

CURRENT STATUS OF APICULTURE AND ITS IMPACT ON LOCAL LIVELIHOOD IN DISTRICT BANNU, KHYBER PAKHTUNKHWA

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ABSTRACT

Apiculture is an important practice for obtaining food, health benefits, gaining jobs and income, pollination of plants to increase crop yield, maintains biodiversity and to protect the environment. The current status of apiculture in district Bannu is evaluated in the study as it is also a famous area for honey production in Khyber Pakhtunkhwa. In this study the primary data was collected through well-designed questionnaire and the study was carried out in different villages of Tehsil and District Bannu. A general survey was also conducted to know about the bee flora for pollen and nectar sources plants in district Bannu. The purposive random sampling method was used. During this study it was found that majority of the respondents belong to age class 21-35 (52%) followed by age class 36-50 (32%) and the least number of respondents belong to age class 51-65 (16%). It was concluded that average production in the study area is 5-7 kg/10 hives and most of the respondents 95% were less educated and were not familiar with modern and advanced scientific practices of beekeeping. The income per year in relation to apiculture was recorded in the study is that 16% people were earning Rs.3,50,000 - 4,00,000/-, 40% were earning up to Rs.4,50,000/- per year while 24% were earning up to Rs.5,00,000/- per year and the rest 20% were earning Rs.5,50,000/- per year and above. This earning is dependent upon various factors. It is also observed that honey obtained from *Ziziphus* spp. is sold up to Rs.1800-2000/kg while that of *Acacia* spp. is sold up to Rs.800/kg.

Keywords: Apiculture, Honey bees, Impact, Livelihood, Bannu

INTRODUCTION

Beekeeping is a very significant activity for getting food, providing jobs, getting income, reduction in poverty, protection of environment, pollination of plants and providing different benefits for the care of human health (Wakgari and Yigezu, 2021). Beekeeping is a high-potential and sustainable activity particularly for the poor rural people and for the local communities to get additional income through non-timber forest products, increases crop yield and maintains biodiversity. It doesn't require high starting costs, too much land, can easily be practiced by men, women and youth requires less labour. In Khyber Pakhtunkhwa the best suitable areas for honey bee farming are Karak, Kohat, Swat, Bannu, and Chitral. The Pakistani government encouraged the beekeeping for rural communities to better their income generation (Qaiser *et al.*, 2013). Beekeeping offers many opportunities for different individuals or members of the community to utilize available natural resources to support their livelihood

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(Gratzer *et al.*, 2021). Bee farming has also a significant role in food production through pollination of crops and enhancing food security (Khan *et al.*, 2017). Beekeeping is the essential sub-sectors of agriculture and forestry which can aid in increase of economies of the developing countries. Beekeeping is practiced for numerous benefits which include honey and its byproducts, producing honeybee hives for sale, bees wax, for industrial use and for foreign exchange earnings thus making it a viable commercial agricultural enterprise presently all over the world (Okpokiri *et al.*, 2015).

Honeybees are normally existing everywhere in all parts of the world excluding extreme Polar Regions and are considered as social insects because they are living in the form of colonies. Colony consist of a Queen, workers and drones performing different tasks within a colony (Khan *et al.*, 2016). Honey bee is the producer of honey and other hive products as well as an important pollinator of fruits and vegetables because their body parts are specially modified to pick up pollen grains, they have body hairs and potential for long working hours, indicate adaptability to different climates and shows flower constancy (Gratzer *et al.*, 2021). There are normally four species of honeybees which are existing in Pakistan namely *Apis dorsata*, *Apis florea*, *Apis cerana* and *Apis mellifera* in which only two species *A. cerana* and *A. mellifera* are domesticated (Khan, 2020). Presently Pakistan has about 0.4 million colonies of honeybee; each colony houses approximately 15,000 – 20,000 honeybees (Qaiser *et al.*, 2013).

