SOCIO-ECONOMIC ANALYSIS OF BEEKEEPING: A CASE STUDY OF DISTRICT KARAK, BANNU AND KOHAT

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Abstract

The was designed to investigate the different major problems in honey bee keeping sector. Moreover, the study also covers socio-economic analysis of the beekeepers in main parts of Khyber Pakhtunkhwa (Bannu, Karak and Kohat) during 2022. About 110 beekeepers from these localities were interviewed with help an exhaustive questionnaires and recorded data were analyzed with statistical package SPSS. Results revealed that the highest percentage of beekeepers were recorded from age grouped 20-30 years from district Karak, Bannu and Kohat, while the lowest were observed from age grouped above 50 years. Similarly, majority of beekeepers were illiterate recorded while middle literate was in minority from all the selected regions. The maximum family size was recorded above 10 members per family whereas minimum member per family was recorded 1-5 member. Majority of beekeepers of these regions faced diseases and pest problems having 80-120 hives per farm. Maximum frequency of colony migration, honey harvesting productivity was recorded from district Karak. Thus, in case of average production cost and net beekeeping income, district Karak was recorded on top as well. The study came to the conclusion that the following factors should be taken into account to accelerate the growth of the sector: Strong research and extension efforts to advance development; concern of the ecology and biology of the local race in technology adoption and selection; conservation and rehabilitation of vegetation with beekeeping integration; organization of beekeepers for effective marketing of bee

products; establishment of colony multiplication centers; and multiplying, dispersing, and conserving the native honeybee race would all be crucial.

Keywords: apiculture, beekeeping, honey production, socio-economic, Pakistan

Introduction

Apiculture is one of the important sub-sectors of agriculture which can help in reviving the economies of developing countries. Beekeeping is practiced for its multiple benefits which include honey, beeswax, industrial use, producing honeybee hives for sale, and for foreign exchange earnings thus making it a commercial agricultural enterprise currently around the globe (Okpokiri *et al.,* 2015). Beekeeping is currently a commercial agricultural operation all over the world because to its many benefits, which include honey, beeswax, industrial use, producing honeybee hives for sale, and earning foreign exchange (Okpokiri *et al.,* 2015). The natural function of bees in plant pollination and the preservation of natural flora are two additional advantages of beekeeping. Bee farming is relatively inexpensive to run because humans merely harvest the honey; the bees take care of production. Additionally, this business does not require a lot of inputs like a lot of land, food, fertiliser, water, etc. to operate and grow. It may thus be readily combined with standard agricultural operations like crop cultivation, horticulture, livestock production, etc. because to its comparatively cheap labour and other input needs (USAID, 2012; Okpokiri *et al.,* 2015). Beekeeping is a sustainable kind of agriculture because, like other agricultural products, its productivity can be enhanced with good management. Due to the economic and nutritional advantages of honey marketing, consumption, and intakes at the household level, beekeeping is practised (Babatunde *et al.,* 2007). In rural families, honey is used to treat or cure scabies as well as wounds, burns, cataracts, skin ulcers, and other medical conditions (Okpokiri *et al.,* 2015). In rural regions, beekeeping is essential for decreasing vulnerability, poverty, and stress brought on by things like crop failure (Bradbear, 2009). Through the pollination of crops, it also plays a significant part in improving food security and food production (MoARD, 2010). According to PARC's 2010-2011 report, beekeeping significantly contributes to rural livelihoods and household income in Pakistan. Beekeeping is done at the home level in various parts of the nation, including Khyber Pakhtunkhwa and Federally Administered Tribal Areas (FATA). FATA is a sparsely populated, largely rural region. FATA is made up of six Frontier Regions (FRs): Peshawar, Kohat,

