A STUDY OF WASTE MANAGEMENT PRACTICES FOLLLOWED BY BEEKEEPERS OF PUNJAB

Research Project Report

Submitted to the Punjab Agricultural University

in partial fulfillment of the requirements

for the degree of

MASTER OF BUSINESS ADMINISTRATION

in

AGRIBUSINESS MANAGEMENT

(Minor Subject: Economics)

By

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CERTIFICATE - I

This is to certify that the research project entitled ,"**A Study of Waste Management Practices Followed by the Beekeepers of Punjab**" submitted for the degree of **Master of Business Administration** in the subject of **Agribusiness Management** (Minor subject: Economics) of the Punjab Agricultural University, Ludhiana, is a bonafide research work carried out by **Karanbir Singh**, L-2013-BS-06-MBA(AB), under my supervision and that no part of this research project has been submitted for any other degree.

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

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CERTIFICATE - II

This is to certify that the research project entitled ," **A Study of Waste Management Practices Followed by the Beekeepers of Punjab**" submitted for the degree of **Master of Business Administration** in the subject of **Agribusiness Management** (Minor subject: Economics) has been approved by External Examiner along with the Internal Examiner after an oral examination on the same.

Internal Examiner

External Examiner

(Dr. Sandeep Kapur)

Director

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ABSTRACT

The present study was undertaken to explore demographic, start-up operations and problems of honey bee entrepreneurs in state of Punjab. Primary data was collected from 50 respondents, selected from Progressive Beekeepers Association of Punjab in PAU, using non-disguised pre-structured questionnaire. The results indicated that majority of the farmers i.e. 36 per cent fall in the category of medium farmers with land holdings between 10-15 acres. Forty eight percent respondents were of the age between 35- 45 years. Thirty percent respondents were having qualification of matriculation, 12 percent were at primary education Ninety two percent of respondents were having agriculture as their main occupation, 4 percent reported services as their main profession and 8 percent of respondents were having beekeeping as their main occupation.

Signature of Major Advisor **Signature of the Student**

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Chapter-I

INTRODUCTION

Honey and beekeeping is having a long history in India. The first sweet food tasted by the ancient Indian inhabiting rock shelters and forests was honey. With the civilization development, honey achieved a unique place in the lives of the ancient Indians. Honey was regarded as a magical substance controlling the fertility of women, cattle, also their lands and crops. Beekeeping includes maintenance of honey bee colonies, commonly in hives, by humans. A beekeeper keeps bees, aiming to collect their honey and other products that are produced by hive (including beeswax, propolis, pollen, and royal jelly), for crop pollination, or production of bees for sale to other beekeepers. A location where bees are kept is called an apiary or "bee yard". Beekeepers are also known as “Apiarist”. In India, mainly forest based beekeeping has been there. Several natural plant species are providing nectar and pollen to honey bees. Thus, the raw material for producing honey is available free from nature. Bee hives neither occupy additional land space nor do they interfere with agriculture or animal husbandry for any input. The apiarist needs only to spare a few hours in a week to take care of his bee colonies. Beekeeping is therefore ideally adopted as a part-time occupation. Beekeeping is considered as a source of sustainable income generation for rural and tribal farmers. Valuable nutrition is provided in the form of honey, protein rich pollen and brood. Bee products are also having important ingredients of folk and traditional medicine.Bee's Honey is natural, unrefined food consumed as much in fresh or canned state. It is readily assimilated and is more acceptable to the stomach, particularly in the case of ailing persons and infants, than cane sugar. It is an antiseptic, is applied to wounds, and burns with beneficial results. Honey collection and its marketing in India are still not fully organized. The Government of India has exclusively reserved honey industry on small scale. There is very good export potential for good quality and original honey obtained from Bee's comb.Honey is commonly consumed in its unprocessed state, that is liquid, crystallized or in the comb. In these forms, it is taken as medicine, eaten as food or incorporated as an ingredient in various food recipes. There is considerable demand for the honey and other products. If the processed honey and other products will pack properly ,the products can be exported . Out of the thousands ofhomemade recipes in each cultural tradition, honey is largely used on a small scale as well as at an industrial level in baked products, confectionary, candy, marmalades ,jams, spreads, breakfast cereals, beverages,milk products and many preserved products.

Honeybees are one of the few assets available to the rural poor. The ownership of honeybees is regarded as an investment and beekeeping has many advantages that help farmer beekeepers to improve their well being. Its advantages can be itemized for the socio economic impact of beekeeping. Successful

beekeepers raise their socio economic standing in areas with subsistence agriculture, and farmers in the region can substantially supplement the family income, some times even double it. This means the family is food secured. Generally, beekeeping is a valuable small scale activity and it plays a significant role in providing nutrition, cash income, pollination service and social benefits to the economy of the region as well as in the subsistence smallholder farmers.

Important and irreplaceable role is played by bees as pollinators in the environment. Besides providing honey and beeswax, honeybee pollination is important for putting on our table four out of the five foods we eat – oilseeds, pulses, vegetables and fruits. Recognizing this important role thathoneybees play in our food chain, the National Audit Office of the UK estimated that the economic value of pollination effected by honeybees is worth £ 200 million pounds a year with the retail value of the pollinated products touching £1 billion pounds a year. Similar trends for India do not exist, but one can imagine the extent, given India's size and variety of crops. Pollination can be done by a number of insects such as butterflies, bumblebees, beetles, flies and even ants, but honeybees are the most efficient one. It is estimated that in normal conditions, a hive of fifty thousand bees pollinates half a million plants per day – making any other pollinator's work into insignificance. Indian subcontinent honeybees, especially *Apisceranaindica* are found largely in the natural environment. *A. ceranaindica honeybee* is an extremely hard working (as compared to the hybrid bee *Apismellifera* which is commonly used by commercial beekeepers). She can work for long hours and even through extreme weather conditions. Studies have pointed out benefits of increasing yields through pollination.