In Pakistan beekeeping is mostly practiced in KP and central and north regions of Punjab but it is raising rapidly these days. Currently in Pakistan there are an estimated 10,000 beekeepers managing almost 600,000 *Apis mellifera* colonies produce yielding more than 12,000 tons of honey annually. Beekeeping industry currently supporting nearly 27,000 families who are practicing commercial beekeeping as self-employment for improving their livelihoods and supporting income generation. It is revealed from a survey of honey hunters and beekeepers that approximately 60 tons of honey was harvested from *A. cerana*, 70 tons of honey was harvested from *A. dorsata* and 10 tons of honey was harvested from *A. florea* bee colonies per annum and the huge portion of that honey were used for personal consumption or sold locally. Pakistan exports honey around 4,000 tons with the worth of about 23.00 million dollars every year to Arab countries (Khan, 2020). Pakistan is producing high quality of honey of different flora that contains acacia (*Acacia spp.*), citrus (*Citrus spp.*), eucalyptus (*Eucalyptus spp.*), rape and mustard (*Brassica spp.*), ziziphus (*Ziziphus spp.*), clover (*Melilotus officinalis*), loquat (*Eriobotrya japonica*), kalongi (*Nigella sativa*), sheesham (*Dalbergia sissoo*), mosquito (*Prosopis juliflora*), sunflower (*Helianthus annuus*), garranda/ currant bush (*Carissa opaca*), robinia (*Robinia pseudoacacia*), shain and many more in different ecological areas (Khan, 2020).

Honey is considered as sweetest natural food product used as a sweetener which is obtained mostly through beekeeping farms as well as obtained wildy. In the same way honey is a valuable nutritive food supplement which contain various type of proteins, sugar molecules, minerals and amino acids. It is already known that for centuries honey has been used in conventional medicines offer medicinal benefits such as it is used for healing of wounds, burns, cataracts, skin ulcer and scabies treatment or cure in rural households, used as usual folk drugs, apitherapy for treatment and a rich source of energy. Several estimates have been made to show the economic value of honeybees in agriculture as well as in forestry in developed countries (Khan *et al.*, 2016).

Objectives of the Study

The proposed study was aimed to achieve the following main objectives.

- To determine the current status of apiculture in district Bannu.
- To determine the impact of apiculture on local livelihood in district Bannu.

MATERIAL AND METHODS

Description of the Study Area

Bannu town is the central part of Khyber Pakhtunkhwa province, Pakistan, just south of the Kurram River. The Bannu district lies between 32° 43' to 33° 06' North latitudes and from 70° 22' to 70° 57' East longitudes. It is surrounded on the north by the tribal area adjoin Bannu district, on the east by Karak district, on the south by Lakki Marwat district and on the west by the south Waziristan agency and tribal area adjoining Lakki Marwat and Bannu district. The general elevation of the plain is from 300 to 600 meters. The maximum rainfall occurs in August i.e. is 111.36 mm. The foothills are formed of stiff clay, protected by layers of stones and pebbles. Wheat, barley and corn (maize) are the main crops of the region. The summer season starts in May and lasts still mid

August. May and June are dry and hot months while in July and August, the weather is hot and moist. June is the hottest month with mean maximum and minimum temperatures more than 40°C and 26°C respectively. December, January and February are the winter months. The mean maximum and minimum temperatures during January are about 17°C and 5°C respectively.