Bannu, Lakki Marwat, Tank, and Dera Ismail Khan, as well as seven agencies: Mohmand, Khyber, Kurram, Bajaur, Orakzai, North Waziristan, and South Waziristan. According to Markey and Daniel (2008), 64 percent of the people of FATA are living in poverty. The area's residents had few options for generating revenue and sustaining their way of life, which mostly consisted of farming, raising livestock, and running small local businesses (FAO, 2015). According to Vural and Karaman (2009), the average annual output of honey for each apiary may be over 20 kilogramme worldwide, including 33 kg in China, 40 kg in Argentina, 27 kg in Mexico, 64 kg in Canada, 55 kg in Australia, 40 kg in Hungary, and almost 16 kg in Turkey. Beekeeping is a beneficial industry selected with Pakistan. *Apis mellifera*, an intriguing species, is now being raised in the existing beehives by over 7,000 beekeepers. Around 300,000 provinces yearly handle 7,500 metric tonnes of honey. Additionally, the nation's bee flora offers excellent opportunities for the growth of beekeeping (PARC, 2014). In addition to honey, hive products help beekeepers financially. Since the production costs of these products are substantially greater than those of honey (PARC, 2014), they include beeswax, pollen, and propolis, which are each priced at Rs. 1100/kg, Rs. 2000/kg, and Rs. 30,000/kg per kg, respectively. One of the active small businesses in the KP (Bannu, Karak, and Kohat) region is beekeeping. Small-scale beekeeping in these regions, where access to revenue is restricted, may considerably enhance people's quality of life by creating jobs and providing cash, as well as by enhancing the health of beekeepers and the general populace. Therefore, such research is crucial for highlighting the contribution of honey bee keeping to the local community in terms of different income-generating and employment-related activities, as well as for identifying challenges and possibilities related to this sector. Therefore, to fill in this research gap this study was designed to investigate the different major problems in honey bee keeping sector. Moreover, the study also covers socio-economic analysis of the beekeepers in main parts of Khyber Pakhtunkhwa (Bannu, Karak and Kohat).

Material and Methods

Study area and Sampling technique

The experiment was conducted at the two different districts of Khyber Pakhtunkhwa (Bannu, Karak and Kohat) during May to November 2022.

The following intents were covered by this experiment; demographic characteristics, beekeeping types, problem facing by beekeepers, season wise problem with beekeepers, cost on management, production of honey bees and Marketable price of honey.

Data collection

Therefore, an exhaustive questionnaire was designed for this study which contained maximum relevant information regarding the beekeeping sector of the sampled regions. The study was comprised 110 beekeepers, every individual of the recorded population got an equal probability. For exploring the general overview of the subsectors, an initial brief survey was conducted following participatory rural appraisal (PRA) approaches. Consequently, the already designed questionnaire was pretested and adjusted based on the feedback obtained from the group and finally data were collected by interviewing of sample respondents.

Analytical technique

Descriptive statistics were utilized to investigate the quantitative information. The data were analyzed with help of the statistical package SPSS.

Results and Discussions

Demographic profile of beekeepers

The demographic data were collected from the study sample. Some household level demographic details as information regarding the age, educations status and family size in order to improve our understanding of the beekeeping enterprise in the study area. The summarized data being obtainable in Table 1. At district Karak, among the recorded beekeepers sample size (n=60), 41.7%, 33.3%, 16.7% and 8.3% respondents lie in the category 20-30 years, 41-50 years, 31-40 years and above 50 years, respectively. Similarly, at district Bannu, among the recorded beekeepers sample size (n=30), 50.0%, 33.3%, 10.0% and 6.7% respondents lie in the category 20-30 years, 41-50 years, 31-40 years and above 50 years, respectively. At the district Kohat, 50.0%, 25.0%, 20.0% and 5.0% respondents lie in the category 20-30 years, 41-50 years, 31-40 years and above 50 years, respectively. The recorded data showed that maximum respondents are belonged to age ranged from 20-30 years. The current findings are accordance to the findings of Baba et al. (2014) and Famuyide *et al.* (2014) who reported that maximum respondents of Nigeria

