, number of beekeepers, honey and wax produced by beekeepers, supply of bee equipment such as bee box, queen gates, wax papers, etc., funds received by Societies for training and other bee development activities. These data give a broad idea about the status and development of beekeeping in the district and especially in the area under the jurisdiction of Societies.

Number of villages: In Uttara Kannada bee keeping activity is said to be found almost through out the district. However, KVI and also Societies estimate that beekeeping activity is found in about 700 villages of the district covering about 55% of total number of villages in Uttara Kannada. These villages are mainly located in 8 of the 11 talukas of the district. Active beekeeping is observed in Ankola, Bhatkal, Honnavar, Karwar, Kumta, Siddapur, Sirsi and Yellapur talukas. The talukas of Haliyal, Mundgod and Joida (formerly known as Supa) are considered to be less favourable for beekeeping activity. Haliyal and Mundgod support mostly deciduous forests where as Joida is comparatively less developed and organised beekeeping is not a major activity there. However, all three taluks present good opportunity for the development of beekeeping. Haliyal and Mundgod talukas have vast area under agriculture and Joida taluka supports rich evergreen forests.

Number of beekeepers: This is also an estimated figure mainly assessed by the Societies on the basis of number of beekeepers selling bee products to the Societies. All the members of the Society are not active beekeepers. According to KVI, number of beekeepers in Uttara Kannada was about 5300 in 1990-91. Since then, there was a gradual reduction in the number of beekeepers with an estimated number of 1550 in 2002. This was mainly because of spread of TSBV disease that has destroyed colonies of *A. cerana* on a large scale and damaged beekeeping industry to a large extent.

Honey Production: Honey production in the area of society is honey purchased by each society. It was difficult to get the information on honey production at the district level since there was no proper mechanism to collect such information

Wax production: Extraction of beeswax and selling of wax is given a low priority by beekeepers. However, very little information existed with the Societies on wax production, purchase and its marketing.

Supply of bee equipment: Bee boxes, honey extractors, foundation sheets, queen gates, queen excluders, supers etc are supplied to beekeepers by Societies. Some of them for example bee boxes are made available to beekeepers on subsidised rates under beekeeping development programmes.

Funding and Development Programmes: Beekeeping activity in Uttara Kannada is mainly supported by funds from KVIC, KVI and DIC. The beekeepers are provided with subsidy towards purchase of bee boxes and other bee equipment. Funds are also provided by these agencies towards the development of apiaries by beekeepers

Training: Training programmes are organised by Societies and other agencies with the help from DIC, KVI and KVIC for those who are already practising beekeeping or beekeeping practitioners and also for beginners in beekeeping. KVI also on its own organises training programme.

Various indicators of beekeeping performance in Uttara Kannada is discussed in more details in later chapters.

Lacunae in the data / information: Societies have been the main source of information/data in this study on beekeeping in Uttara Kannada. However, information available with Societies was unable to provide a complete picture of beekeeping in Uttara Kannada. There are several reasons for this.

1 Societies do not have proper mechanism to collect and compile all information related to beekeeping such as active beekeepers, honey and wax production, selling of bee products by beekeepers in their respective talukas.
2. Information on beekeeping available with Societies is extracted from the records of Societies.
3 All the members of Societies are not active beekeepers.
4 All beekeepers in each taluk are not necessarily members of respective Societies.
5 All member beekeepers do not sell all their bee products to their respective Societies

6. Thus, quantities of bee products purchased and sold by Societies will not necessarily include all bee products that are produced in their taluks
7. All the beekeepers present in taluka do not get included in the data provided by the Societies.
8. The quantity of wax purchased by Societies and sold by beekeepers is very low.
9. Grants received by Societies were used for various purposes apart from actual development of beekeeping the area. A major portion of grants was used for developing infrastructure of Society such as building, honey processing unit etc.

9. Results and Discussion

Data collected using Part B of the questionnaire include quantitative data. The annual reports of the societies were found to be adequate for such numerical data. Thus, we could obtain more information about the societies and increase span of our study over many years. Especially, the Honnavar Bee-Keepers Co-operative Society provided us with data going back to 1941. Table 3 gives summary of the data thus collected.

Table 2. Summary of the Data Collected

	Society	Years		Number of Records
		From	To	
1.	Ankola	1980	2010	29
2.	Honnavar	1941	2010	65
3.	Itagi	1989	2010	21
4.	Kumta	1976	2007	31
5.	Siddapur	1987	2010	23
6.	Sirsi	1981	2004	23
			Total	192

Variables like number of members, number of active bee keepers, number of bee boxes used, the honey purchased by a Society enlighten us about the bee keeping activity in a year.

Each Society purchases honey from its members. Thus, the honey purchased by a society is a clear indicator of honey production. However, Societies buy honey also from non-members and even they purchase honey from outside the district to fulfil the increased demand for honey. In discussion, term "Honey Produced" is used interchangeably in place of "honey purchased".

To help the beekeepers, the societies sell bee boxes, foundation sheets and queen gates. These parameters with quantity of wax purchased also reflect the beekeepers' activities to certain extent. These variables were also studied.

Classified like this, maintenance of data becomes easier. Most simple software like Microsoft Office 2000 can be used to store the data. In particular

entering the data in MS Excel 2000 makes it even easier for analysis. Data collected up to now will be put into Excel and future entries will be made using Excel only. The only disadvantage with Excel is that complexity in entering long textual notes. But these minor difficulties can be overcome by practice and training.

Analysis of data pooled over all societies:

Let us look at the data pooled over all societies. The data and analysis will be presented on following parameters:

- Year
- Number of Members
- Number of active beekeepers
- Number of bee boxes
- Quantity of honey purchased
- Quantity of wax purchased in Kg
- Number of local boxes sold
- Number of ISI boxes sold
- Number of extractors sold
- Number of foundation sheets sold
- Number of queen gates sold
- Number of queen excluders sold
- Total Grants

Parameters like Active Beekeepers, Bee Boxes Used, and Honey Produced will be analysed in details. Effect of grants over honey production will be examined. Miscellaneous parameters of activity will be looked into.

Fig 1. Major parameters of society activities

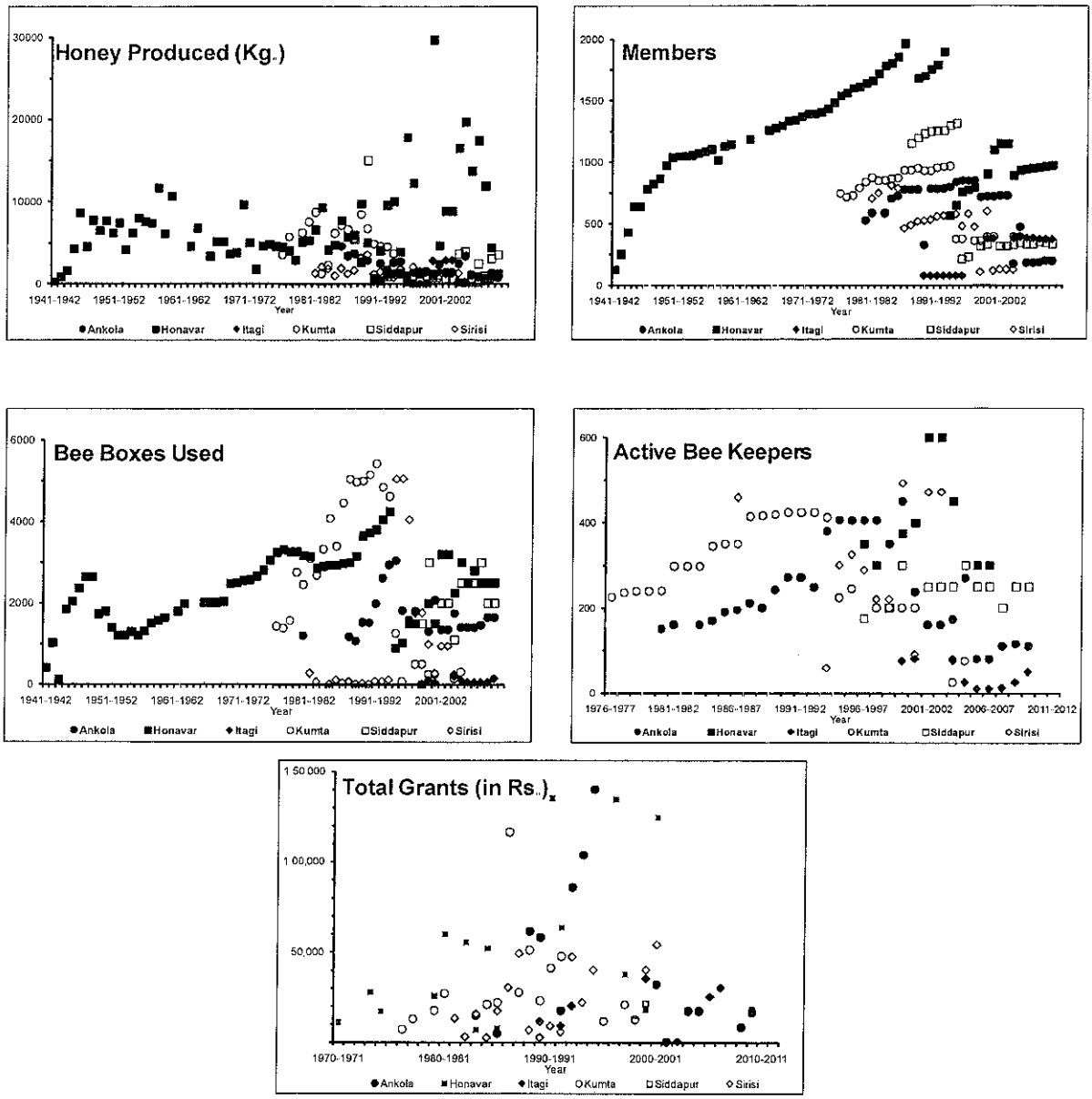
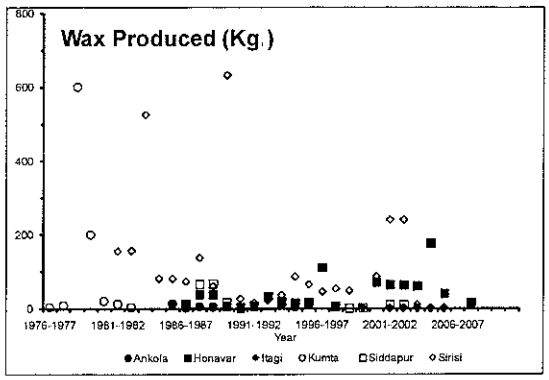
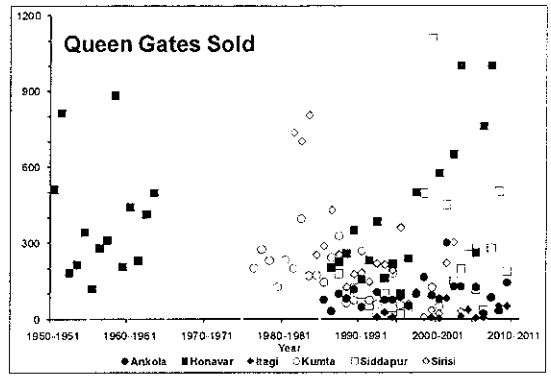


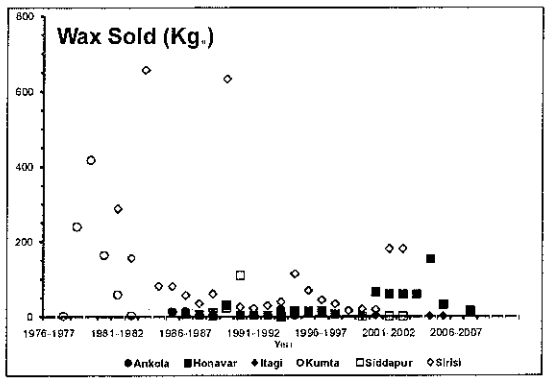
Table 3. Minimum, maximum, and number of observation on major parameters of society activities

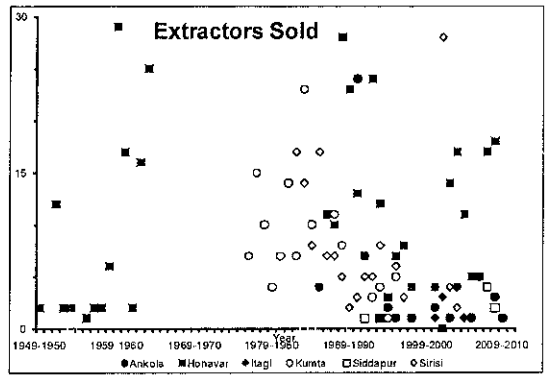
	Min	Max	Number of Observations
Honey Produced (Kg)	2	29,713	179
Active Beekeepers	10	800	101
Members	75	2,010	176
Bee Boxes used	3	5,416	156
Total Grants (Rs.)	91	1,85,000	80

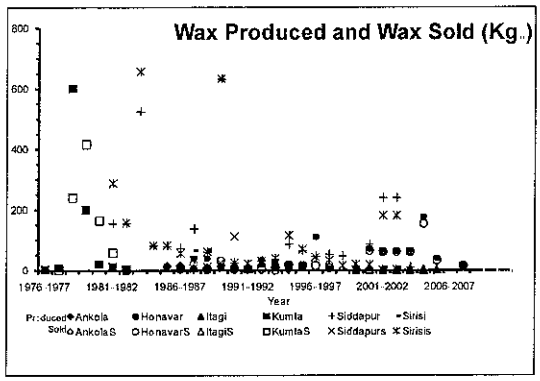
Fig 2. Other parameters of society activities

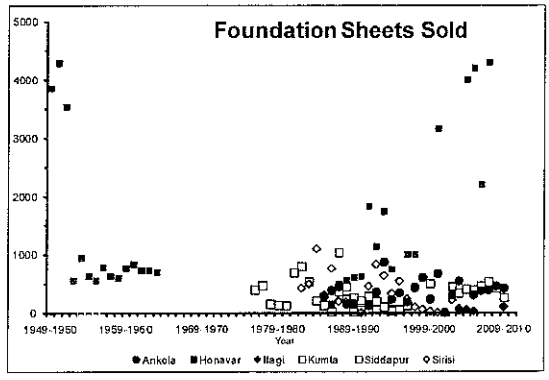


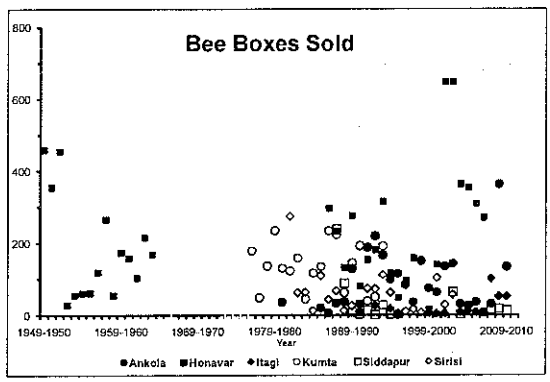












Honey Produced:

Honey production has been varying from year to year. A trend in honey production becomes clear as we analyse it at society level. Although the bee keepers' societies sometimes purchase honey directly from market to meet the demand, the societies mainly purchase it from their members. Thus, it is one of the reliable indicators of society activities

Number of Members:

There is constant increase in the number of members. The longest running society at Honnavar has grown from 125 members in 1941 to about 1000 members in 2004 peaking at 2010 members in 1987. The newly established society at Itagi is increasing in strength over recent years. There seems to be a sudden drop in number of members in a some years. This could be due to updating of the society records after restructuring of the membership fees. Constant number of members over many years could be due to lack of information update by Societies. Members are also the shareholders in a society and may not be the actual bee keepers. Information regarding their numbers does not seem to be updated yearly. Thus, number of members do not remain true indicator of societies' beekeeping activities.

Active Bee Keepers:

The number of active bee keepers shows trends in consistent with number of members. Number of active bee keepers has increased over the years. A sudden change in their numbers could be attributed to diseases in honeybee colonies. Although, not all societies maintain accurate records of number of active beekeepers, it still is reliable indicator of state of society activities.

Bee Boxes Used:

The number of bee boxes used seems to be increasing over the years. As the society like Kumta flourished over the years, number of bee boxes used also increased. Over the last five years, the numbers seem to be decreasing. This could be due the prevalence of Thai-Sac brood disease.

Total Grants:

Every year the Government of Karnataka helps the bee keepers' societies in many different ways. It helps them through Khadi and Village Industries Commission. The societies are given loan based on extent of their activities. Monetary help is also provided to organize training camps. For purpose of the

analysis for a year we have summed up different kinds of grants and considered it as a single variable viz. Total Grants. Based on data over more than last 25 years, the grants seems to have been increasing

However, it should be noted that over the last few years the grants coming from the government for various beekeeping activities has dried up.