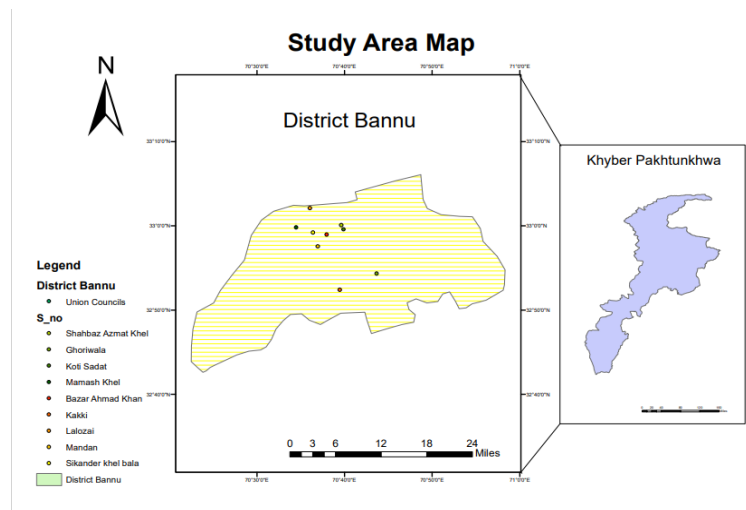


Fig.1. Map showing study area of District Bannu

Methodology

In this study the primary data was collected through well-designed questionnaire and the study was carried out in different villages of Tehsil and District Bannu. Keeping in view the purpose of the study the questionnaire was developed and tested before data collection and different other question was added in the light of field observation and discussion. Thus, the questionnaire was improved more to increase its strength and reliability and avoid any confusions in the final stages. The present study was conducted in District Bannu which is famous for honey production. The purposive random sampling method was used. A purposive sample, also commonly called a judgmental sample, is one that is selected, based on the knowledge of a population and the purpose of the study. Apart from this, the study area was studied and different spots of District Bannu were identified to know the current status of beekeeping in that areas which is shown in the map. A general survey was also conducted to know about the bee flora for pollen and nectar sources plants in district Bannu which is shown in table 10.

Sampling procedure

Firstly, five union councils were selected randomly from the list of Union Councils in the Tehsils. In the second step, ten farmers were selected randomly from each selected village. Thus a total of fifty farmers were interviewed for gathering the desired information related to the purpose of the study. The detail of the union council and the number of respondents is given in the table 1.

Table 1. List of Union Councils selected

S. No	Name of Union Council	No. of respondents
1	Mandan	10
2	Mamash Khel	10
3	Koti Sadat	10
4	Sikandar Khel Bala	10
5	Ghoriwala	10

Data Collection

A field survey was conducted from August 20 to September 30, 2022. Data were collected from 50 respondents with different relevant questions through a well-structured questionnaire. The questionnaire was first prepared and then tested in the field to increase its legitimacy. After testing in the field, the questionnaire was modified according to the local situation. The respondents were interviewed personally at their Deras/farms. The Interview schedule was structured in English but the Questions were asked in the local language (Pushto) for the ease of the respondents to obtain dependable and essential information with maximum accuracy. The response was 100% as all the selected respondents were contacted and interviewed.

RESULTS AND DISCUSSION

The overall results of the study was evaluated, compared and analyzed the main findings which are discussed below.

Socio-demographic data

General characteristics of the respondents

All the respondents were permanent residents of the study area. The respondents were male with no female respondent. Majority of the respondents were living in a joint system while a few respondents have nuclear family system.

Household Socio-Economic Characteristics

During this study it was found that majority of the respondents belong to age class 21-35 (52%) followed by age class 36-50 (32%) and the least number of respondents belong to age class 51-65 (16%).

Table 2. Household Socio-Economic Characteristics

S. No	Age Class(Years)	Frequency	Percentage
1	21-35	26	52
2	36-50	16	32
3	51-65	08	16

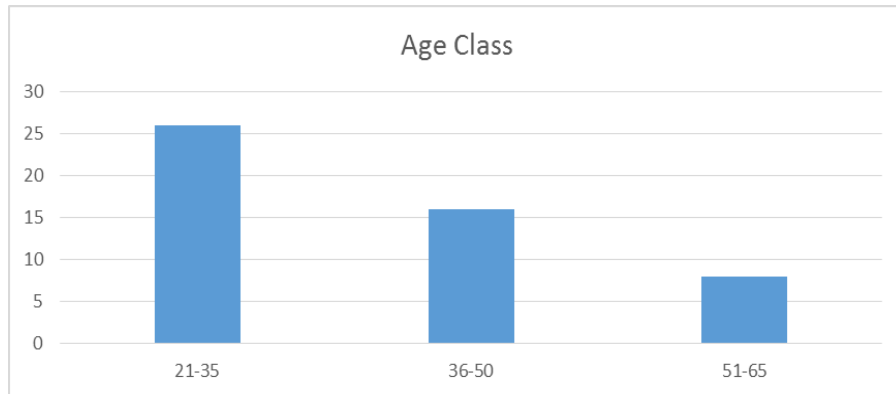


Fig. 2. Household Socio-Economic Characteristics

Literacy rate and Occupation

The number of respondents in this survey were 50. Out of 50 respondents 36% were primary, 26% were middle, 06% were matric and 32% were illiterate.