Indian agriculture mainly comprises of small and marginal farmers, who account for 80% of all farmer households. Agriculture has been affected by declining productivity over the last years. The ability of agriculture to provide new jobs has also declined with various policy documents highlighting largely the urgent requirement for rural livelihood diversification.Observing that the benefit of beekeeping is 40 times more than the value of honey and beeswax, the first National Commission on Agriculture (1976) in India, recommended beekeeping truly as an agricultural input and put forth a plan for apiculture until 2000. However, existing agricultural policy unfortunately did not give beekeeping the importance it deserves.

Honey Bee entrepreneurship has seen a steady growth in Punjab. Honey bees are one of the important primitive social insects as well as rich source of honey. Honey has traditionally found

applications in various diet preparations, medicines, cosmetics, ointments, candles and household beeswax items, besides ayurvvedic drug preparations. The propolis of the bee hive is used for lip balms and tonics , where royal jelly is used for improving appetite,preventing aging of skin and and for the treatment of cancers. Beekeeping has emerged as a viable option for diversification of agriculture. Keeping in view high returns with low cost investments farmers consider beekeeping as an important subsidiary, occupation. Beekeeping is preferred because after a little investment in honey bees, hives and other relevant equipment, one can start his/her own business.

The raw materials for the beekeeping industry are mainly pollen and nectar that come from flowering plants. Both the natural and cultivated vegetation in India constitute an immense potential for development of beekeeping. About 500 flowering plant species, both wild and cultivated, are useful as major or minor sources of nectar and pollen. There are at least four species of true honey bees and three species of the stingless bees. Several sub-species and races of these are known to exist.Further, the exotic honey bee has been introduced. Together these represent a wide variety of bee fauna that can be utilized for development of honey industry in the country. There are several types of indigenous and traditional hives including logs, clay pots ,wall niches, baskets and boxes of different sizes and shapes. In modern beekeeping, the combs are built on wooden frames that are moveable. This facilitates inspection and management of bee colonies. Besides the hives, the beekeeper need equipment and implements like hive stand, nucleus box and smoker. The industry also needs equipment and machinery for handling and processing of honey, beeswax, for manufacture of comb foundation sheets and for other operations.

1.1 Major capital inputs required for beekeeping has been discussed as follows:

1.1.1 Land and Building

To limit the capital cost,the promoter can start this activity on own land or it can be obtained on long term lease. There is no need to have sturdy building but a shed of around 20-25 sq.mtrs. with asbestos sheet roofing is sufficient.

1.1.2 Machinery

Beekeeping is not a manufacturing activity as such and no machines are required. There is nothing like production capacity as well. Small wooden frames with boxes are needed.Sizes of these

boxes are also standardized. Honey extractors are required with filtration facilities. Manually operated bottle capping machine can also be useful for packaging purposes.

1.1.3 Utilities

There is no need to have industrial connections for power and even domestic supply is sufficient. In case of non availability of power connection, the operations can be carried out during day-time.

1.1.4 Raw Material

Limited raw material is required for the purpose of beekeeping. Honey feed will be required every year for bee boxes. Quantum of bottles depends upon type of packing. Incase of bulk packing, bottles could be of bigger sizes.

1.1.5 Manufacturing process

Bee keeping activity should ideally located where there are minimum movements of human beings with very little noise. Forest area is, therefore, suited with many flowering plants naturally grown. Movable wooden frames with boxes are placed at such locations and these boxes are spread with honey spice to attract more and more honey bees. These bees leave fresh honey sucked from flowers in the cells of honey comb provided in the boxes to eat bee feed.when these cells are full of honey, they are hermetically sealed by capping with wax and then honey is extracted from these cells. Freshly extracted honey is warm and easy to bottle. It is essential to undertake proper training of extraction and bottling.

1.1.6 Apiculture Technology

Modern beekeeping includes production of beeswax, bee collected pollen, bee venom, royal jelly, propolis, as also of package bees, queen bees and nucleus colonies. All these are possible only with a proper management of bees, utilizing the local plant resources and adpting to the local climatic conditions. Modern beekeeping makes heavy use of bee keeping equipment and honey processing plant. This results in high efficiency and also ensures the quality of the processed honey.

Seasonal management of bee colonies varies in different parts of the country although the basic management methods are the same. Flow management, dearth management, provision of feeding and control and cure of bee disorders, bee diseases, pests and enemies ,are some of the routine measures to keep bee colonies healthy and strong. There are special management techniques like queen rearing,

migration for honey production or for colony multiplication, which the beekeeper takes up after he gains sufficient knowledge and experience in handling bee colonies.

1.1.7 Market for honey product

Forest honey is usually thin, contains large quantity of pollen, bee juices and parts, wax and soil particles. Forest honeys are mostly multifloral. Much of forest honey is sold to the pharmaceutical, confectionary and food industries, where it is processed and used in different formulations. Apiary honey is usually processed at the producers level. This consists mainly of heating the honey and filtering. A few beekeepers or honey producers co-operatives societies have better processing facilities that involve killing of honey fermenting yeasts. About 50 percent of the apiary honey under the KVI sector is graded and marketed under AGMARK specifications.

1.2 Major Constraints in beekeeping

1.2.1 Indiscriminate use of pesticide

Beekeeping is an important input in the agricultural system, and indiscriminate use of pesticides on the crops causes heavy losses to colonies ultimately discouraging beekeeping. Some researchers reported that problem of pesticide sprays was faced by majority of the respondents, resulted in killing of honey bees, which caused great loss .