Statistical Data Analysis:

We further investigate interrelationships between the parameters mentioned earlier.

We have looked at how honey production is influenced by the grants, number of active bee keepers and the number of bee boxes used. We also look at how the grants affect the number of active bee keepers and the bee boxes used. Thus we have looked into following relationships:

1. Honey Produced and Grants,
2. Honey Produced and Active Bee Keepers
3. Honey Produced and Bee Boxes Used
4. Active Bee Keepers and Grants
5. Bee Boxes Used and Grants

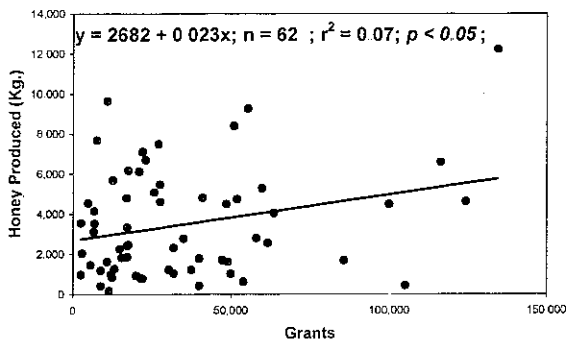
Outliers in the observations: In certain cases, e.g. grant of `1.35 lakhs given to society in Honnavar in 1990, we knew that it has been given for construction of society building. Such very large grants were considered outliers for the purpose of analysis. So as to fulfil extra demand for honey, society sometimes buys it not just from its members, but also from other bee keepers. These bee keepers may come from other areas. Such large purchase of honey, when known, are also considered as outlier observations. Such data points are excluded from the analysis. Six data points were thus ignored while analysing effect of Grants on Honey Production. Further, grants less than one thousand rupees in a given year seem far too less for any achievable purpose. Five more data points were not considered during analysis. Thus, totally eleven points were considered outliers while analysing effect of Grants on Honey Production.

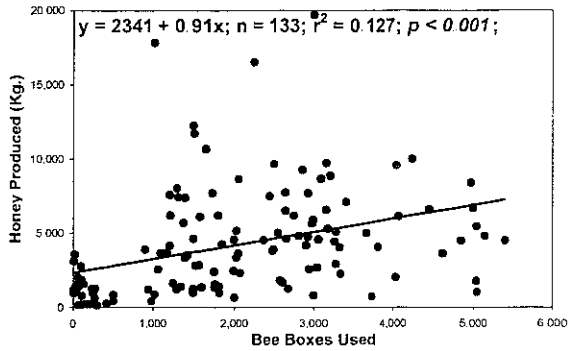
While analysing effects of grants on Active bee keepers eight data points were considered outliers. While analysing effect of Grants on Bee

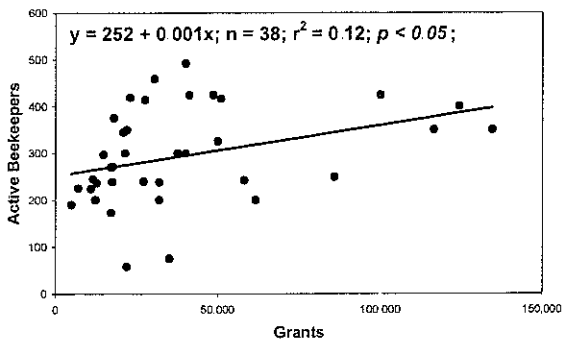
Boxes used few data points where number of bee boxes used were too small compared to grant received were not considered during analysis. Total eleven data points were not used while analysing effect of grants on bee boxes used

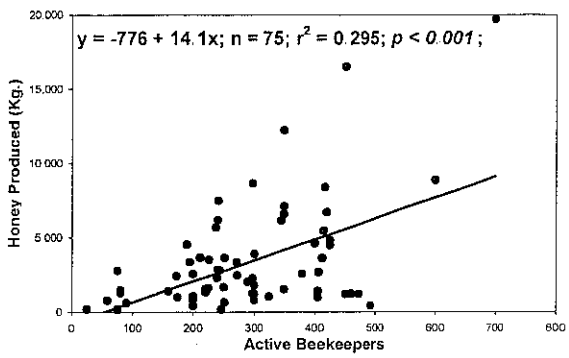
Note on not forcing zero intercept while analysing effect of 'Bee Boxes used' and 'Active Bee Keepers' on honey production: The regression equation indicates that more than two thousand kilogram of honey produced with even when no bee box was used. When there were no or very few bee keepers, no honey was produced. In fact, to sustain society activities, more than eight hundred kilo of honey needed to be bought from non affiliated bee keepers. A non-zero intercept in these analysis further reinforces our observation that there are more bee keepers in the area. These are not affiliated to societies. More proactive measures needed to get integrated in co-operative society activities.

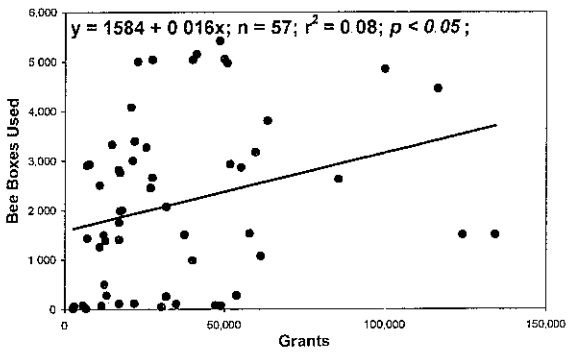
Fig 3. Regression Analysis on data pooled over all societies









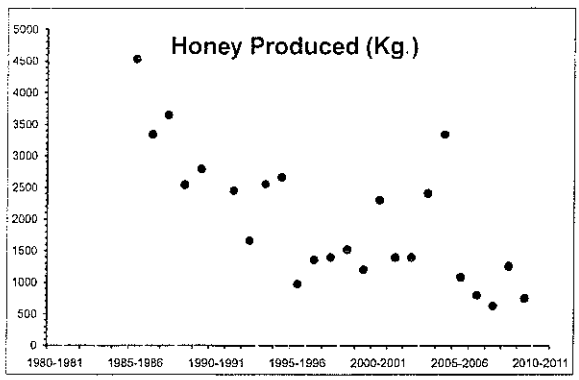


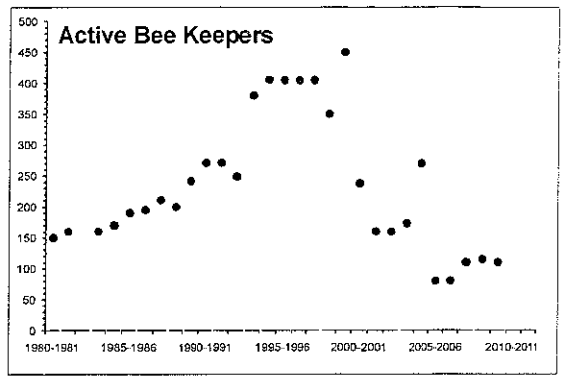
The honey production increases with number of active beekeepers, and with the number of bee boxes. The number of active beekeepers in turn influenced by the grants. The grants affect honey production directly. Grants affect number of active bee keepers. They help societies organising training camps. They help expanding their base. For smaller societies like Siddapur and Sirsi, grants result in increased honey production – reflected in the year next. This especially is visible when grants were around fifty thousand rupees. Larger grants in tune of one lakh rupees and higher were used for building society offices and strengthening society's infrastructure

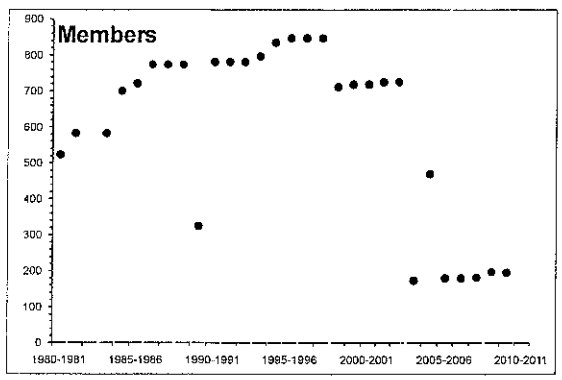
Impact of grants and training camps on production of honey is further analysed and is discussed in next chapter.

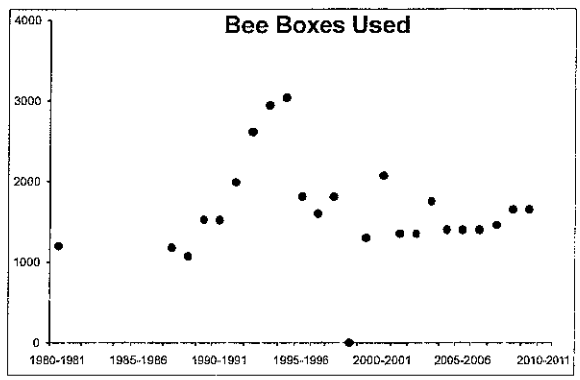
Analysis at society level:

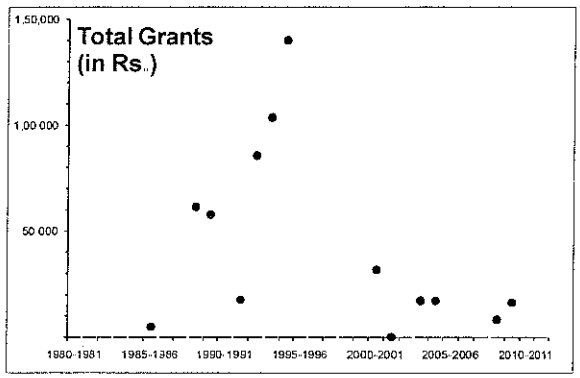
Fig 4. Ankola: Major parameters of society activities







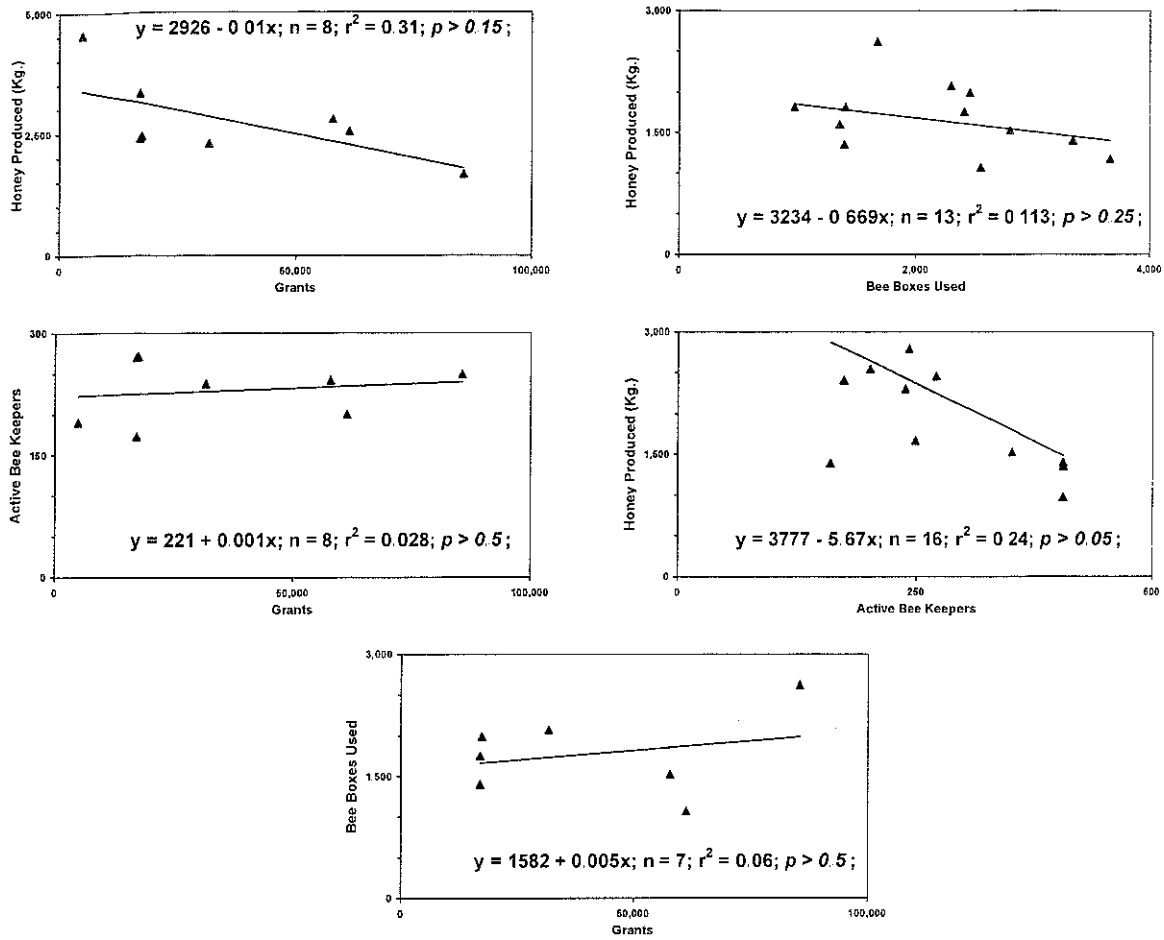




The production of honey has declined over the years. The number of active bee keepers, members, and the grants have increased upto 1996

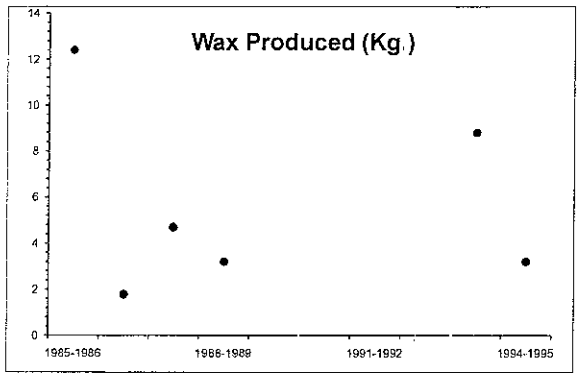
There is lot of variation in all the parameters over the last ten years. The fluctuations, especially the downward shift could be attributed to the Thai-sac brood diseases that is affecting the beekeeping activities in this region. However, the honey production is picking up since last five years. Bee keepers are increasing. Training camps are the need of the day to rejuvenate beekeeping activity.

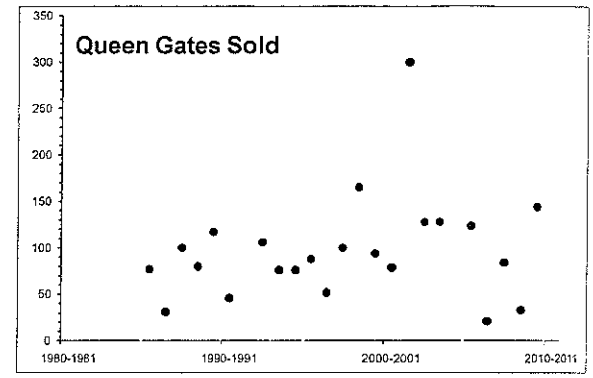
Fig 5. Ankola: Regression Analysis

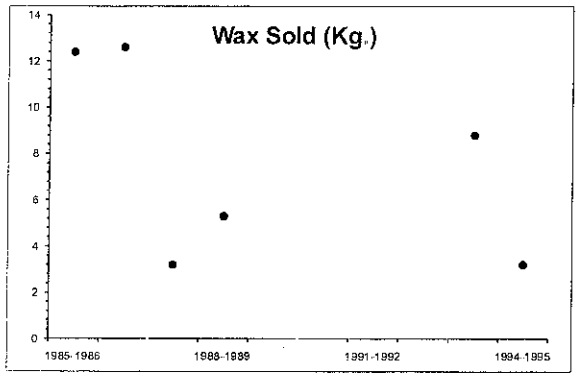


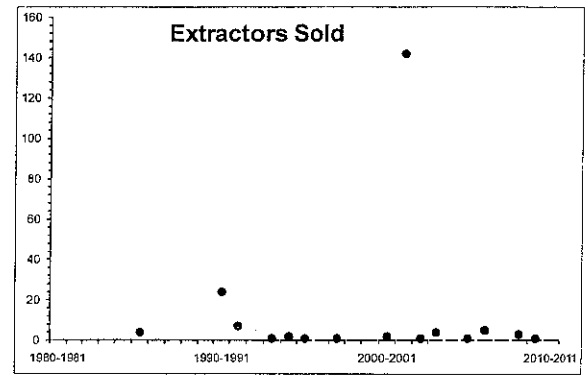
None of the regressions are significant. It could be due to very few data points. The regressions, especially between honey produced and 'Active Bee Keepers' and 'Bee Boxes Used', in particular the intercepts points back to purchase of honey from non-members. This could be keeping this society alive. As seen in overall analysis, Grants could help this society increasing use of number of bee boxes. Active recruitment of bee keepers will also help. Training programs can bring such bee keepers more closer.