Table 3. Literacy rate and Occupation

S. No	Education Level	Frequency	%age
1	Primary	18	36
2	Middle	13	26
3	Matric	03	06
4	Illiterate	16	32
Total		50	100

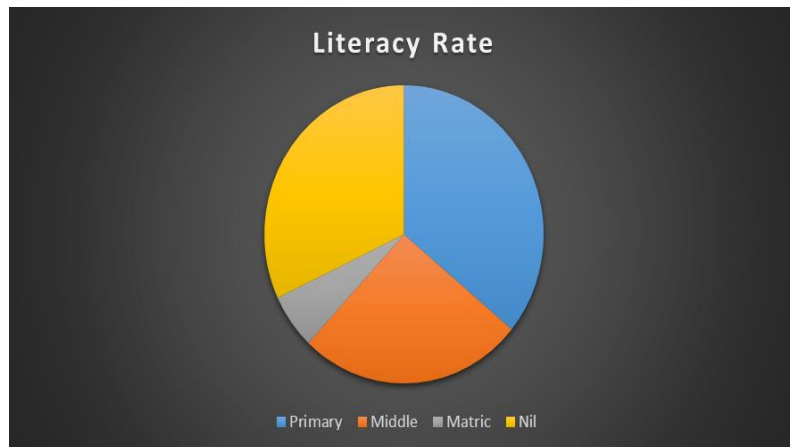


Fig. 3. Literacy rate and Occupation

Occupation of the Respondents

The respondents of the survey were also asked about their occupations, which showed that the respondents were having occupations in different sectors but majority of them practiced agriculture for gaining livelihood for their families. The survey showed that agriculture was practiced by (60%) of the respondents followed by Business (16%) followed by Services and labor each (12%).

Table 4. Occupation of the Respondents

S. No	Occupation	Frequency	Percentage
1	Agriculture	30	60
2	Business	08	16
3	Services	06	12
4	Labor	06	12
Total		50	100

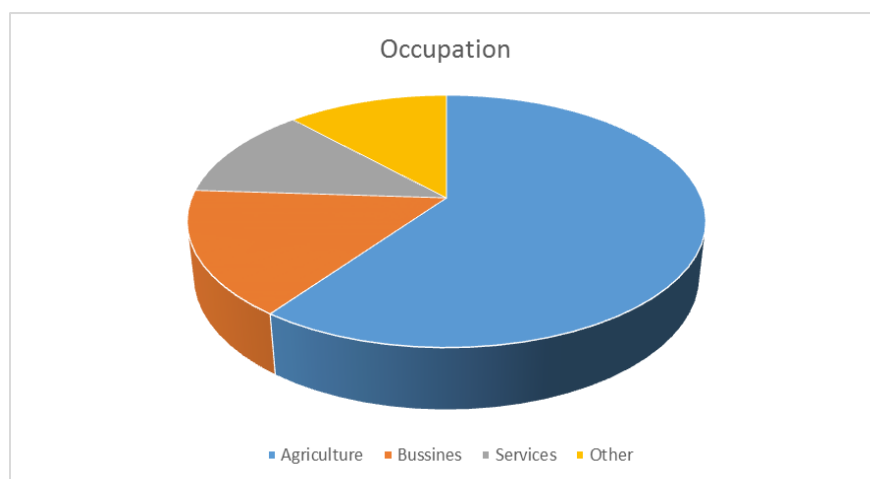


Fig. 4. Occupation of the Respondents

Income per Year of the Respondents

During this survey the respondents were asked about their income per year, out of the 50 respondents interviewed 16% were earning Rs. 3,50,000 - 4,00,000/- , 40% were earning up to Rs. 4,50,000/- per year while 24% were earning up to Rs. 5,00,000/- per year and the rest 20% were earning Rs. 5,50,000/- per year and above. This earning is dependent upon various factors for example production per colony, weather conditions of that area, diseases which attack on honeybee colonies, flowering time and the type of honey which is extracting because there are different rates for different varieties of honey. For example honey obtained from *Ziziphus spp.* is sold up to Rs. 1800-2000/kg while that of *Acacia spp.* is sold up to Rs. 800/kg etc.