1.2.2 Marketing

Marketing of honey is a major constraint which discourages the producers. Without proper marketing, the beekeeping industry cannot flourish to its maximum. Bulk honey collected from different producers is often of poor quality and fails to meet the national and international standards. In the export markets, there is great competition and importing countries have strict quality requirements regarding aroma, color, consistency and floral source. Most of the producers are not aware of these standards and ultimately they fail to meet the national and international standards. An evaluative study conducted by found that marketing was one of the major problems in beekeeping as stated by 65 percent of the beekeepers. Non fixation of minimum support prices for beekeeping products, variant prices and unorganized market were other troublesome factors in marketing of bee products. Another study conducted by researcher also reported that regarding sale of honey, there was no specific market and

beekeepers were selling their produce without any brand name also reported marketing problem of the bee products and found that there was no specific market for sale of honey. It was reported that 65-70% beekeepers have highlighted the problem of honey marketing and low price for bee products

1.2.3 Bee diseases and enemies

The problem of bee diseases and natural enemies is a major constraint in beekeeping industry. Sometimes, the diseases remain undetected for long and when they appear, cause catastrophic destruction. Treatment of bees for disease is a challenge even to the pathologist. The spread, intensity and control of disease are affected by climatic factors, forage availability and quality. It was reported problem of bee pests and diseases, while found that 55 percent of the respondents were bothered by the attack of bee enemies. Bee enemies including all the major pests like bee-eater, wax moth, wasps, mites and diseases were reported to be detrimental to beekeeping by the respondents.

1.2.4 Poor management of honey bee colonies

This is a major constraint, beekeepers lack proper management know-how, especially during the dearth periods when besides the scarcity of bee flora, they are confronted with various pests and predators of apiaries, which results in dwindling of the bee colonies, Same problem was indicated by, who reported that majority of the respondents lack knowledge about proper management of honey bee colonies.

1.2.5 Difficulties in the migration of honey bee colonies

Migration of bee colonies is generally a practice with commercial beekeepers. Hobbyists or marginal beekeepers generally have tough times during dearth periods. A beekeeper may need to move his honey bee colonies to long distance for various reasons such as abridge the floral dearth periods, to exploit different bee floral sources/ honey flows, to send out his colonies for pollination of the crops/orchard plants or to establish a new apiary at some new location .Transportation or migration of bee colonies to potential bee flora areas throughout the year was also one of the major problems faced by the beekeepers. High transport charges/cost, mortality of bees during transportation, interference of police and octroi people etc. during migration of bee colonies concerned them a lot.

1.2.6 Adverse effect of weather

Unfavorable weather conditions were also a major setback for beekeeping. Extreme hot and cold weather reduced bee population. In parallel, cloudy atmosphere and rainy season also affect bee population adversely. Inferred that the natural factors put great limitation in expansion of beekeeping whereas found bad weather conditions as a major constraint in honey production.

1.2.7 Depleting floral resources

The plantation of bee flora is not being taken up either by the forest department or individually. The problem of depleting floral resources has reduced the beekeeping potentials in the country. Beekeepers cannot afford to grow bee flora exclusively for honeybees. But social forestry programme, which advocate growing of multipurpose trees, can be augmented so as to incorporate growing of such trees which are also good bee forage reported about 20 percent beekeepers face colony migration constraints due to lack of bee flora and financial facility, harassment of the migratory beekeepers by the state administrators and non-cooperative attitude of the forest department officials and the problem of increasing the death of bee flora due to decrease in area under bee plant species.

1.2.8 Cost of equipment / tools

Many beekeepers expressed high cost of equipment/tools as main problem in beekeeping expansion. Equipment/tools particularly bee hives (boxes) and bee frames getting costlier day by day which put negative impression on entrepreneurial spirit of new comers as well as of those who want to expand their business.

1.2.9 Administrative and financial constraints

Farmers faced problems in getting loans and non-availability of insurance policy. During migration of honey bee colonies, harassment at the barriers including impositions of taxes, octroi etc. and non-cooperation of Govt. agencies especially for forest department for sitting the migratory apiaries in vacant Govt. land/forest areas/ along the canal in bank ments, roads / railway tracks etc.

1.2.10 Emphasis on Production of Honey Instead of other Bee Products

At the moment only honey is produced by the beekeepers. Honey bee can also produce pollen, propolis, royal jelly beeswax bee venom which can add to the overall income from the bee live.

Bees Wax

This is easily produced has great demand in the world market and is used in the cosmetic and pharmaceutical industries. The most important producer of beeswax in India is Apis dorsata. This is not so pure as the beeswax obtained from Apis mellifera ,which has a greater export demand. However to produce beeswax from the bee colonies supers must have only 7 to 8 frames instead of 9 frames so that beekeepers can produce larger quantities of beeswax from the bees.

Pollen

Pollen is not produced at all in India. Pollen is a natural vegetarian protein source containing many nutritive elements and minerals and can do much to improve the general nutritional intake in rural areas. It also has a great demand in the export market.

There is tremendous potential for pollen production by the bees particularly from coconut the mustard species of oilseeds maize sunflower etc. Pollen is easy to produce and beekeepers can use simple technology to supplement the income from the hive by inducing bees to collect pollen. Pollen can be produced in tons.

Propolis

Propolis is the resinous substance collected by bees from trees to seal cracks in the hive. Propolis has been found to be a natural antibiotic and has many medicinal qualities when used externally or internally and is valuable in the field of Apitherapy. There is great demand for propolis for export.

Propolis collection is by the use of special propolis screens and can be easily mastered by the average beekeeper. A.c. indica does not collect propolis and there is great scope for the use of a mellifera for propolis collection.

Bee venom

This is an unexploited source of production from the bees in India Bee venom has various medicinal uses in Homeopathy ,Allopathy and systems of natural medicine. Extraction is complicated and can be done by beekeepers with great technical skill using special bee venom extractors in front of the hive.

Royal Jelly

This is secreted by the bees from special glands in their body and is used to feed the queen bee larva. It is supposed to have rejuvenant and beneficial properties like Ginseng. It contains various natural hormones and is a highly concentrated food. It has a great demand for exports. China has become a major producer and exporter of royal jelly. Royal jelly however can only be produced by beekeepers having high technical knowledge.

All the above by products from bees are not produced yet in India and can add to the income of beekeepers besides having great scope for exports.