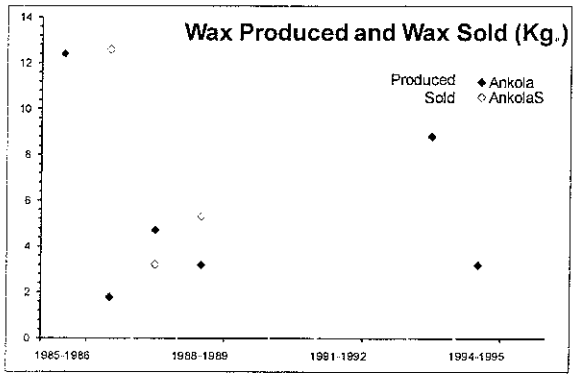
Fig 6. Ankola: Other parameters of society activities

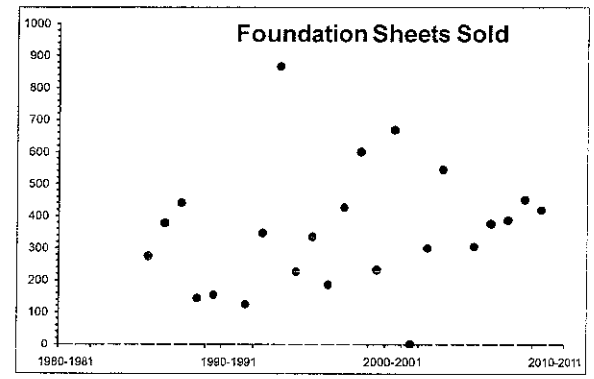


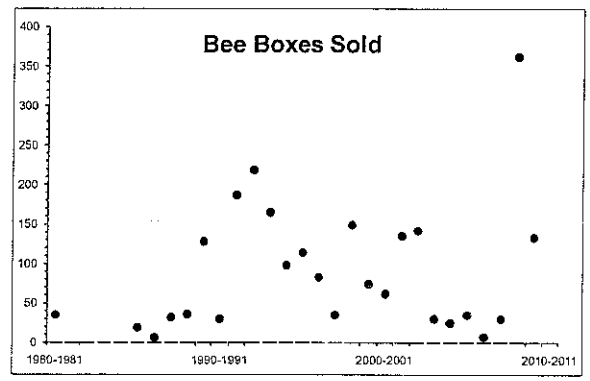






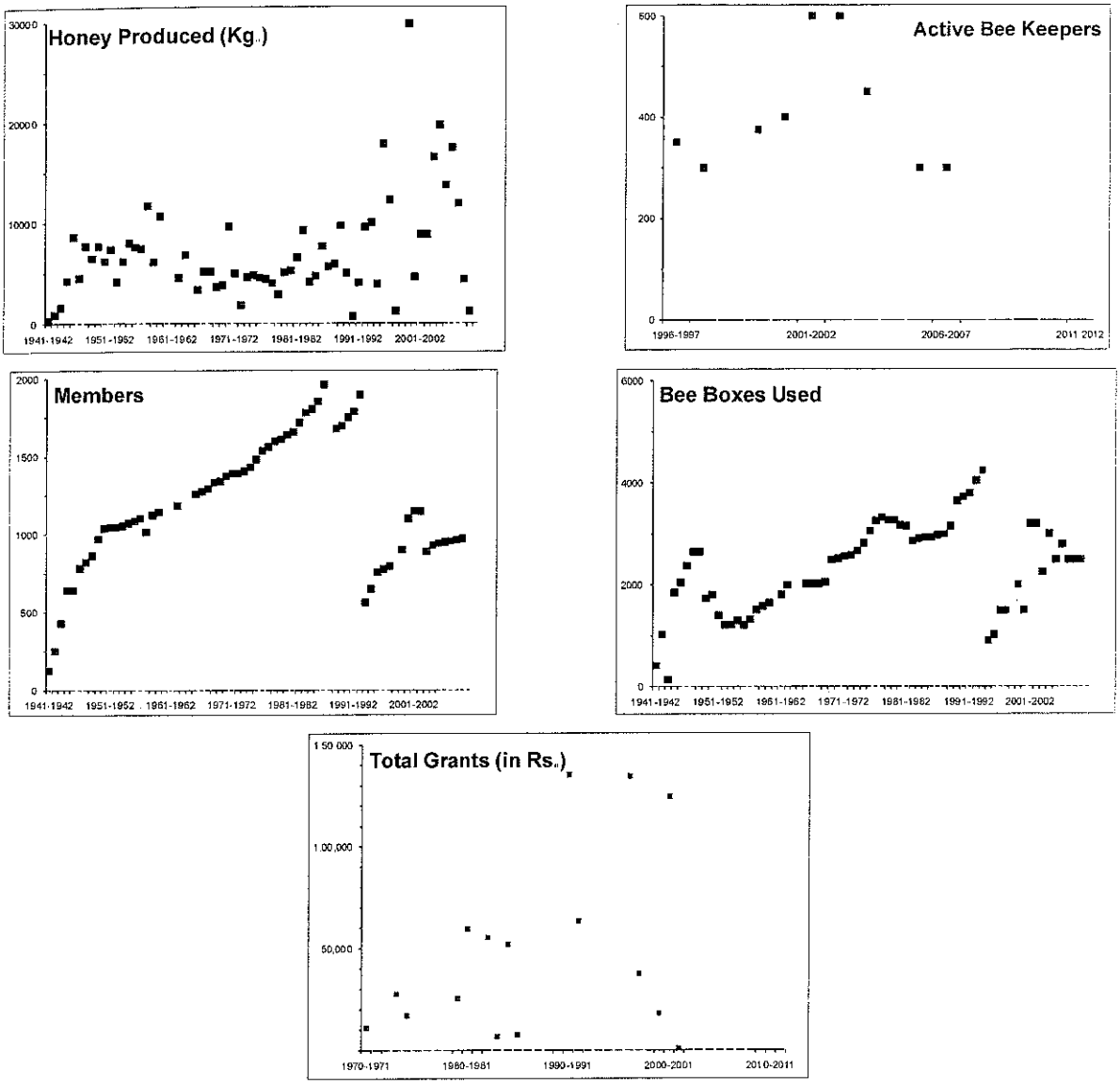






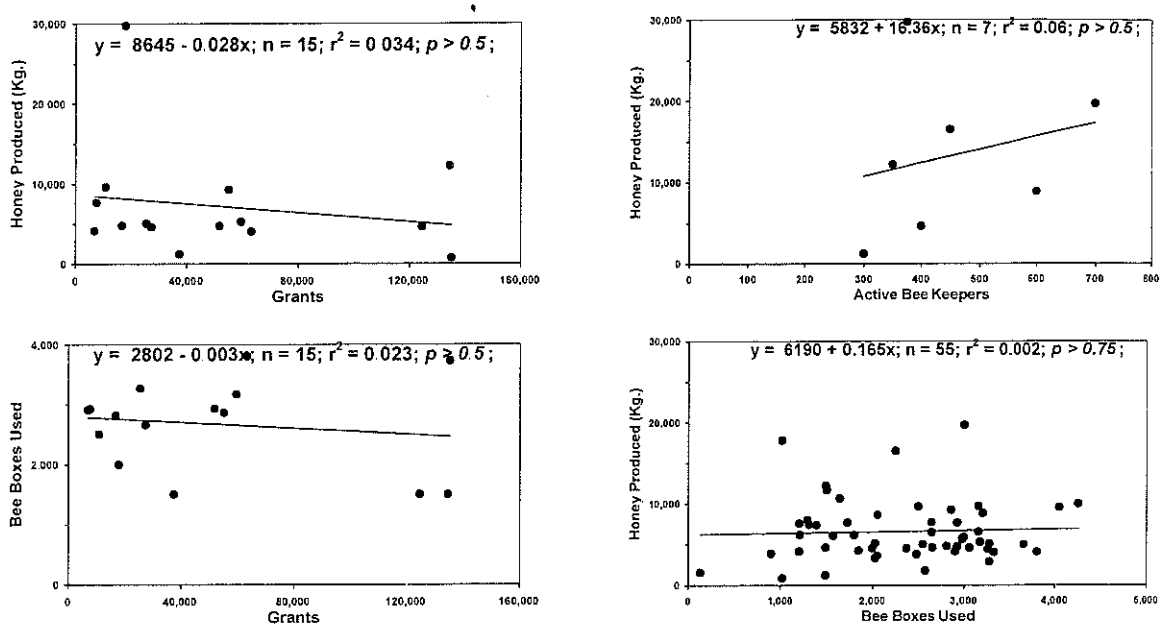
Various charts given above indicate that this is a very active society. It seems have recovered well from 2005 outbreak of Thia-sac brood disease and society activities are indicated from bee boxes, queen gates and foundations sheets sold are rising steadily over last few years.

Fig 7. Honnavar: Major parameters of society activities



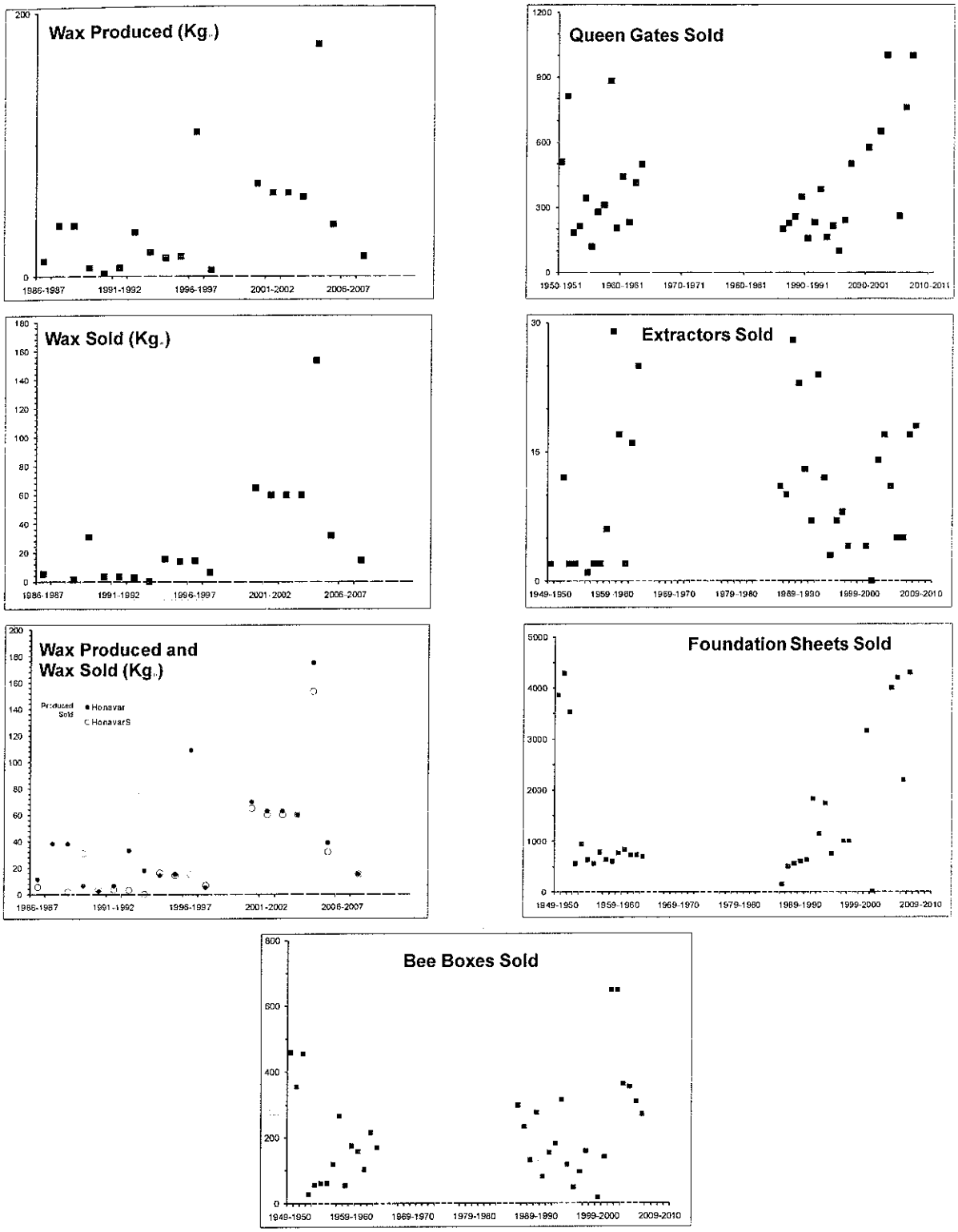
This is one of the oldest societies. The data on number of members, honey production and number of bee boxes used are available since 1941. The number of members and the bee boxes used have steadily increased over the years. The honey production, however, seems to be varying over the years. Apart from grants for society's new building, it has regularly received grants for large and medium apiary. More accurate data are required for number of active bee keepers. The break in trends for number of members and bee boxes used reflect prevalence of Thai-sac-brood disease.

Fig 8. Honnavar: Regression Analysis



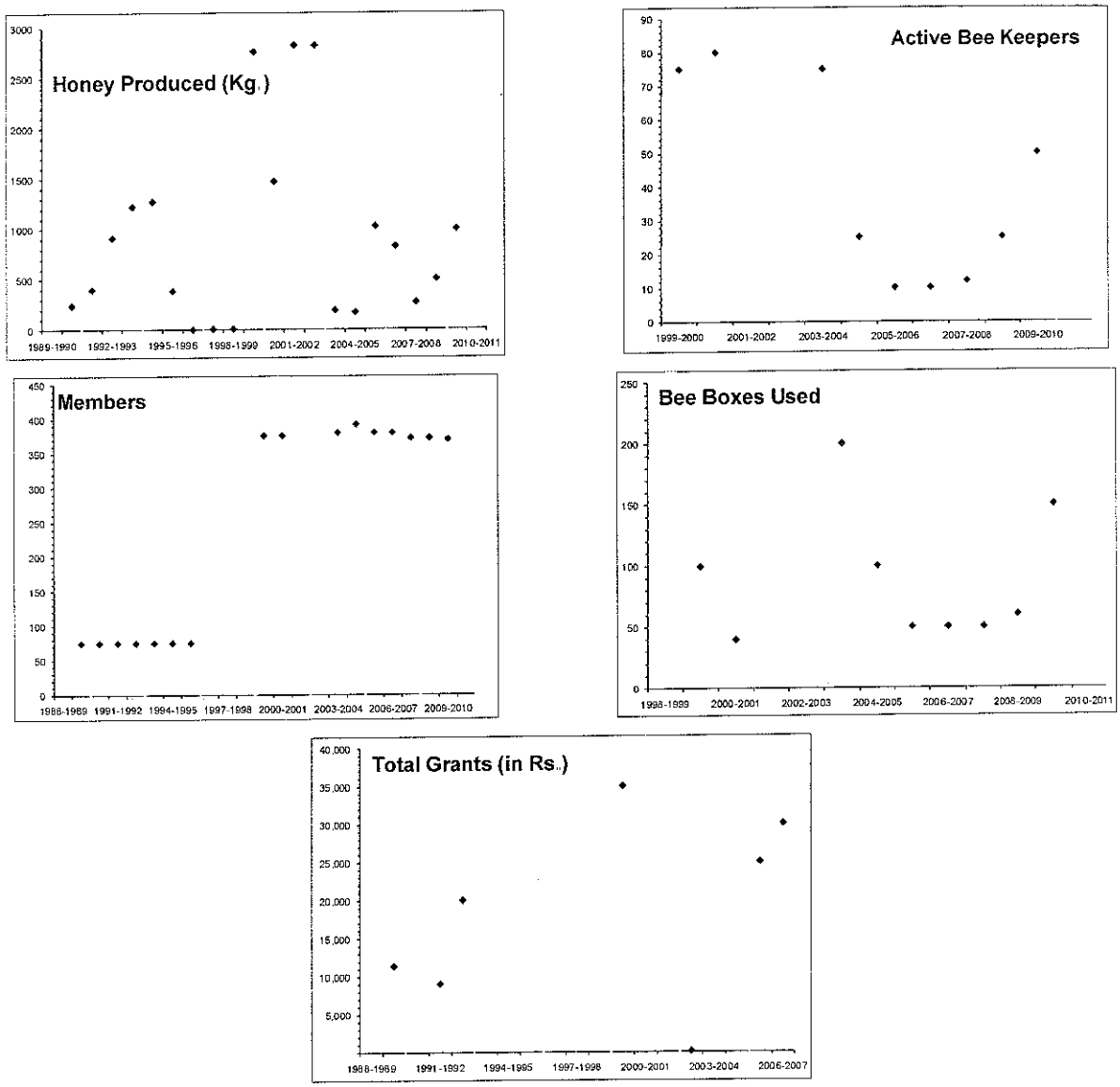
All regression analysis return statistically non significant results. The honey production is not influenced by either the bee boxes used or the number of active bee keepers. This society seems to be near equilibrium, governing on its own, honey production unfazed by grants, bee boxes, number of active beekeepers. As seen in individual charts, earlier, its activities are recovering well from Thai-sac brood disease that plagued bee colonies in this area.