Table 5. Income per Year of the Respondents

S. No	Income/Year (Rs.)	Frequency	Percentage
1	3,50,000 - 4,00,000	08	16
2	4,50,000	20	40
3	5,00,000	12	24
4	5,50,000	10	20
Total		50	100

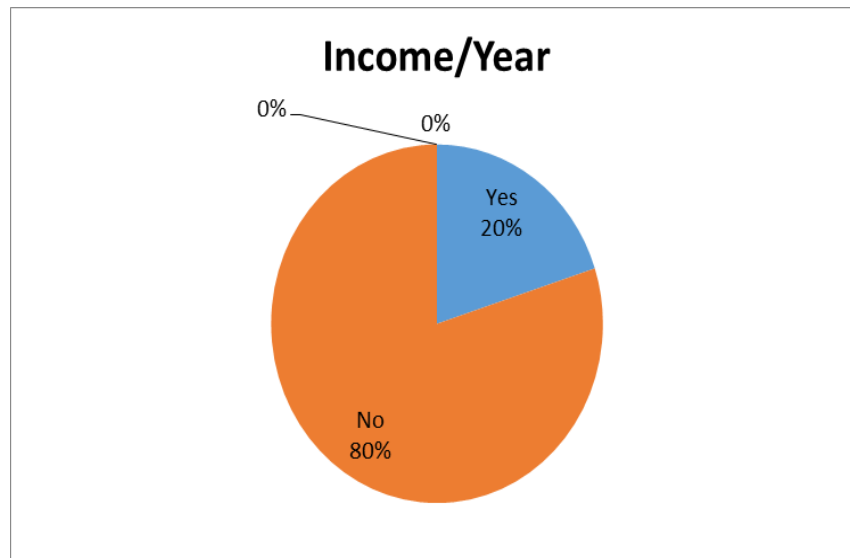


Fig. 5. Income per Year of the Respondents

Management of floral requirements and diseases

The study reveals that majority (90%) of farmers were aware of the flowering time of different plants, most common diseases which attack on honeybee colonies and its control methods as well as the management of the floral requirements. However a negligible number of farmers (5%) had no idea about flowering time, diseases and its control methods, management of the floral requirements etc. and (5%) were uncertain.

Honey Collection

Respondents were asked about whether they visited outside their area or district for collection of honey. Almost 50% of them told that they visited outside their district for honey collection and 50% of them didn't visit outside.

Knowledge about suitable area for Honey collection

The study assessed that majority of the respondents (75%) have knowledge about suitable area for honey collection while (25%) were unaware of the areas suitable for honey collection.

Government support in transportation of Honey bees

Without government support none of the industries can make progress. In this study the respondents were also enquired about if they received any support

or aid from government sector for honey bees and honey transportation. Majority of the respondents answered in negative almost (90%) and the remaining (05%) had no idea regarding government help in this regard but complained about the behavior of the police department regarding their checking and demand for money per vehicle that carried the honey bees.

Assessment of Honey Bee Keeping Skills

The respondents of the study were also asked about whether they knew about scientific management of honey bees and any training was given to them or not. Majority of the respondents (95%) answered in negative and were unaware of the scientific management of the honey bees and no training was given to them. The remaining respondents (05%) were aware of scientific management and its role in increasing the production potential.

Table 6. Assessment of Honey Bee Keeping Skills

S. No	Knowledge about scientific skills	Frequency	Percentage
1	Yes	10	20
2	No	40	80
Total		50	100

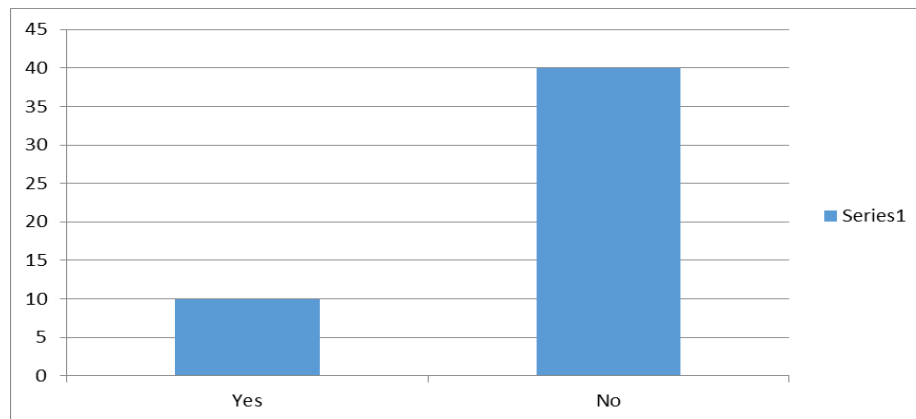


Fig. 6. Assessment of Honey Bee Keeping Skills

The respondents were asked whether they attended any workshops, seminars, conferences conducted by the forest, agriculture or any other government department to enhance their skills and to make them familiar with modern advanced scientific practices used in Apiculture Industry. Majority of the respondents answered in negative.