Others constraints

` Others technical constraints in beekeeping activities include poor extension systems (absence of coordination between research, extension and farmers), lack of credit service, shortage of records and up-to- date information, shortage of reading materials regarding to beekeeping, and lack of research stations to address the problems related to apiculture.

A waste is a material that is discarded, useless or unwanted. Waste management refers to the activities connected with the collection and disposal of wastes. Waste management comprises waste collection, Waste transportation, Waste segregation, Waste recycling, Waste disposal, Waste minimization & control. Facilities should be provided for waste disposal and storage. Covered receptacles should be used for holding beekeeping waste until final disposal. Honey or honey products unfit for human consumption should be kept in covered containers with a label until disposed of appropriately. Waste-disposal areas should be properly identified and designed for easy access. Waste-

disposal areas should not be a harbourage for pests/ rodents/diseases or aid in contamination/pollution of premises or water.

Major waste found in beekeeping is wooden boxes, generally having a life span of 2-3 years. The study was conducted with the following objectives-:

1. To study the awareness level of waste management of bee keepers.
2. To study practices and problems regarding waste management in bee keeping.

Chapter-II

REVIEW OF LITERATURE

Chahal et al (1981) studied the establishment of exotic honey bee in Punjab. Authors observed that farmers have shown favorable response towards beekeeping due to the reasons that it is easy to start, add income through honey production and improves yields of crops due to better pollination.

Free (1981) reported the extent to which the individuals become committed to beekeeping can be steadily increased. Using simple methods and cheap hives, beekeeping can be started as a spare time occupation with the aim of providing high energy food for the keeper and the family. Later as experience grows, more sophisticated methods can be introduced and surplus honey and wax can be sold for profits.

Shah and Shah (1982) observed that the honeybee has the capacity to produce large quantities of honey but this is possible with an improvement in bee forage and management. Sihag (1983) reported that the Haryana state represents a good beekeeping potential in view of the continuous availability of bee forage for eight months and provides an excellent site for migration of the colonies during the death period.

Trehan (1987) reported that beekeeping was also popular with servicemen and businessmen along with the farmers. It also found that the many respondents were dissatisfied with this profession due to marketing problem.

Tonapi (1988) concluded that the natural factors put great limitations in the horizontal expansion of beekeeping in India. However, adoption of scientific methods of bee management would enable the development efforts to exploit the vast potential for honey production, though not without difficulties.

Sharma (1989) reported that regarding the sale of honey there was no specific market as 80 percent beekeepers were selling their produce without any brand name. He also reported that respondents also faced difficulties in getting loans from banks.

Sharma (1993) concluded that contribution of industrial development programme was relatively more in form of general facilities like transportation, communication, industrial estates establishment, electrification etc. than in terms provision of entrepreneurial prerequisites like land and technical knowhow to individual entrepreneurs for setting up the unit. It was further observed that the contribution of banks was relatively more as compared to that of financial corporations and exploration of the market within and outside India was not very encouraging.

Vepa (1993) classified the needs of credit facilities for small scale entrepreneur into three categories: direct credit, indirect and export credit. Direct credit constitutes of equity or risk capital, long and medium term loan, export credit involves working capital, loans and credit supplementation for export and indirect credit is in form of provision of facilities of industrial estates or plots in concessional rates.

Habibullah and Ismail (1994) conducted a study examining the level of technical efficiency of a sample of beekeepers in Malaysia. Study revealed that Malaysian beekeepers were technically highly inefficient. There was considerable potential to increase output using available inputs and technology.

Chauhan (1995) reported that due to lack of any central concreted policy on honey, there was glut of unsold honey in some states and in others, there was shortage of honey.

Panda and Padhi (1995) studied beekeeping in Orissa. It was observed that beekeeping was a valuable self help activity, which provides food and cash income for the landless poor of any subsistence economy. Shende and Phadke (1995) studied that deforestation, indiscriminate use of pesticide, pollution, and monoculture were manmade problems, which affected the development of beekeeping industry.

Androulidakis and Harizanis (1996) conducted a study to identify the educational needs of Greek beekeepers. It was considered necessary to provide a quality education for adult beekeepers which must be flexible enough to meet the needs of farmers.

Kennedy (1996) discussed the growth of entrepreneurship in the society and also the failures in business due to lack of it. The various factors supporting entrepreneurship viz. technological, economic, demographic etc were discussed. It was stressed that with a better understanding many proposed new ventures would not be launched and those that are existing would stand a much better chance of success. It was concluded that business failure rate could be reduced by 50 percent if entrepreneurs were required to carry out preliminary steps before starting their proposed new ventures.

Pidek (1996) studied trends in polish beekeeping. He concluded that honey produced in Poland constitutes 1.1 percent and 7.9 percent of World and European production respectively. Beekeepers with 10 or few colonies sold about 90 percent of their honey directly to consumers; those with large apiaries sold 46 percent of their honey mainly to wholesalers or shops.

Singh (1997) in his study concluded that entrepreneurs of Ludhiana are becoming more professional and are trying to keep pace with the changing business conditions. Sources of motivation for understanding motivation were found to be contacts or relationship with industry,high income prospects,

unemployment, diversification in earlier jobs and implementing new innovative ideas in the order mentioned. It was suggested that young people should be imparted training at the earlier age and entrepreneurship should be the part of university/college curriculum.

Chauhan and Sharma (1998) concluded that the beekeeper-wholesaler-retailer-consumer was main route of honey sale in case of stationary and migratory bee farms. Kaur (1998) reported that mostly beekeepers were selling honey directly to consumersgetting price Rs. 15 to Rs. 25 per kilogram and were packing it in tins. Most of the respondents procure colonies from private agencies. Only 20 percent of respondents took loan for beekeeping. it was also reported that less price of honey, difficulty in getting loan and marketing were main problems while pesticidal sprays and non-availability of good species of bees were minor problems in beekeeping.