Fig 9 Honnavar: Other parameters of society activities



Data on various parameters is not available remarkably between years 1964 to 1985. This strongly reflects a clerical error, where earlier best practices were not continued. Like society at Ankola, this society, too has recovered well from Thia-sac's prevalence

Fig 10 Itagi: Major parameters of society activities

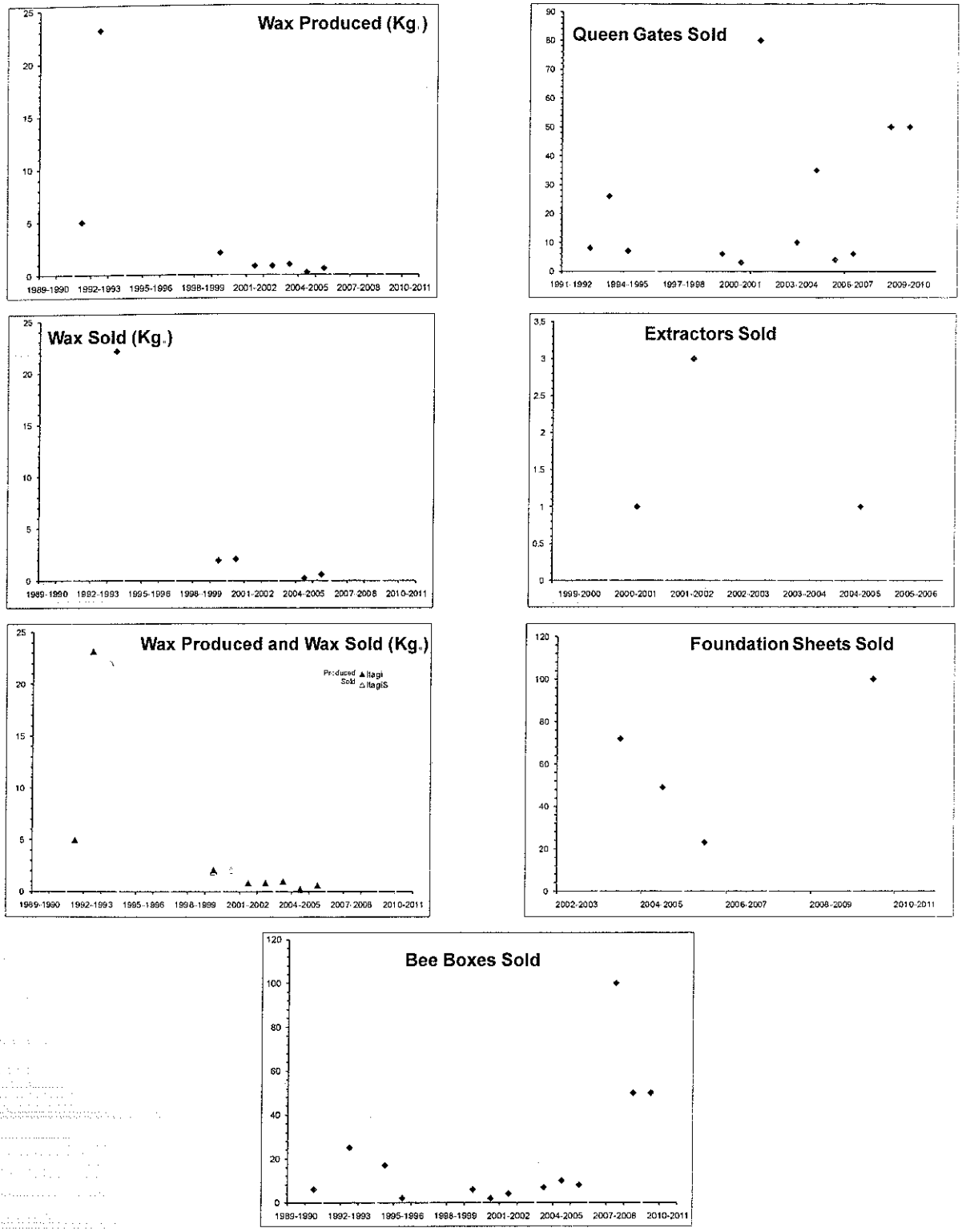


This is one of the nascent societies. It was established in 1985 and started bee keeping and related activities only since 1990.

Regression Analysis:

As information on "Active Bee Keepers" and "Bee Boxes Used" is available only for few years, its impact on Honey Production could not be determined. No meaningful comparisons can be made for interrelationships between Total Grants and other major parameters of society activities.

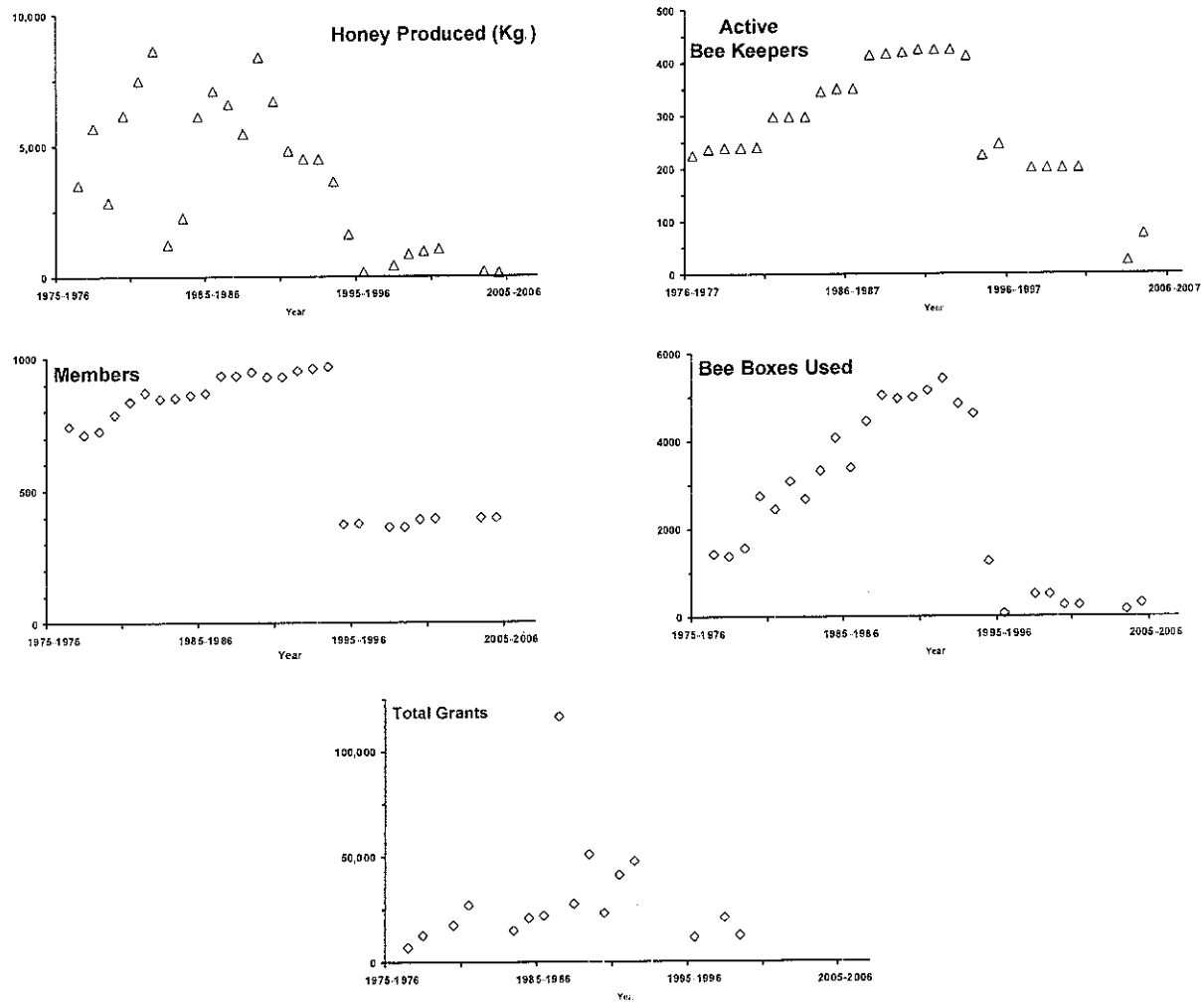
Fig 11. Itagi: Other parameters of society activities



For this nascent Society, established only in 1985, it is remarkable to have such a detailed information available. Although no meaningful analytical information can be extracted, it looks like this society is improving its performance, especially with respect to the number of bee boxes sold. It is recovering remarkably well from the Thai-Sac brood disease that affected the

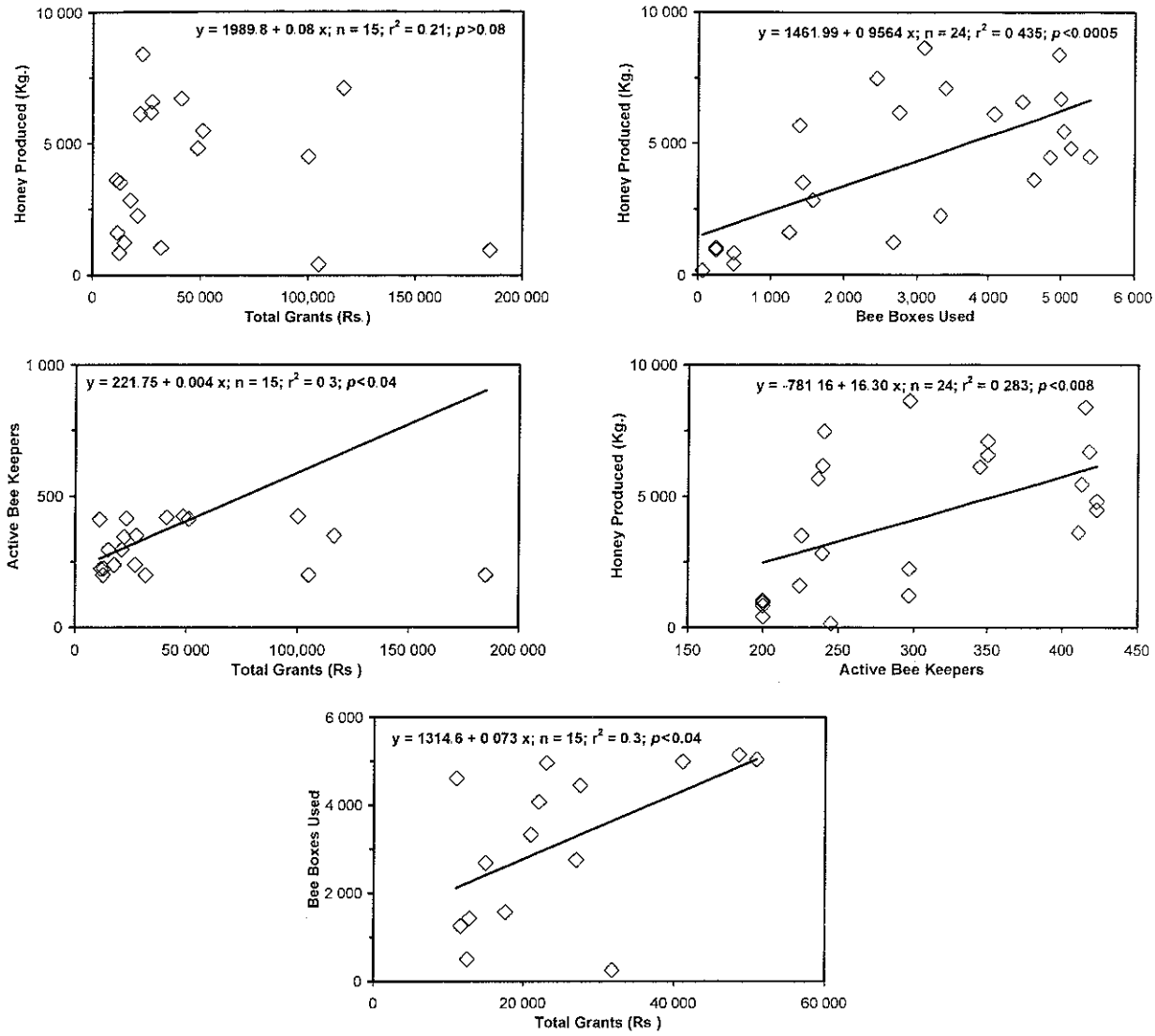
honey bee rearing activities few years back. Organization of awareness programs, training camps will help this society immensely.

Fig 12. Kumta: Major parameters of society activities



Honey production is varying in this society. The number of active beekeepers increased steadily upto 1996. The number of Bee Boxes used has also increased upto 1996. The honey production, number of active beekeepers and the number of bee boxes used have dropped down considerably since 1996. This could be due to the occurrence of Thai-sac brood disease. Will the society recover from it? This society seems to be getting the grants regularly.

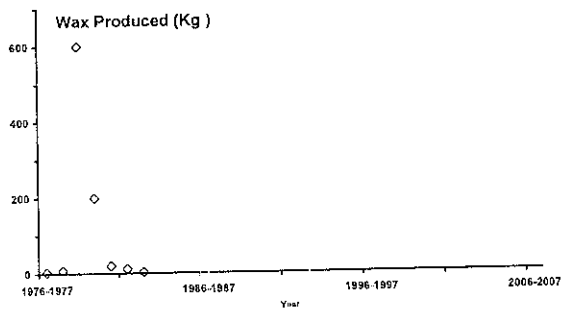
Fig 13. Kumta: Regression Analysis

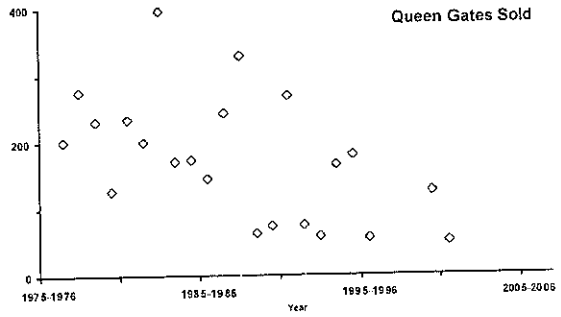


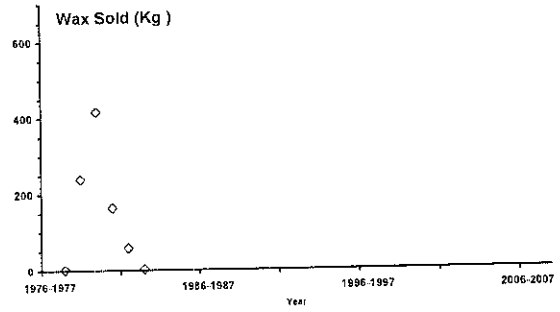
Despite the prevalence of Thai-sac brood disease, this society have shown significant increase in honey production with the number of bee keepers. The honey production has also increased with the increasing number of bee boxes used. Grants has affected neither the number of active bee keepers, nor the honey production.

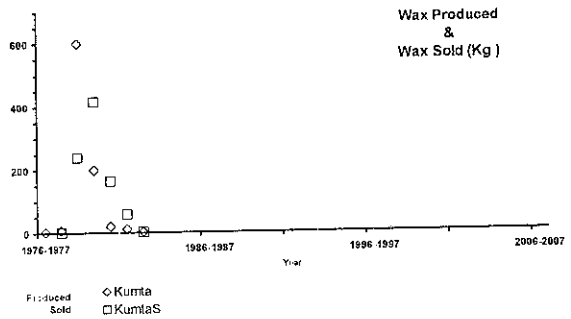
This society has received grants for building society office. The relationship between honey production and grants was tested ignoring these observations. Providing regular grants has an indirect effect on honey production. Grants are influencing number of active beekeepers and are inducing use of higher number of bee boxes.