Production per Colony

The table 9 shows that the maximum production per 10 hives in UC Mandan that is 6-7 kg followed by Mamash Khel 5-6 kg, Koti Sadat 5 kg, Sikandar Khel Bala 4-5 kg and Ghoriwala 3-4 kg respectively. The highest production per 10 hives is observed in UC Mandan that is 6-7 kg.

Table 9. Production per colony

S. No	Union Council	Production/10 hives
1	Mandan	6-7 kg
2	Mamash Khel	5-6 kg
3	Koti Sadat	5 kg
4	Sikandar Khel Bala	4-5 kg
5	Ghoriwala	3-4 kg

Bee Flora of District Bannu

During this study bee flora of different Union Councils of District Bannu was recorded. Following are the major bee flora of different Union Councils of District Bannu. Names of different Union Councils where the flora was recorded are Mandan, Kakki, Bazar Ahmad Khan, Laloza, Ghoriwala, Shehbaz Azmat Khel, Koti Sadat, Sikander Khel Bala and Mamash Khel.

Table 10. Table showing Bee flora of District Bannu

S. No	Scientific name	Local name	Family
1	<i>Acacia modesta</i>	Palosa	Mimosaceae
2	<i>Brassica campestris</i>	Sarsoon/Sharsham	Brassicaceae
3	<i>Citrus medica</i>	Khatta	Rutaceae
4	<i>Citrus sinensis</i>	Malta	Rutaceae
5	<i>Dalbergia sissoo</i>	Shisham/Shawa	Papilionaceae
6	<i>Phoenix dactylifera</i>	Khajira	Arecaceae
7	<i>Trifolium alexanderianum</i>	Shaftal	Papilionaceae
8	<i>Zizyphus mauritiana</i>	Bera	Rhamnaceae
9	<i>Zizyphus namularia</i>	Karkanrha	Rhamnaceae
10	<i>Zea mays</i>	Makai/Juwar	Poaceae
11	<i>Cenhrus biflorus</i>	Bhurat	Poaceae
12	<i>Cestrum nocturnum</i>	Raat ki Rani	Solanaceae
13	<i>Citrus limon</i>	Nimbo	Rutaceae
14	<i>Combretum indicum</i>	Jhumka bail	Combretaceae
15	<i>Datura innoxia</i>	Dathura	Solanaceae
16	<i>Duranta erecta</i>	Daranta	Verbenaceae

17	<i>Hamelia patens</i>	Hummingbird Bush	Rubiaceae
18	<i>Helianthus annuus</i>	Lamar Gul	Asteraceae
19	<i>Ipomoea cairica</i>	-	Convolvulaceae
20	<i>Luffa aegyptiaca</i>	Tori	Cucurbitaceae
21	<i>Nerium oleander</i>	Kaneer	Apocynaceae
22	<i>Ocimum basilicum</i>	Kashmalay/Tulsi	Lamiaceae
23	<i>Parthenium hysterophorus</i>	Bang Booty/ Gaajar Booti	Asteraceae
24	<i>Pennisetum typhoides</i>	Bajra	Poaceae
25	<i>Prosopis cineraria</i>	Aghzakai/Jand	Fabaceae

Climate Change and Apiculture

The respondents of the survey were also asked about the effects of climate change on apiculture and its effect on honey production. Majority of the respondents were aware of the phenomenon of climate change and its impacts on honey bees and honey production. The common impacts was on the quality of honey produced as the flowering occurred before timing and occurred for a short period with less nectar which effected the quality and quantity both and caused problems for the farmers. Climate change also caused diseases in the honey bees.

CONCLUSION

It was concluded that average production in the study area is 5-7 kg/10 hives. It was observed that most of the respondents were less educated and were not familiar with modern and advanced scientific practices of beekeeping. It was also observed that the farmers were not provided with any kind of support from the government. Most of the farmers shifted their honey bees colonies according to the weather conditions i.e. they performed altitudinal migration. Majority of the farmers used traditional methods for extracting honey which causes honey loss. The income obtained from apiculture practices was handsome amount but it was dependent on climatic conditions. Farmers were also affected from the consequences of climate change.

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