Ramchandran and Ramnarayan (1998) have discussed the role of interpersonal networking in the process of enterprise creation and growth. Efficient and effective networking helps the creation of new enterprise. Networking isprimarily a mean of raising the required resources.

Singh and Singh (2000) found that net income of Rs. 5500/- could easily be attained from a bee farm of 5 colonies a year. The success in beekeeping was mainly question of understanding properly the behaviour of bees, managing them properly, handling the equipment correctly and controlling the natural enemies and diseases of bee.

Anonymous (2002) reported the role of entrepreneurs and their positive effects on local and national communities. Entrepreneurs lead small companies that are based on an innovation and are designed to grow quickly. Finding and retaining quality talent at all levels is the biggest challenge. Access to capital has until recently been the primary problem of entrepreneurs.

Lans (2004) presented a study on work-related lifelong learning for entrepreneurs in the agri-food sector. During the study, learning needs, learning preferences, learning motivation and conditions in the context of lifelong learning were identified. The results indicated that technology, information technology and entrepreneurial competencies will become of increasing importance in the future. Non-formal and informal learning seem to play an especially important role in the competence development of entrepreneurs.

Veeraputhran (2004) revealed that beekeeping under rubber plantations in India is a potential source of maximizing the net income and employment of rubber growers. But only less than 3 percent of the actual potential is being commercially exploited. The oligopolistic structure of the rubber honey

market dominated by cooperatives and their inherent constraints like low working capital and institutional rigidities are the major factors contribuitng to the low level of popularization and adoption of beekeeping among rubber growers vis-a-vis commercial exploitation of rubber honey.

Bhusal and Thapa (2005) in their study reported that the adoption of improved beekeeping practices was compared between the mobilized and non-mobile farmers' groups of Nawalparasi district using semi-structured questionnaire survey after introducing improved beekeeping practices during 2002-2003. Women involvement was low in enterprise development and adoption in both mobilized and non-mobilized groups. Therefore, transfer of improved technology to subsistence farmers emphasizing women through social mobilization could help generate income and alleviate poverty.

Singh and Ram (2005) revealed that stationary and migratory type of beekeeping was prevalent in their study area. Beehive was the major item of investment in beekeeping while total cost, gross returns and net returns were higher on migratory bee farms. In case of migratorybeekeeping, the cost per kg honey production was low mainly due to higher average yield per colony as compared to stationary bee farms. The study suggested for migration of all bee colonies to enhance the income of the beekeepers. Further, the beekeepers should be encouraged to sell honey through co-operatives.

Bajaj (2006) revealed that hard working farmers in Punjab has found equally diligent partner in honey bees. Honey is valued as one of the most natural sweet "a pure product that doesn't allow for the addition of any substance". The study also revealed that world of honey bees is facing a disturbing story as the humans are upsetting the very building blocks of the environment that sustains them. As the pressures of population and global warming destroy the quantity and variety of flora the world needs the diligent honey bees all the more.

Anonymous (2008) revealed that due to economic importance of honey bees and their products, the biotechnological interventions are required to upgrade the qualitative and quantitative production taking into account further investigation on generic stock of Indian bees that may lead to new biotypes.

Chapter-III

RESEARCH METHODOLOGY

This chapter describes the methodology adopted for conducting the study. For fulfilling the stated objectives, there was a need to explore aspects like profile and the various problems of honey bee entrepreneurs. The present study is an attempt to explore the awareness of waste management among the profile of honey bee entrepreneurs, their profiles and problems faced by honey bee entrepreneurs.

The methodology used to meet the data requirement and analysis to cover the above mentioned aspects has been discussed in this chapter.

3.1 Research Design

Descriptive research design was used to carry out the study in state of Punjab. The focused on studying factors such as demographic profile, startup operations and problems faced in waste management, finance, marketing etc. by honey bee entrepreneurs.

3.2 Sampling Technique

Population comprised of beekeepers of Punjab and for purpose of carrying out the study, a list of registered beekeepers was obtained from Progressive Beekeepers Association. A sample of 50 farmers was selected from list on the basis of convenience and willingness of respondents to participate in the study. Primary data from respondents was collected.

3.3 Data Collection

Primary data was obtained from respondents with the help of pre structured non disguised questionnaire (Annexure-1). For convenience of the respondents, the questionnaire was translated in Punjabi language. To fulfill the objectives enquiries were made regarding profile of entrepreneur on the basis of demographic variables and problems of honey bee entrepreneurs related to marketing, finance and waste management etc. Before administering the questionnaires, main objective of the research was explained to the bee farmers.

3.4 Data Analysis

The data collected through the questionnaire was converted to master table which facilitated tabulation of data in desired form. The collected data was then grouped into tables and was analyzed using various statistical tool like mean score, average, percentages.

3.5 Limitation of the Study

Any study based on the survey through questionnaires suffers from the basic limitation of the possibility of difference between what is recorded and what is truth, no matter how carefully the questionnaire has been designed and field investigation has been conducted. This is because the respondents may not deliberately report their preferences and even if they want to do so, there are bound to differences owing to filters of communication process. The error has been tried to be minimized by conducting interviews personally yet there is no fool proof way of obviating the possibility of error creeping in.

In addition there are limitations regarding scope of validity conclusion:

1. The study relates to Punjab and in general, findings are applicable to Punjab only and cannot be extended beyond Punjab.
2. The study was restricted to members of Progressive Beekeepers Association only.
3. Due to shortage of time and resources only 50 respondents have been covered.

Chapter-IV

RESULTS AND DISCUSSION

This chapter includes the analysis of the primary data collected from the respondents in order to understand their demographic and problems faced related to waste management, finance, and general management.

4.1 Profile of respondents

To gain a better understanding of honey bee entrepreneurs, demographic profile and socio-economic background of the respondents may be helpful. Hence, the information regarding age, qualification and land holding of the respondents has been tabulated.

4.1.1 Classification on the basis of land holding

The respondents were asked about their land holdings and on the basis of landholding, the respondents were divided into five categories. The responses thus obtained have been tabulated in table 4.1.1.