Fig 14. Kumta: Other parameters of society activities









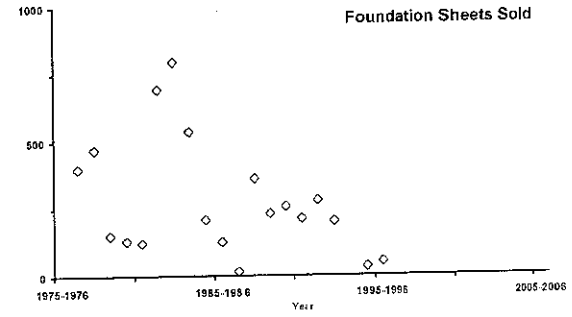
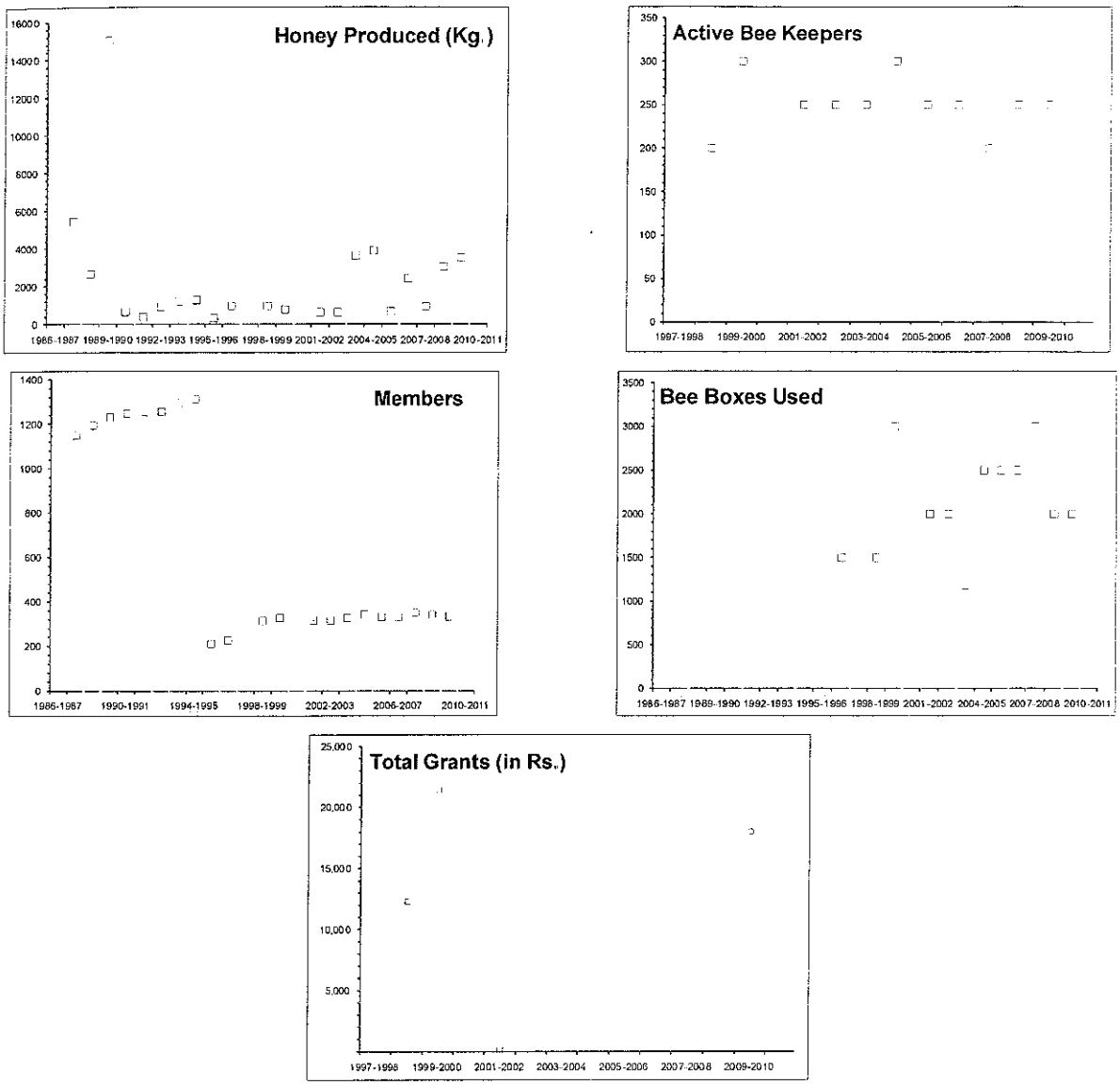


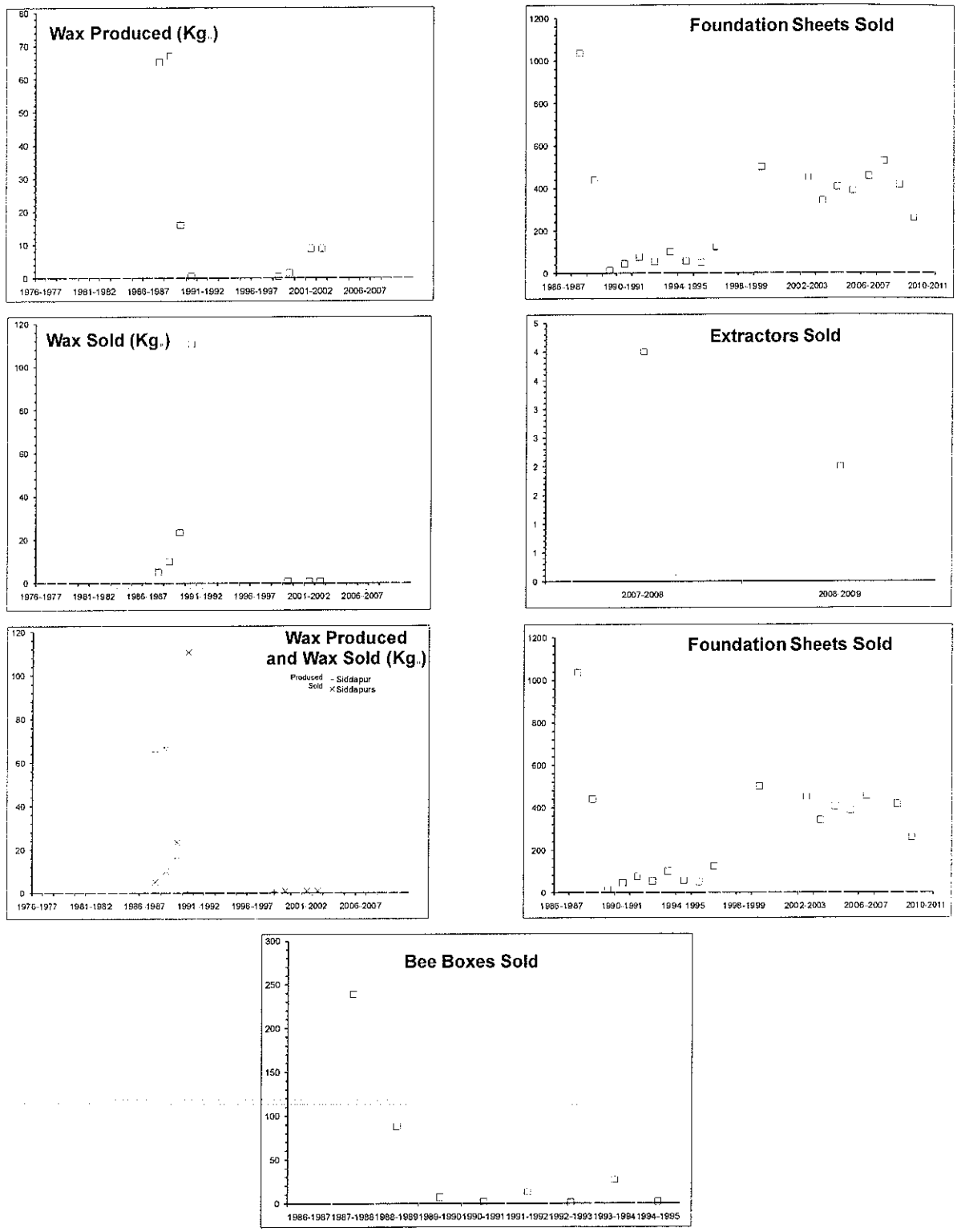
Fig 15. Siddapur: Major parameters of society activities



Hardly any data is available about this society. Data only on honey production is available for 13 years. Data on other parameters is available only for few years. Only two years provide us information on all the four variables of interest. Thus the data is insufficient for performing statistical analysis and drawing any meaningful conclusions.

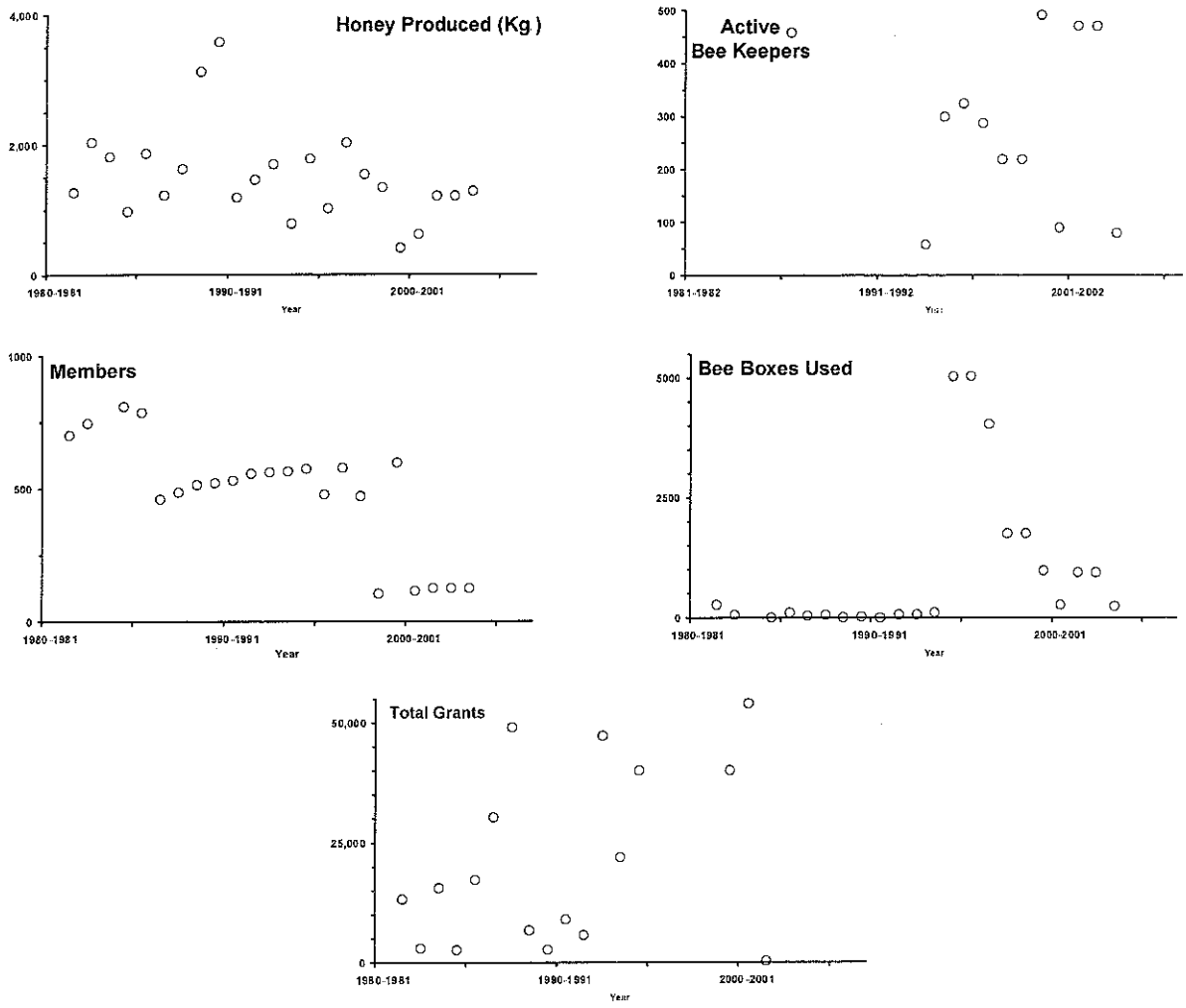
This society does not seem to be receiving any aid. There is also absence of data on number of active bee keepers and the number of bee boxes used.

Fig 16. Siddapur: Other parameters of society activities



This society was formed in 1985, and has been active since. Its activities seems to be at very low level.

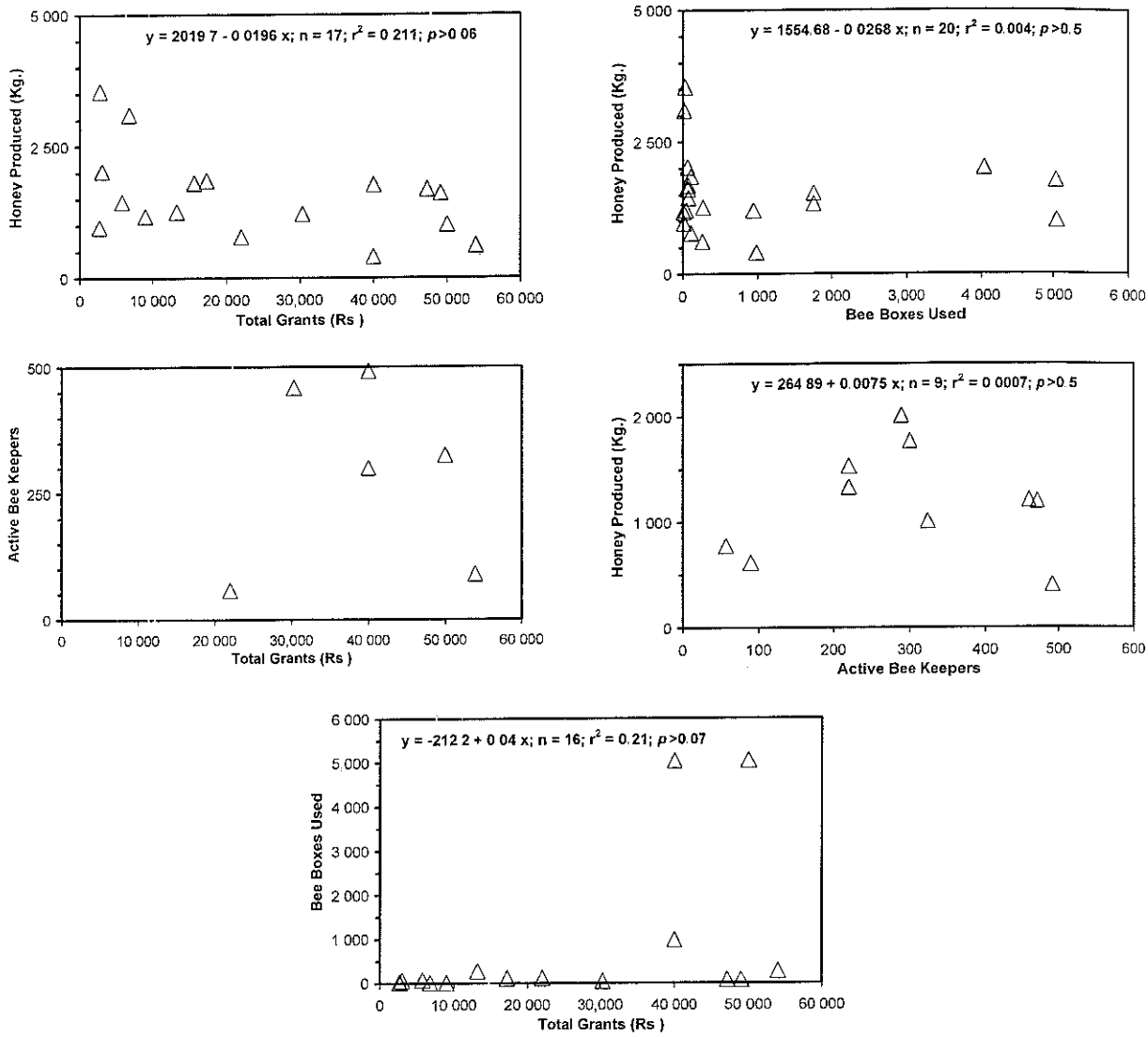
Fig 17. Sirsi: Major parameters of society activities



This is a mid-range society with members from 100 to 1000, and active beekeepers between 50 to 500. Number of bee boxes used has peaked in 1994. Incidentally, its same year when it received highest grant. Honey production has remained in the range of 500 to 2000, highest in 1989-90 at 3548 Kgs.

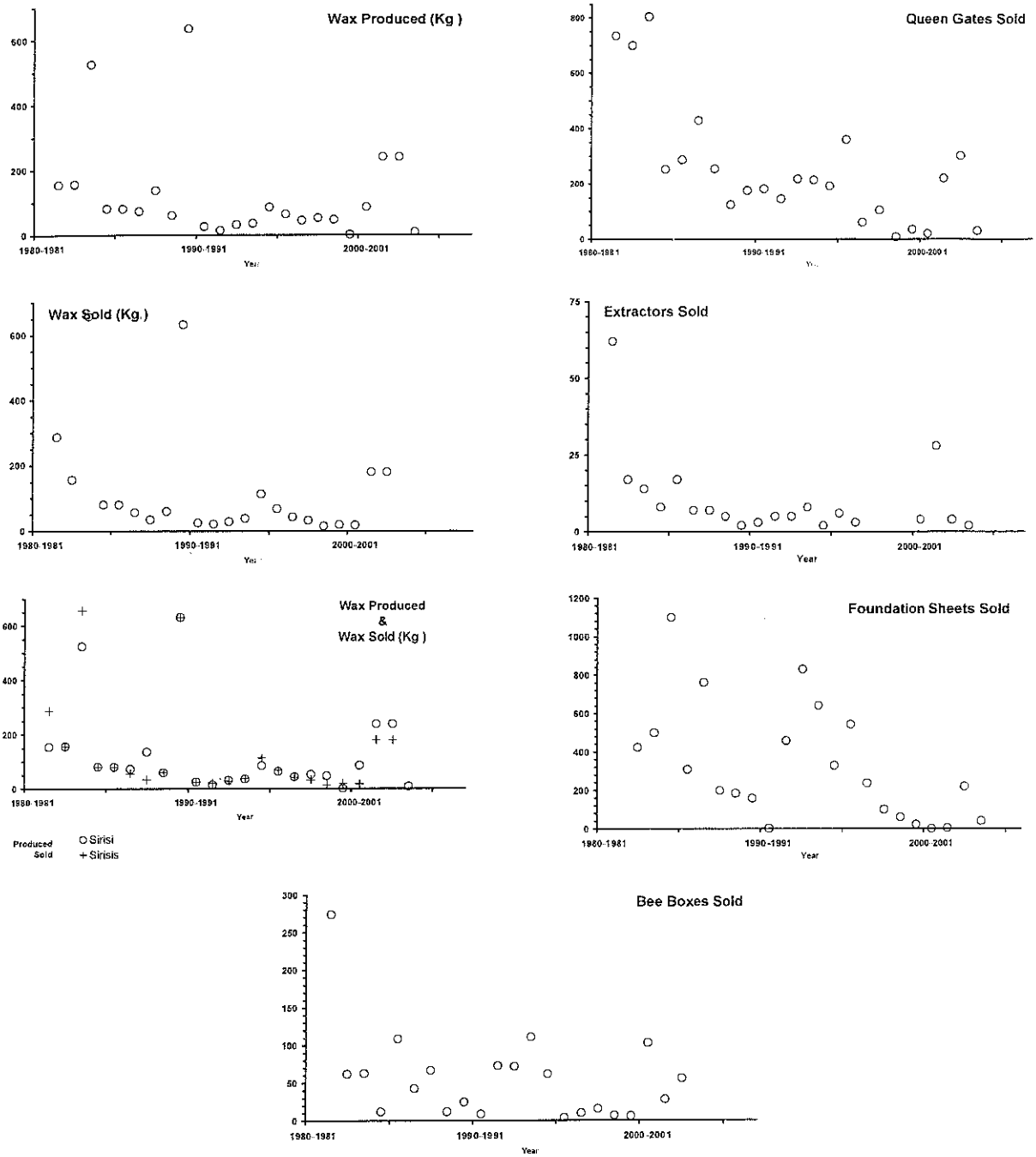
The honey production is varying in this society. The number of bee boxes used, the number of active bee keepers, and the number of members show sudden decrease since 1996. The society seems to be receiving grants regularly.

Fig 18. Sirsi: Regression Analysis



Grants do not affect significantly to the number of active bee keepers, bee boxes used and to the honey production. Grants seems to have marginally non-significant adverse effect on honey production (p=0.06). Honey production does not increase significantly with number of active beekeepers or with number of bee boxes used.

Fig 19. Sirsi: Other parameters of society activities



This is one of the active societies. It has been buying and selling wax. Although the selling of foundation sheets, bee boxes, extractors, and queen gates varies from year to year, it seems to be increasing over last few years.

We also analysed the data considering the societies in Up-Ghat or Hilly Region and the societies in Coastal Region.

Coastal Region:

Fig 20. Coastal Region: Major parameters of society activities

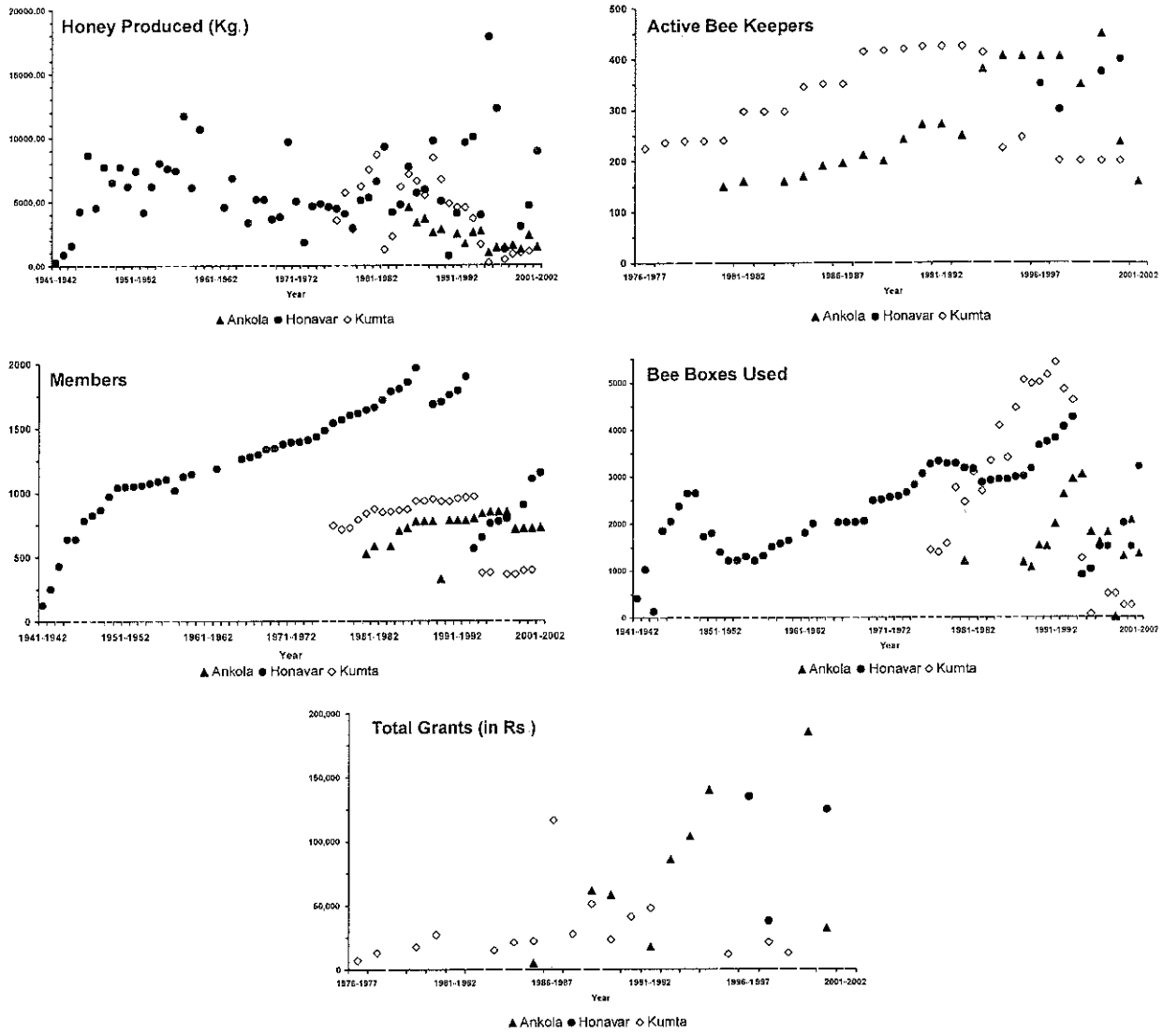
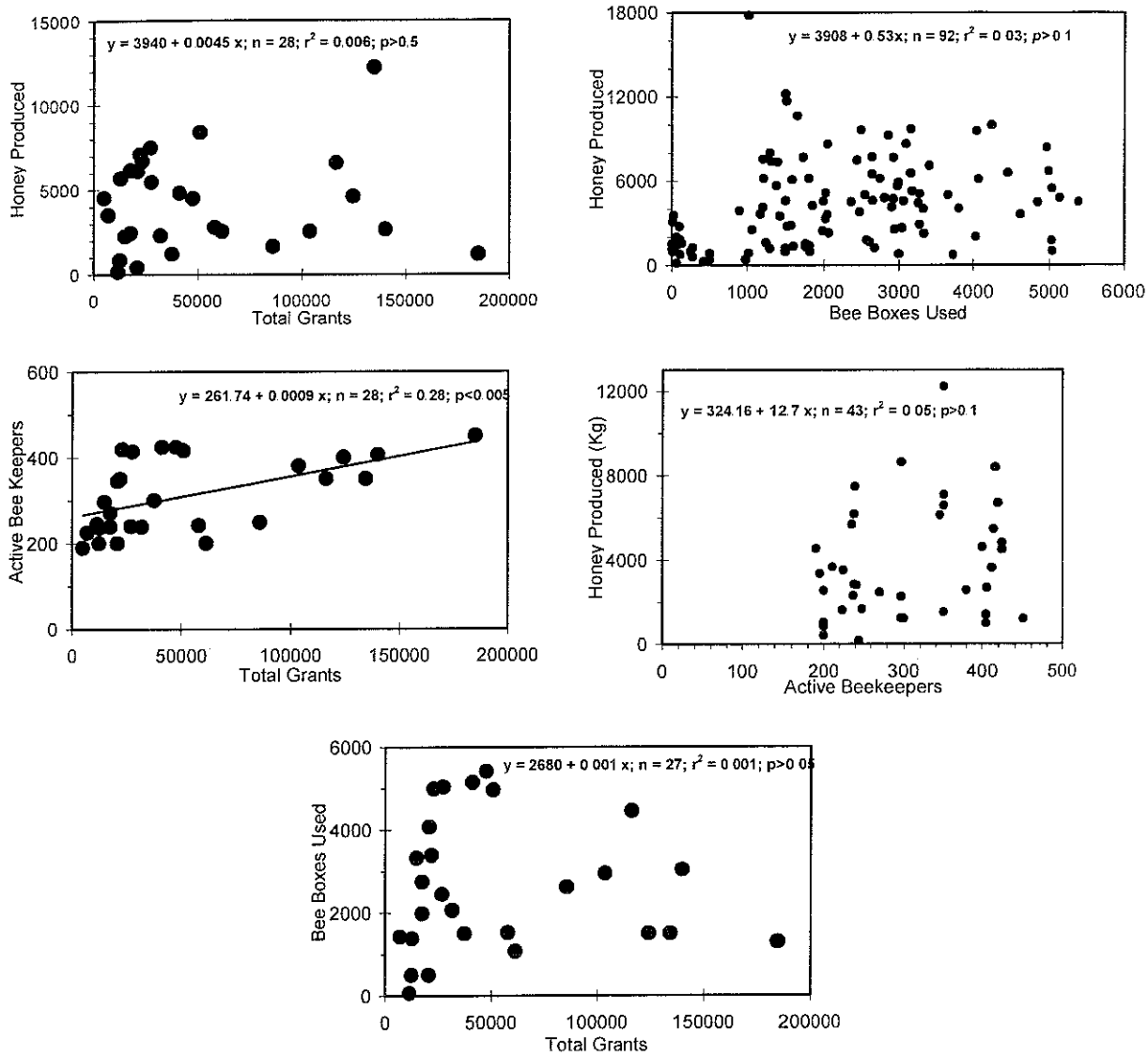
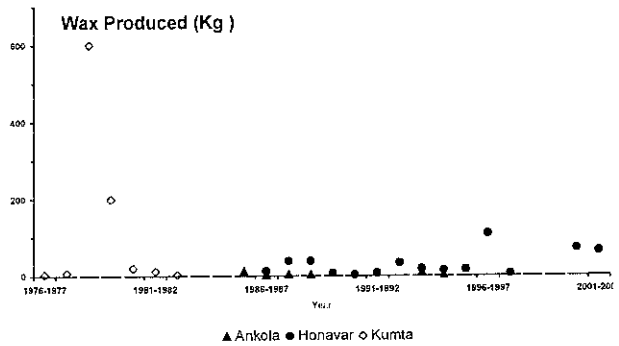


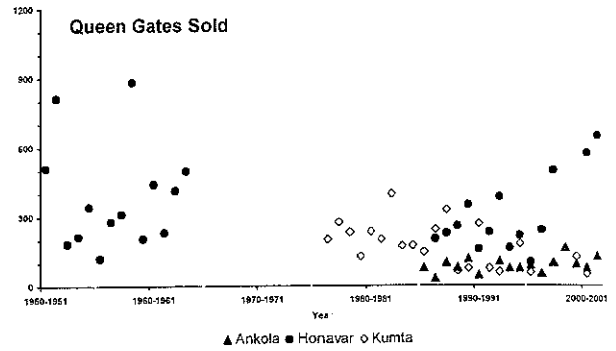
Fig 21: Coastal Region: Regression Analysis

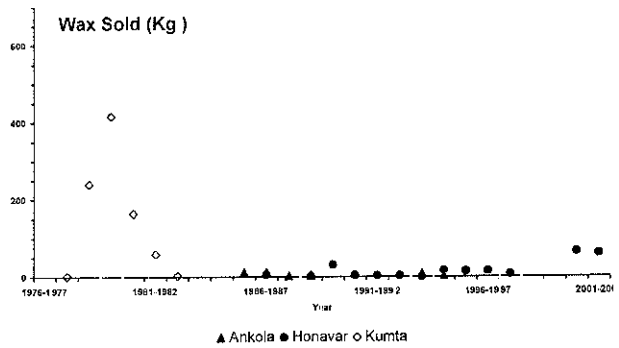


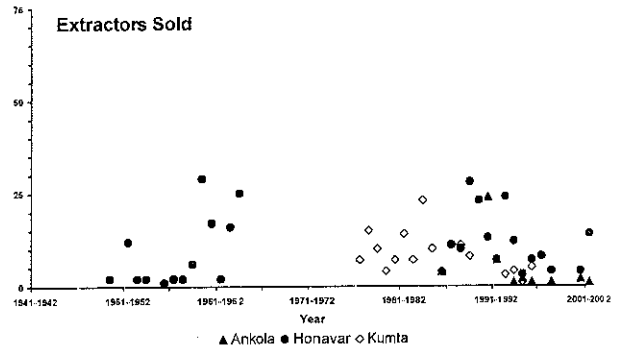
The grants make their impact to the number of active bee keepers. However, this effect does not translates into increasing honey production. The grants do not translate directly into increasing bee boxes used. The honey production does not vary with number of active bee keepers and with number of bee boxes used.