Table 4.1.1 Classification of respondents on the basis of land holding (n=50)

Category	Land holding	Number of respondents
Marginal farmers	< 3 acres	4 (8.00)
Small farmers	3-7 acres	8 (16.00)
Semi- medium farmers	7-10 acres	6 (12.00)
Medium farmers	10-15 acres	18 (36.00)
Large farmers	>15 acres	14 (28.00)

It can be seen from table 4.1.1 that majority of the farmers i.e. 36 per cent of the respondents fall in the category of medium farmers with land holdings between 10-15 acres. Fourteen percent of the respondents were semi-medium farmers with landholding from more than 15 acres. Twenty four percent of the respondents were categorized as marginal and small farmers with land holding of less than 7 acres. From the available data, it can be stated that majority of the respondents i.e. 36 per cent of the respondents were medium farmers with land holdings between 10-15 acres.

4.1.2 Classification on the basis of age

The respondents were enquired about their age and the responses were categorized into three groups. The responses thus obtained have been tabulated in table 4.1.2.

Table 4.1.2 Classification of respondents on the basis of age

Age	Number of respondents
25 -35 years	4 (8.00)
35- 45 years	24 (48.00)
Above 45 years	22 (44.00)

It can be seen from the table 4.1.2 that 48 percent of respondents were between 35-45 years, 44 percent were above 45 years. From the available results it can be stated that majority of respondents were in the age category of 35- 45 years. No respondent was found in the age category of less than 25 years. The results indicate that beekeeping is not popular among youth and is undertaken majorly by the persons having age more than 35 years.

4.1.3 Classification of respondents on the basis of qualification

The respondents were enquired about their qualification and the responses were categorized into three groups. The responses thus obtained have been tabulated in table 4.1.3.

Table 4.1.3 Classification of respondents on the basis of educational qualification

Qualification	Number of respondents
Primary	12 (24.00)
Matriculation	30 (60.00)
Graduation	8 (16.00)

It can be seen from table 4.1.3 that 30 percent respondents were having qualification of matriculation, 12 percent were at primary education. From the available results, it can be stated that majority of respondents i.e. 30 percent respondents were having qualification of matriculation.

4.1.4 Classification on the basis of main occupation

Table 4.1.4 Classification of respondents on the basis of main occupation

Main Occupation	Number of respondents
Agriculture	46 (92.00)
Apiculture	8 (16.00)
Services	4 (8.00)
Business	

It can be seen from the table 4.1.4 that 92 percent of respondents were having agriculture as their main occupation, 4 percent reported services as their main profession and 8 percent of respondents were having beekeeping as their main occupation. This indicates that the main occupation of the respondents was agriculture as 92 percent of respondents were found to be engaged in agriculture as their main profession.

4.2 Number of boxes at the start of venture and at present

The respondents were asked about the number of boxes they possessed, at the start of beekeeping and at present. The responses have been tabulated in table 4.2.1 & 4.2.2. It can be seen from table 4.3.1 that 80 percent of respondents had started their beekeeping business with less than 10 boxes. Four percent had started their venture with 10-20 boxes, 6 percent respondents had started their venture with 20-30 boxes.

Table 4.2.1 Number of boxes at the start of venture

Number of boxes	Number of respondents
Less than 10	40 (80.00)
10-20	4 (8.00)
20-30	6 (12.00)
Above 30	0

From the available results it can he stated that majority of beekeepers had started their beekeeping business with less than 10 boxes. It was found that on average beekeepers started with 1.36boxes .

Table 4.2.2 Number of boxes at present

Number of boxes	Number of respondents
Less than 100	4 (8.00)
100-200	4 (8.00)
200-300	20 (40.00)
300-400	6 (12.00)
400-500	6 (12.00)
Above 500	10 (20.00)

It can be seen from table 4.2.2 that 20 percent of respondents possessed between 200-300 boxes at present. Four percent had 100-200 boxes while 6 percent respondents had 300-400 boxes. Only 10 percent of respondents were found to be possessed above 500 boxes. From the available results it can be stated that majority of beekeepers possessed 200-300 boxes at present beekeeping business.

4.3 Type of boxes used for beekeeping

The respondents were asked about type of boxes preferred while beekeeping. The responses have been tabulated in table 4.3.

Table 4.3 Type of boxes preferred used for beekeeping

Type of boxes	Number of respondents
Kail wood	22 (44.00)
Kikar wood	50 (50.00)
Safeda wood	14 (28.00)
Mango wood	8 (16.00)

It can be seen from table 4.3 that 50 percent of respondents preferred boxes made of kail wood while 14 percent respondents preferred boxes made of safeda wood for beekeeping. The other type of boxes preferred by beekeepers were found to be made of dek, mango, safeda as these are cheaper than kikar and kail. From the available results it can be stated that most of the honey bee entrepreneurs prefer boxes made of kail wood.

4.4 Mode of selling honey

Respondents were asked about the mode of selling honey. The responses have been tabulated in table 4.4.

Table 4.4 Mode of selling honey

Mode of selling	Number of respondents
Direct selling	28 (56.00)
Through agents/shopkeepers	22 (44.00)

It can be seen from table 4.4 that 28 percent respondents were selling their product directly in the market while 22 percent respondents were selling their product through agents/shopkeepers. From the available results it can be stated that majority of the respondents i.e. 28 respondents were selling their honey directly in the market.

4.5 Type of financial problems faced during bee keeping

Respondents were asked about the mode of selling honey. The responses have been tabulated in table 4.5.

Table 4.5 Type of financial problems faced during beekeeping

Type of problems	Number of respondents
High cost of finance	20 (40.00)
Securities demanded	40 (80.00)
Lack of knowledge for recording financial transactions	16 (32.00)

From the available results it can be stated that majority of the farmers, fourty percent of them were facing the problem of securities demanded, twenty percent faced the problem of high cost of finance and sixteen percent with lack of knowledge for recording financial transactions.