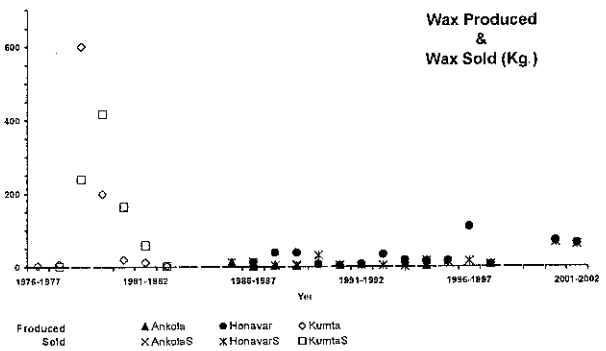
Fig 22. Coastal Region: Other parameters of society activities

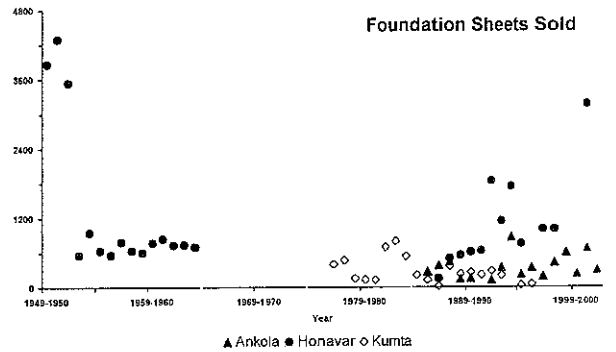












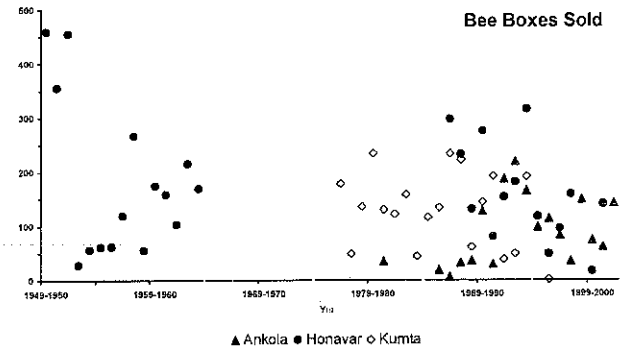
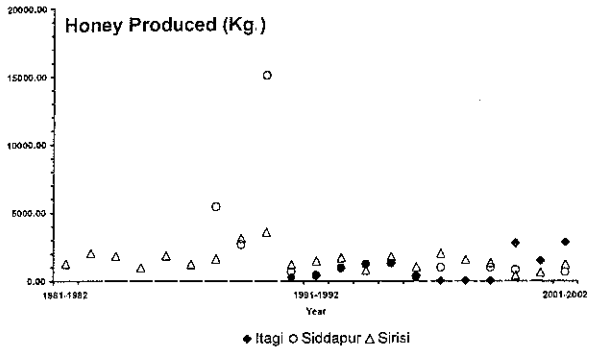
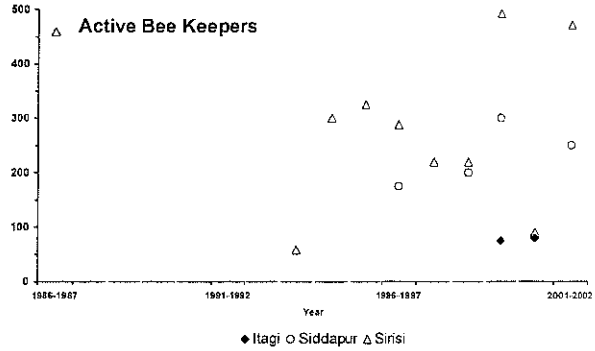
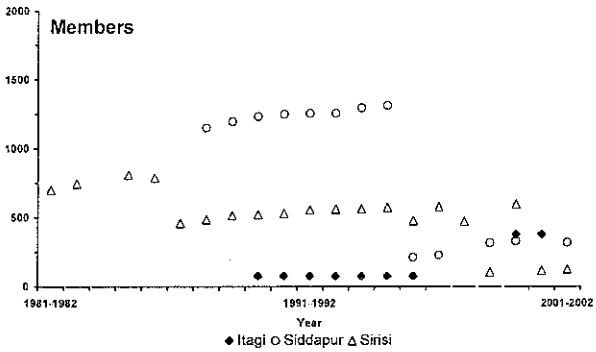
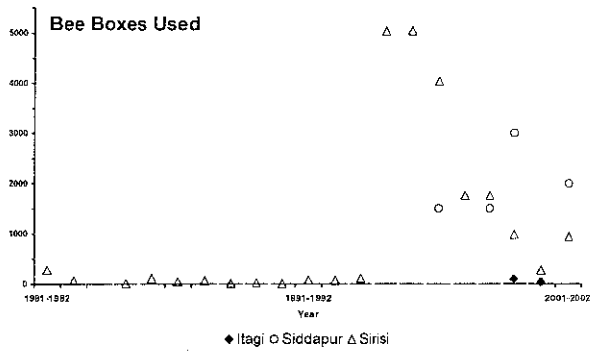


Fig 23. Up-Ghat (Hilly) Region: Major parameters of society activities:









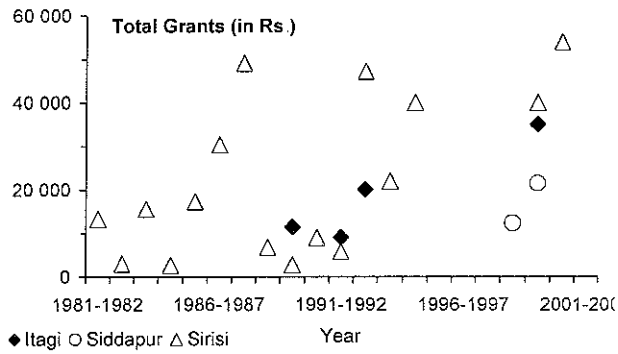
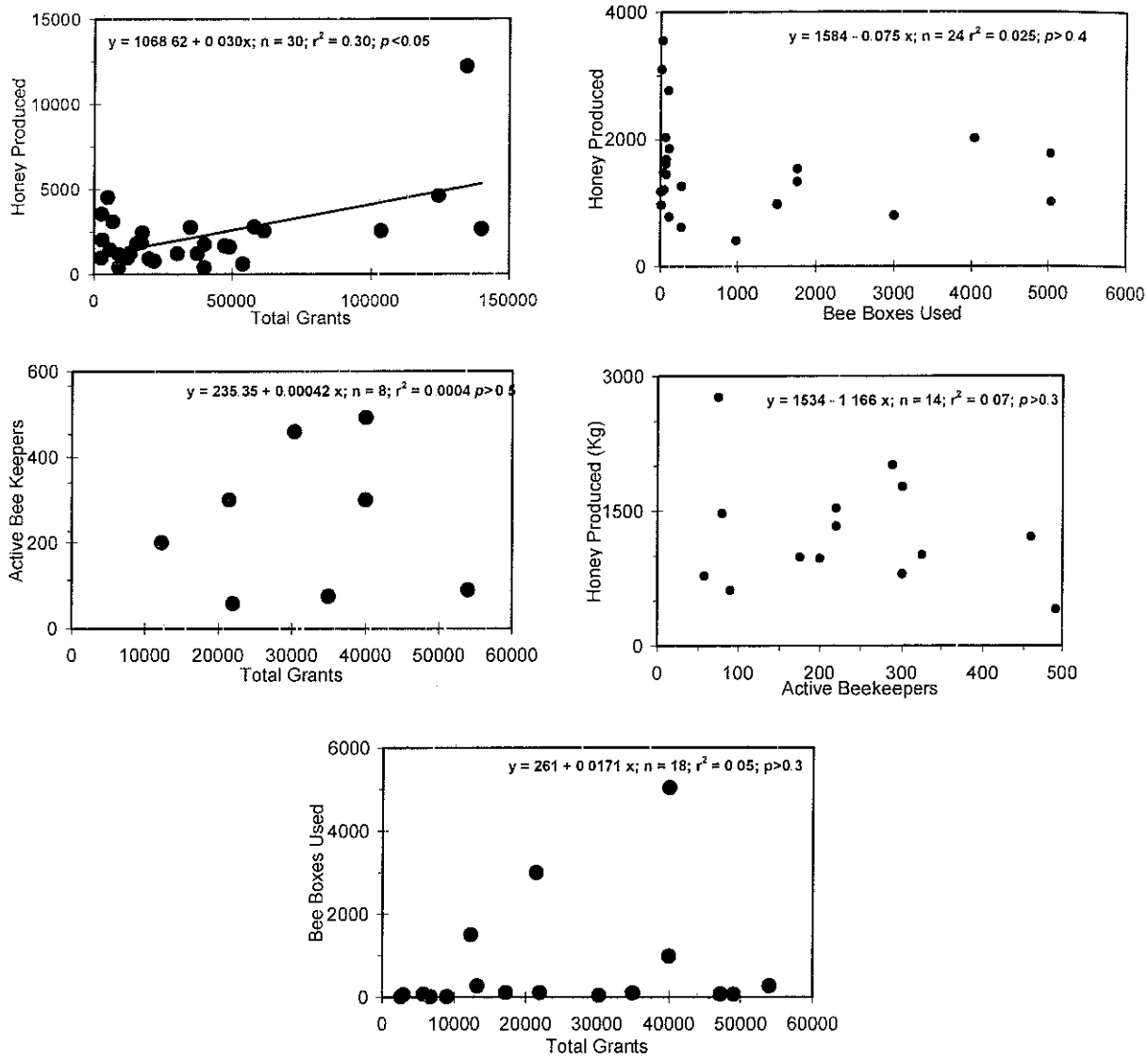
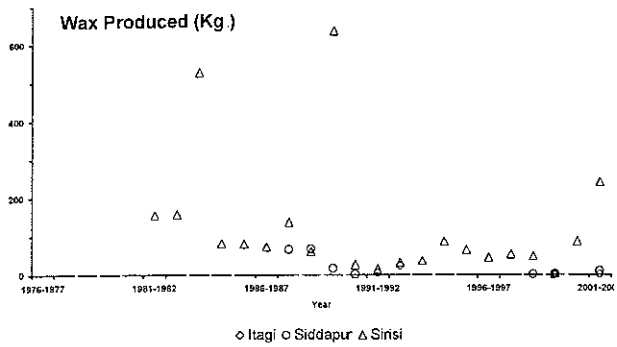


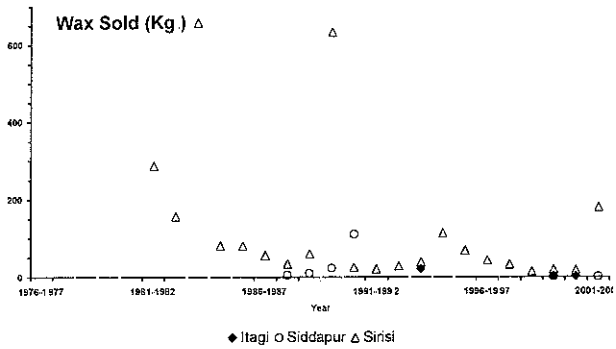
Fig 24 Up-Ghat (Hilly) Region: Regression Analysis

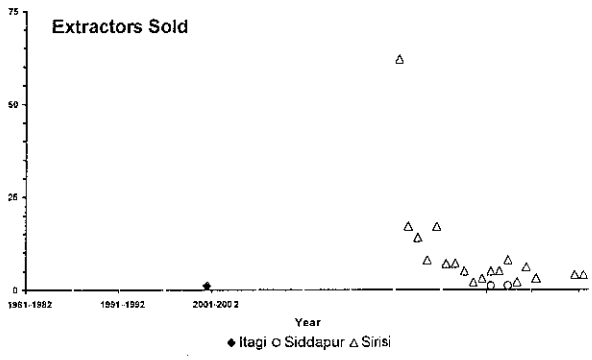


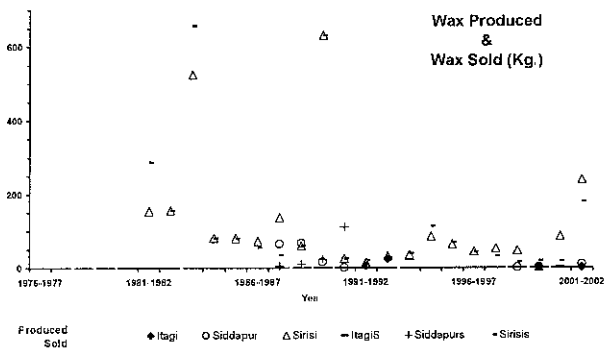
Up-Ghat region shows significant increase in honey production with grants.

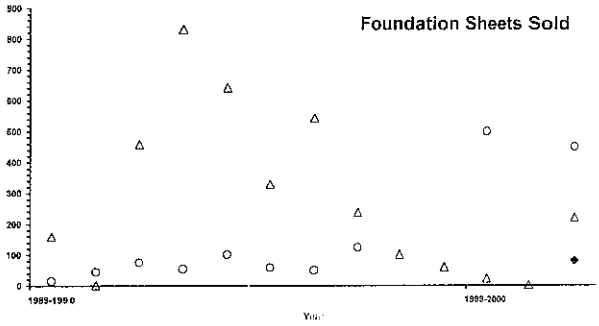
Fig 25. Up-Ghat other parameters of society activities:

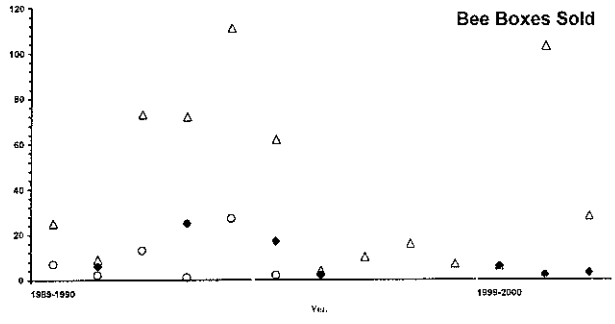












10. Impact of grants and training camps on honey production

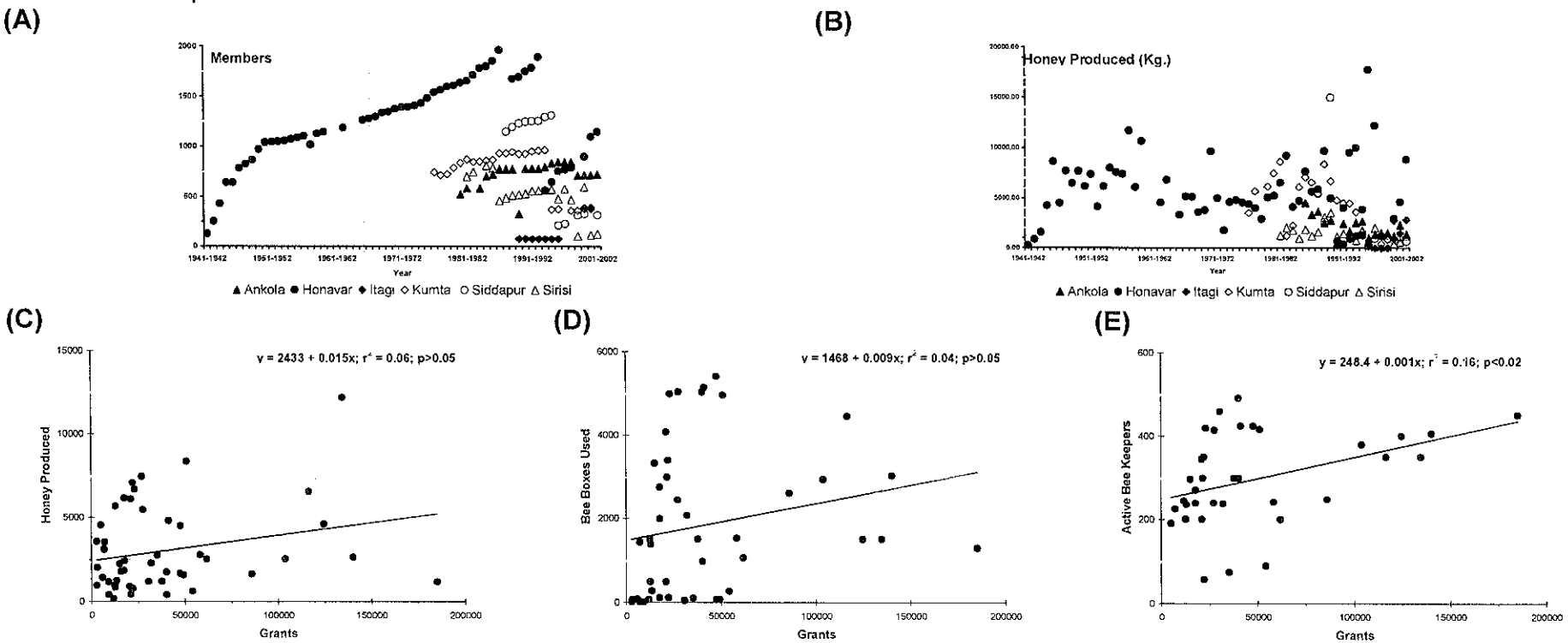
In two parts, we assess the impact of grants and training camps on production of honey under these societies.

(A) Impact of grants on honey production.

An attempt was made to analyze interrelationships among number of members, number active bee keepers, number of bee boxes, grants received from the Govt. and honey production in a given Society.

Bee keepers in each of Six taluks of Uttara Kannada have enrolled themselves as members of these Societies. The number of active bee keepers and the number of members are increasing steadily (Figure 25(A)). The honey purchased by a society is good indicator of the honey produced (Figure 25(B)) in the area. Although, the Thia-sac brood disease is quite prevalent in the district, the beekeeping activities seems to be recovering over last five years. The grants do not influence the honey production (Figure 25, (C)). More grants do not mean more bee boxes in use (Figure 25(D)). However, Grants allow societies to arrange training camps. During 2001-2002, such Training Camps were organized through the District Industry and Commerce Department. At these camps, 37 newcomers were trained at Honavar, 50 at Ankola, 57 at Siddapur, and 42 at Sirsi. The significant positive correlation between the Active Beekeepers and Grants (Figure 25(E)) and significant correlation between Active Beekeepers and Bee Boxes (r^2=0.40; $p<0.0001$) underline the allusive impact of Grants on honey production.