4.6 Disposal of wooden boxes

On an average basis ,the life of a wooden box is 2-3 years. Respondents were asked how did they disposed off the boxes which are not more useful for beekeeping. The responses have been tabulated in the table 4.6.

Table 4.6 Method of disposing wooden boxes

Method of disposing wooden boxes	Number of Respondents
Used for fire purpose	32 (64.00)
Get them repaired	24 (48.00)

From the available results it can be stated that majority of the farmers, sixty four percent of them were disposing off the boxes by using them for fire purposes and also 24 percent of the respondents prefer to get them repaired and further use for beekeeping. Majority of the farmers, that is 32 percent , were using them for firing purposes.

4.7 Disposing honey which is unfit for human consumption

When respondents were asked about the method of disposing honey which is not fit for human consumption, majority of them said that they had never come across a situation when the honey produced by bees is not fit for human consumption. The responses have been tabulated in the table 4.7.

Table 4.7 Methods of disposing honey which is unfit for human consumption

Method of disposing honey	Number of respondents
Throw it as a waste	14 (28.00)
Use for lubrication	8 (16.00)
Never faced a situation in which honey is unfit for human consumption.	36 (72.00)

From the available results, it can be stated that majority of the farmers that is 72 percent of the farmers had never faced a situation in which honey is unfit for human consumption and also 14 percent of them had thrown it as a waste and 8 percent of them said that they used it for lubrication purposes.

4.8 Awareness about various uses of beeswax

When respondents were asked about the various uses of beeswax, majority of them were aware that beeswax is used for reducing friction, making candles, cosmetic products. The responses have been tabulated in the table 4.8.1 and 4.8.2.

Table 4.8.1Awareness about use of beeswax for making candles, cosmetic products ,reducing friction.

Awareness about use of beeswax for making candles, cosmetic products ,reducing friction.	**Number of respondents**
Yes	44 (88.00)
No	6 (12.00)

From the available results, it can be stated that majority of the farmers, that is 88 percent of them were aware about the use of beeswax for making candles, cosmetic products and reducing friction. Also 6 percent of them were not aware about this.

Table 4.8.2 Awareness about use of beeswax for lowering cholesterol, relieving pain and swelling.

Awareness about use of beeswax for lowering cholesterol, relieving pain and swelling	**Number of respondents**
Yes	22 (44.00)
No	28 (56.00)

From the available results, it can be stated that majority of the farmers, that is 56 percent of them were not aware about the usage of beeswax for lowering cholesterol, relieving pain and swelling, while 44 percent of them were aware about this.

4.9 Waste related to beekeeping

When respondents were asked to enlist about the various waste materials related to beekeeping business, all of them listed the name of wooden boxes used for beekeeping. On an average basis, the life of a wooden box used in bee keeping is 2-3 years. After their life completion, majority of the beekeepers used them for fire purpose, while some of them prefer to get the boxes repaired and use them again for beekeeping.

4.10 Awareness about “Slumgum”

When respondents were asked about “slumgum”, a organic waste product that appears in beeswax rendering process, all of them were not aware about this. It states that there is lack of knowledge about the byproducts in beekeeping among the respondents. Slumgum is considered to be a organic product,having high NPK content, which can be used as a fertilizer .

Chapter- V

SUMMARY

In this chapter, a brief summary and conclusions of the study have been presented, so as to understand the implications of the findings.

5.1 Summary

The present study was undertaken to explore the profile of honey bee entrepreneurs in terms of their demographic background and to study the start up, waste management operations and problems faced by honey bee entrepreneurs. Study was conducted in Punjab by taking 50 respondents from Progressive Bee Keepers Association, PAU and data was collected with the help of pre structured questionnaire. The pre structured questionnaire was translated in Punjabi language to collect better and accurate responses.

5.2 Findings

Major findings of the study have been presented as follows:

- Majority of the farmers i.e. 36 per cent fall in the category of medium farmers with land holdings between 10-15 acres.

- Forty eight percent respondents were of the age between 35- 45 years.

- Thirty percent respondents were having qualification of matriculation, 12 percent were at primary education.

- Ninety two percent of respondents were having agriculture as their main occupation, 4 percent reported services as their main profession and 8 percent of respondents were having beekeeping as their main occupation.

- Majority of beekeepers had started their beekeeping business with less than 10 boxes.

- Twenty percent of respondents possessed between 200-300 boxes at present. Four percent had 100-200 boxes while 6 percent respondents had 300-400 boxes. Only 10 percent of respondents were found to be possessed above 500 boxes.

- Fifty percent of respondents preferred boxes made of kail wood while 14 percent respondents preferred boxes made of safeda wood for beekeeping.

• Twenty eight percent respondents were selling their product directly in the market while 22 percent respondents were selling their product through agents/shopkeepers.

• Majority of the farmers, forty percent of them were facing the problem of securities demanded, twenty percent faced the problem of high cost of finance.

• Sixty four percent of them were disposing off the boxes by using them for fire purposes and also 24 percent of the respondents prefer to get them repaired and further use for beekeeping.

• Majority of the farmers that is seventy two percent of the farmers had never faced a situation in which honey is unfit for human consumption and also fourteen percent of them had thrown it as a waste and eight percent of them said that they used it for lubrication purposes.

• Majority of the farmers, that is eighty eight percent of them were aware about the use of beeswax for making candles, cosmetic products and reducing friction. Also, six percent of them were not aware about this.

• Majority of the farmers, that is fifty six percent of them were not aware about the usage of beeswax for lowering cholesterol, relieving pain and swelling, while 44 percent of them were aware about this.

• When respondents were asked to enlist about the various waste materials related to beekeeping business, all of them listed the name of wooden boxes used for beekeeping.

▪ When respondents were asked about “slumgum”, a organic waste product that appears in beeswax rendering process, all of them were not aware about this. It states that there is lack of knowledge about the byproducts in beekeeping among the respondents.

5.3 Scope for Future Research

The following issues pertaining to honey bee entrepreneurship can be further explored:

- Training can be provided regarding the benefits of various byproducts in honey processing.

- Focus study can be conducted on marketing related problems of honey bee entrepreneurs.

- A study dealing with supply chain management of honey can be undertaken.

- Relationship between scale of business and type of problem faced by honey bee entrepreneurs can be explored in greater detail.

- Pollen is not produced at all in India. Pollen is a natural vegetarian protein source containing many nutritive elements and minerals and can do much to improve the general nutritional intake in rural areas. It also has a great demand in the export market.

- Propolis is the resinous substance collected by bees from trees to seal cracks in the hive. Propolis has been found to be a natural antibiotic and has many medicinal qualities when used externally or internally and is valuable in the field of Apitherapy. There is great demand for propolis for export.

- Bee venom is an unexploited source of production from the bees in India Bee venom has various medicinal uses in Homeopathy ,Allopathy and systems of natural medicine.

- Royal Jelly is secreted by the bees from special glands in their body and is used to feed the queen bee larva. It contains various natural hormones and is a highly concentrated food. It has a great demand for exports. China has become a major producer and exporter of royal jelly. Royal jelly however can only be produced by beekeepers having high technical knowledge.

- Demand of honey bees for crop pollination is also increasing in some parts of the country. This profession offers a great scope in generating employment besides a good livelihood. Apart form direct employment to the beekeepers, there would be need for good artisans, hive manufactures, apicultural equipment and machinery manufactures, transport system for irrigation of colonies, traders, product quality experts, packers, sellers, raw material dealers etc. and allied industries.

5.4 Recommendations

The following recommendations have been suggested from the study

- Majority of the farmers were aware about the use of beeswax for making candles, cosmetic products, lubrication purposes. But they are not involved in the manufacturing process, so they should start manufacturing other products on their own to generate more profits.

- Farmers were not aware of the other by product i.e “Slumgum”, which can be used as a fertilizer and is obtained during beeswax rendering process, so they should be aware about this product during training programmes.

- Farmers are mainly focused on honey production only, they should also focus on manufacturing other profitable and useful products like pollens, bee venoms , royal jelly etc.

- The wooden boxes used should be made of kail wood,as kail wood is having more life as compared to others.

- Farmers should sell their honey on their own and reduce the intermediaries so as to earn more profits.

- Major waste found in bee keeping is wooden boxes, training should be provided to them to efficiently manage this waste.

- . Facilities should be provided for waste disposal and storage. Covered receptacles should be used for holding beekeeping waste until final disposal.

- Honey or honey products unfit for human consumption should be kept in covered containers with a label until disposed of appropriately.

- Waste-disposal areas should be properly identified and designed for easy access. Waste-disposal areas should not be a harbourage for pests/ rodents/diseases or aid in contamination/pollution of premises or water.

5.5 Conclusions

Major waste found in beekeeping is wooden boxes, which are having life span of two-three years generally .All the other products are obtained as byproducts from various processing techniques. Farmers are not aware of the useful products like Slumgum, which is obtained during beeswax rendering process and that can be used a fertilizer. Slugum is having high NPK content which is beneificial for the soil properties. Majority of the farmers were not very much aware about the waste management practices.Beekeeping plays an important role in the sustainable agriculture as it contributes significantly as an allied industry. Bee farming provides supplementary and sometimes major source of income to the farmers, especially to the small farmers. Enterprises like poultry, piggery, dairy, mushroom growing etc., require higher initial costs than beekeeping. Due to its low cost farmers prefer beekeeping as an important subsidiary occupation, which provide high returns as various honey products. Beekeeping production is affected by indiscriminate use of pesticides, bee diseases and enemies, adverse effects of weather, low price of products, etc. The susceptibility of honey bees to different diseases, pesticide hazards and marketing of bee products were found to be major limiting factors in the prospects of beekeeping. Majority of the beekeepers wanted to increase their level of business. Government authorities should possess serious concern to the problems faced by bee keepers and promote small land holder farmers for honey bee farming, so that they can fetch maximum return from apiculture.

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ANNEXURE

Questionnaire

1. General Information

a. Name: _____ b. Age: _____ c. Village: _____

d. Land/Cultivation Pattern: _____

2. What is your educational qualification?

a. Primary ☐ b. Matric ☐

c. Graduate ☐ d. Post Graduate ☐

3. Main Occupation

a. Apiculture ☐ b. Agribusiness ☐

c. Services ☐ d. Anyother,Please specify: _____

4. In which year did you start bee keeping ?

_____

5. How many number of boxes did you have at the start of Bee keeping business and now ?

_____

6. What type of wooden boxes do you use while production of honey ?

a. kikar ☐

b. Kail ☐

c. Any other(Please specify) _____

7. How you dispose these wodden boxes, when they are not more useful ?

_____

8. What you do with honey ,which is unfit for human consumption ?

_____

9. Are you aware that beeswax is used for reducing friction, making candles, cosmetic products?

a. Yes ☐ b. No ☐

10.Are you aware that beeswax is used for lowering cholesterol, relieving pain and in case of swelling ?

a. Yes ☐ b. No ☐

11. Enlist all waste related to beekeeping ?

a. _____

b. _____

c. _____

12. a) Do you know about 'slumgum', a organic waste product that appears in beeswax rendering process?

a. Yesb. No ☐ ☐

b) If yes,then how you use it ?

_____

15. What are the problems you faced when you started bee keeping business ?

a. Lack of business expertise ☐ Lack of training for beekeeping ☐

c. Unskilledlabour ☐ Any other(please specify) _____

16. How do you sell your product (honey) in the market ?

a. Direct selling ☐ Through Agents/shopkeepers ☐

c. Any other, please specify _____

17. What kind of finance related problems you faced ?

a. High cost of finance ☐

b. Securities demanded ☐

c. Lack of knowledge for recording financial transactions ☐

d. Any other, please specify _____

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