Figure 25: (A) Members; (B) Honey Produced; (C) Bee Boxes regressed over Active Beekeepers; (D) Regression analysis between Active Bee Keepers and Grants.



(B) Impact of training camps on production of honey.

Beekeepers societies arrange training camps and conduct courses in summer encourage people in beekeeping. Typically 15 to 30 people were trained about basic aspects of beekeeping. We have information about 25 of such camps. Listed in Table 1, we present data about type and number of camps, number of people trained and grants received specifically for training along with the year and the society that conducted such a camp. When more than one camp was arranged, their number is given in bracket along with the type.

Table 1: Training camps and summer course

Sr. No.	Society	Year	Type (Numbers)	Peoples Trained	Grants (Rs.)
1.	Ankola	1984-1985	Training Camp		
2.	Ankola	1988-1989	Training Camp		
3.	Ankola	1990-1991	Training Camp	20	
4.	Ankola	1991-1992	Summer Course		
5.	Ankola	1992-1993	Training Camp	36	
6.	Ankola	2003-2004	Training Camp	30	
7.	Ankola	2004-2005	Training Camp	30	17215
8.	Honavar	2004-2005	Training Camp	50	
9.	Honavar	2005-2006	Training Camp (3)	125	
10.	Itagi	2005-2006	Training Camp	10	
11.	Itagi	2006-2007	Training Camp	7	
12.	Kumta	1984-1995	Summer Course		5000
13.	Kumta	1985-1996	Summer Course (2)		3500
14.	Kumta	1991-1992	Training Camp		7500
15.	Kumta	2000-2001	Training Camp		14830
16.	Sirisi	1981-1982	Training Camp	31	
17.	Sirisi	1984-1985	Training Camp (2)	50	
18.	Sirisi	1985-1986	Training Camp	25	
19.	Sirisi	1986-1987	Training Camp (2)	52	2000
20.	Sirisi	1987-1988	Training Camp (2)	65	2000
21.	Sirisi	1990-1991	Summer Course	25	1000
22.	Sirisi	1991-1992	Training Camp	30	2000
23.	Sirisi	1992-1993	Training Camp (2)	43	
24.	Sirisi	1993-1994	Training Camp (2)	52	2000
25.	Sirisi	1994-1995	Summer Course (2)		2000

We analysed direct, immediate impact of these camps on number of beekeepers, number of bee boxes used and honey production

Does conducting a training camp this year rises number of active bee keepers and thus increasing use of number of bee boxes and increasing honey production? **It does.**

Table 2. Summary of Correlation Analysis: Correlation coefficients between values in previous year and year in which training camp(s) were held. Positive significant correlation implies rise in activity when training camp was conducted.

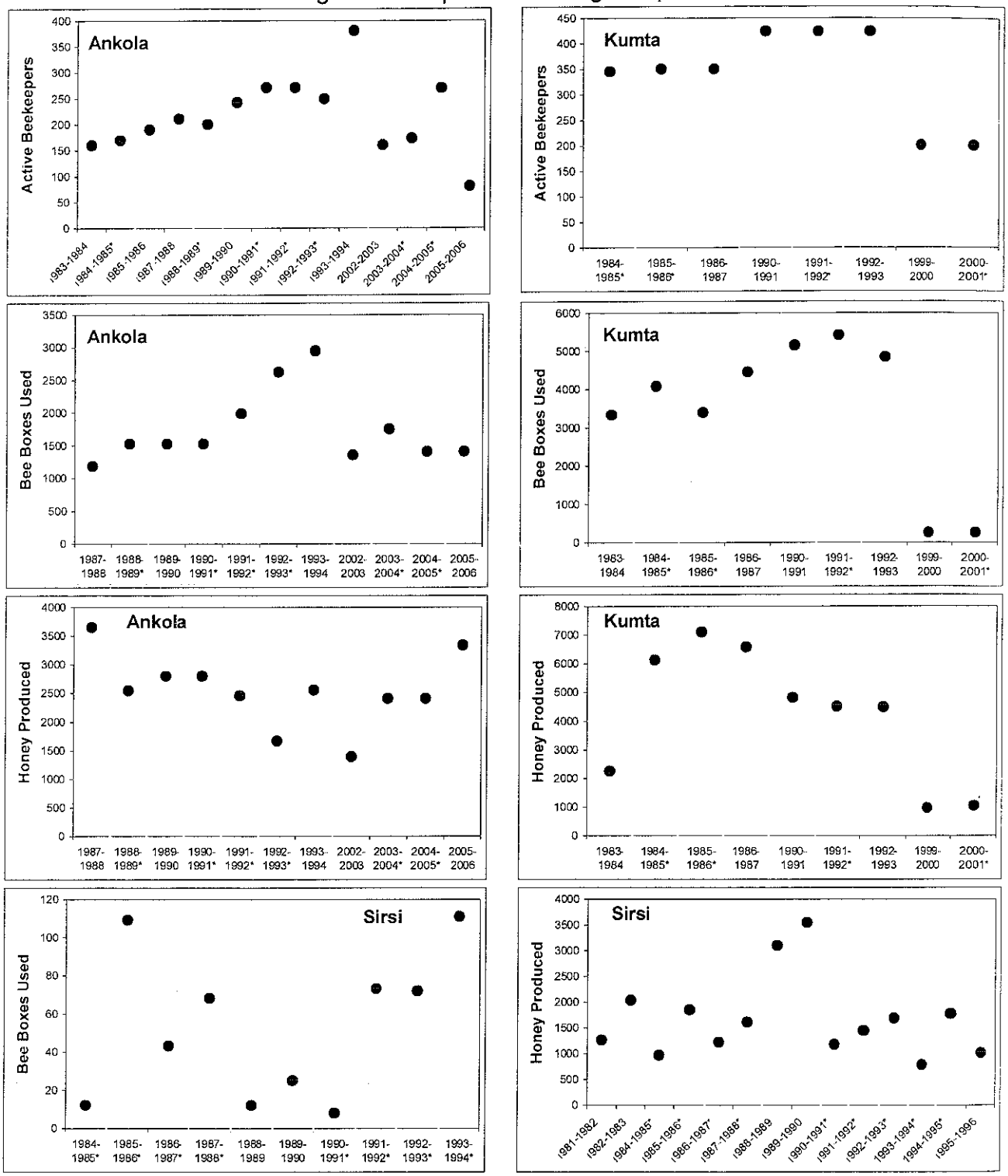
	n	Correlation	p-value
Active beekeepers	17	0.734	< 0.001
Bee Boxes	22	0.782	< 0.001
Honey Produced	16	0.924	< 0.001

Training camps have immediate, direct impact on number of active beekeepers, which translates directly into increased number of bee boxes used which in turn significantly increase honey production. Compared to previous year, the year in which training camps were conducted, all the three parameters show significant positive rise. (Table 2). Not only this, further analysis reveals, training camps continue to influence honey production in subsequent year, too. (Figure 26).

Conclusions

Bees fend themselves. Only a trained individual will be able give them best accommodation, and rip rich harvest of honey. Only training camps will make that individual a good beekeeper. Training is very essential to promote bee keeping. Government has already been conducting such training programs. It is very important to impart the techniques on rearing queens, multiplying colonies, migratory bee keeping, prevention and management of diseases, production of different bee products etc Sustained support from the Government to bee keeping industry is important.

Figure 26. Impact of training camps.



* - Training camp(s) were held in the year are shown with *'s. No data available for preparing meaningful charts for number of active beekeepers from beekeepers society at Sirsi.

11. Recommendations

Development of Beekeeping:

Beekeeping has a major role in conserving biodiversity, improving the quality of crop and increasing the crop yield. At the same time, beekeeping also enhances opportunity in rural employment without exerting any further pressure on scarce land resource. There is a tremendous scope for beekeeping to be developed as a forest or horticulture based rural industry. The National Commission (1970-76) was conscious of this and made a chain of radical recommendations for spreading apiculture to every nook and corner of the country for raising productivity besides creating rural employment (Savoor, 1998). The Commission had projected India with its forest resources and area under crops to raise about 150 million bee colonies and targeted to have 6 million by the year 2000. FAO has projected that India could produce 900,000 tons of honey by raising more than 25 million bee colonies. Government had taken steps to promote and develop bee keeping in a big way. In 1993, Government constituted a 14-member National Beekeeping Board and drew up a six-point programme with an outlay of Rs 18.87 crores. The components of the scheme were: promotion of research and development; production of bee colonies; development of infrastructure for handling and marketing honey kits products; training; promotion; and planning for long term development (Savoor, 1998). However, later the stress was mainly given by the Board to raise bee colonies only for bee products such as honey. Therefore, beekeeping development got only a marginal support since it has not been treated as either an industry or an agriculture activity. In 1980s, beekeeping activities increased to a greater level in Uttara Kannada, which is evident from the activities of Societies and increased number of beekeepers during that period. However, after the occurrence of TSBV in Uttara Kannada in 1994 the activities declined drastically. Flow of funds was also reduced. In later period of 1990s, beekeeping activities came almost to a standstill.

From 2000, a new package of development programmes common to all districts was introduced in Karnaraka State in which main emphasis was given to developing bee keeping with *A. mellifera*. Unfortunately, performance of *A. mellifera* has not been good in Uttara Kannada. There were attempts by Societies to introduce A. mellifera without any success. Many beekeepers and NGOs opposed the propagation of *A. mellifera* in Uttara Kannada. Under National Horticulture Mission and Suvarnabhoomi Programme of the State Government financial assistance is provided to beekeeping. However, the assistance is limited to providing bee equipment such as bee colony, bee box, extractor etc. Other programmes such as training on beekeeping, strengthening the activities of Beekeepers' Societies do not figure in the developing programmes related to beekeeping.

Beekeeping is passing through a difficult phase at present. It is facing many problems such as TSBV disease, inadequate support from development agencies so on. Hence, a serious and more organised efforts are necessary to develop beekeeping by making use of available resources fully to their potential. Following are few recommendations for developing beekeeping through Societies in Uttara Kannada.

Strengthen Societies: Beekeepers' Cooperative Societies have been working over several decades for development of beekeeping in Uttara Kannada. Strengthening of existing Societies is essential to develop beekeeping in the district by covering all villages of all talukas of the district. Activities of Societies should reach all villages and cover all beekeepers. Infrastructure of Societies for facilitating the storage of honey and supply of bee equipment has to be improved. The working capital of Societies has to be further improved to buy bee products throughout the year from beekeepers and store them properly to make better profit.

Federation of Societies: Formation of federation of Societies would enable individual societies to help each other. This would also help all Societies in presenting the problems and prospects of beekeeping, beekeepers and the industry to the development agencies and to the Government.

Census of beekeepers and colonies: Database on different aspects of beekeeping is essential for developing and formulating development programme on beekeeping. A good database at each panchayath and taluka level on beekeepers, bee colonies and management practices has to be developed by the Societies. Enrolment of all beekeepers in taluka as members of Societies would be of great help in understanding the spread of bee keeping in the district and in formulating any development and monitoring programme

Diversification of bee products: Data collected from Societies over the years show that the main product of beekeeping in Uttara Kannada has been honey. Now, importance is given only to honey by beekeepers. There had been less emphasis on production of bee wax. Beeswax is an important product that has been neglected by beekeepers as well as Societies. Beekeepers could be trained to extract good quality beeswax and also all other bee products so that bee keeping would be monetarily more attractive to people.

Propagation of bee flora: Deforestation, fragmentation of forests have greatly affected availability of bee flora in the district. Dwindling nectar and pollen resources is one of the main problems facing beekeeping industry. Past few decades saw implementation of major afforestation programmes in Uttara Kannada. Between 1984 and 1999, about 7000 hectares of forest plantations were raised annually in Uttara Kannada. None of these programmes in any way helped improving bee flora in the district. It is therefore necessary to propagate bee flora by including it as a major component in all afforestation programmes. In addition, individual beekeepers and Societies seriously could take up propagation of bee flora in their surroundings.

Training and Transfer of Technologies: Beekeepers are in need of practical knowledge on different aspects of bee keeping. The present training programmes are like awareness programmes. Training and transfer of

techniques to beekeepers on subjects such as rapid multiplication of colonies, queen rearing, better management practices, migration of colonies are important and necessary.

Popularisation of bee keeping: Beekeeping activities should involve all educated village youths. Awareness about many positive aspects of beekeeping such as importance of beekeeping in sustainable production of agriculture and horticulture crops and conserving forest biodiversity and agro-biodiversity; value of honey as food, its potential as a source of additional income for poor farmers has to be spread among the youths.

Setting up nurseries: Societies should have bee nurseries to make available new colonies to beekeepers and beginners in beekeeping.

Research: Though documentation and research on different aspects of beekeeping are being carried out in different parts of the State and in many research institutions for the last several decades, there are many areas where further research and investigations have to be carried out in the Western Ghats region for several reasons. Preparation of floral calendar of the area, amount of bee forage available at different time of year in different region, compilation of information on sustainable beekeeping practices, bee breeding, management of diseases etc and their dissemination are important areas for participatory research in future. Beekeepers and Beekeepers' Societies could become important partners in the research. Source of nectar and pollen is also to be understood which would give beekeepers beter idea of the quality of bee forage and preference of bees on different bee forage. Participatory research and education on scientific management of beekeeping play very important role in the development of beekeeping industry in Western Ghat region.

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Annexure

The two questionnaire are given below.

CENTRE FOR ECOLOGICAL SCIENCES

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QUESTIONNAIRE FOR BEE KEEPERS SOCIETIES

PART A

1. Name of the Society:
2. Year of Establishment:
3. Name and Address of President/Chairman:
4. Name & Address of Secretary:
5. Name & Designation of Official Incharge:
6. Number of people employed:
7. Membership Fee (Registration / Deposit / Share):
8. Name of Taluks covered:
9. Total number of villages covered:
10. Name & Designation of Informant:
11. Has Bee Keeping activity in your area has been increasing or decreasing? What do you think are the reasons for this trend?
12. Have there been any reports of diseases or other problems faced by Bee Keepers?
13. In your opinion, how can bee keeping be increased in your area?
14. Which are the areas with high and low performance in Bee keeping in your area?
15. Which are the important plants for Bees in your area?

16. What is your estimate of the number of people in your area who keep bees but who are not members of your society?

17. What is your estimate of honey production by such non-members?

18. How many kilograms of honey do you think getsold in your area without going through your society?

19. How many kilograms of honey from non-members gets sold through your society?

20. Do you know anybody who keeps *Trigona*?

21. Do you know people engaged in collecting honey from Apis dorsata?

22. Has *Apis mellifera* been introduced into your area?

23. Is your society facing any problems in conducting training programs and extension programs?

24. Is your society facing any problems in processing and marketing honey and wax?

25. Any other information you would like to give?

PART B

1. Name of the Society: .....

2. Data for the Year ..... (Months:.....)

3. Number of Members (Life / Annual): .....

4. Number of Active Bee Keepers: .....

5. Total number of Bee Boxes used: .....

6. Kgs of Honey Purchased: .....

7. Price of Honey Purchased:.....

8. Kgs of Honey Sold: .....

9. Price of Honey Sold: .....

10. Kgs of Wax Purchased: .....

11. Price of Wax Purchased: .....

12. Kgs of Wax Sold: .....

13. Price of Wax Sold: .....

14. No. of Local Bee Boxes Sold: .....

15. Price of Local Bee Boxes Sold: .....

16. No. of ISI Bee Boxes: .....

17. Price of ISI Bee Boxes: .....

18. No. of Extractors Sold: .....

19. Price of Extractors: .....

20. No. of Foundation Sheets Sold: .....

21. Price of foundation Sheets: .....

22. No. of Queen Gates Sold: .....

23. Price of Queen Gates: .....

24. No. of Queen Excluders Sold: .....

25. Price of Queen Excluders: .....

26. Training Camps conducted : Place

.....

27. Target Groups for whom Training programme was conducted: .....

28. Training Camps conducted: Number of persons trained:

.....

29. Grants received through KVIC / Khadi Board: Working Capitol: .....

30. Grants received through KVIC / Khadi Board: Small Scale Apiary: (Loan: .....Grant: .....)

31. Grants received through KVIC / Khadi Board: Medium Scale Apiary: (Loan: .....Grant: .....)

32. Grants received through KVIC / Khadi Board: Large Scale Apiary: (Loan: .....Grant: .....)

33. Grants received through KVIC / Khadi Board: Subsidy:

.....

34. Grants received through KVIC / Khadi Board: Others:

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35. Grants received through other sources:

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