and fall in age range 31-40 years. Table also showed the education status of beekeepers, in sample size of district Karak, Bannu and Kohat, maximum beekeepers were Illiterate (50.0%, 40.0% 45.0%) recorded followed by graduate (25.0%, 30.0% and 25.0%) then secondary literate (13.3%, 13.3% and 15.0%) and primary literate (8.3%, 10.0% and 10.0%) while minimum beekeepers were middle level educated (3.3%, 6.7% and 5.0%). Current results are in line with findings of Onyekuru who reported that maximum of beekeepers in Enugu are literate whereas out of the total sample size of literate beekeepers, 18% were primary educated, 14% middle educated, 30% secondary and 38% having graduate level of education. Table also revealed that majority of beekeepers having above 10 members in family from reported districts (50.0%, 50.0% and 50.0%) as followed by 6-10 member per family (33.3%, 33.3% and 35.0%) while minimum family size (1-5 member per family) was recorded with 16.7%, 16.7% and 15.0% from district Karak, Bannu and Kohat.

Problems faced with beekeepers

The Table 2 shows the association between the number of hives and problems faced with beekeepers. In this regards, the maximum disease incidence was observed with district Karak, Bannu and Kohat beekeepers, who's having 80-120 hives per bee farm (41.7%, 50.0% and 50.0%) as followed by those beekeepers, having 10-40 hives (25.0%, 26.7% and 25.0%), 120 above (21.7%, 16.7% and 15.0%) while minimum disease issue was reported from those beekeepers, containing 41-80 hives per bee farm (11.7%, 6.7% and 10.0%). Similarly, in term of pest problem, the maximum pest problem was observed with district Karak, Bannu and Kohat beekeepers, whos having 80-120 hives per bee farm (36.7%, 50.0% and 40.0%) as followed by those beekeepers, having 10-40 hives (25.0%, 23.0% and 30.0%), 120 above (21.7%, 13.3% and 20.0%) while minimum pest problem was reported from those beekeepers, containing 41-80 hives per bee farm (16.7%, 13.3% and 10.0%). The present findings cannot be compared with the findings of earlier researcher because of some different problems faced by beekeepers in the present and earlier studies. Also, problems fluctuate from country to country.

Honey production and productivity of colonies

Table 3 shows the frequencies of colony migration and honey harvesting and productivity by hive types in the sampled regions. The maximum frequency of colony migration/year was recorded by beekeepers of district Karak (n=5) followed by Bannu (n=3) and Kohat (n=3) with cumulative average (3.66). However, the maximum frequency of honey harvest/year was also recorded in

district the district Karak (n=4) followed by Bannu and kohat (n=2) with cumulative average (2.66). Table also showed productivity (kg) of box hive/harvest, the maximum production was recorded by Karak (n=10) followed by Bannu (n=8) while minimum productivity was recorded by beekeepers of district Kohat (n=6.5) with cumulative average (8.16). Whereas, the maximum annual productivity (kg)/box hive was recorded in district Karak (n=20) followed by Bannu (n=13) while minimum respondents were recorded from district Kohat (n=11) with cumulative average (14.66). Depending on the frequency of the migration and subsequent harvests, these yields could grow. The average yearly honey output for local and box hives, however, was reported by Abdulaziz (2012) to be 5.8 kg and 9 kg, respectively.

Cost of production and net income of honey production

The overall average total production cost and net income per beekeeper from honey production were 866.66 kg per annum. The results in Table 4 show that the highest average annual production was recorded in the district Karak (1100 kg) as followed by Bannu (800 kg), while the lowest production was recorded in district Kohat (700 kg). The total annual cost was observed in this study (42333.33 Rs.), the highest cost was recorded in district Karak (50000 Rs.) followed by Bannu (40000 Rs.), while the minimum annual cost of beekeepers was recorded from district Kohat (37000 Rs.). The total average gross annual income from honey sale was Rs. 736666.66, the highest cost was recorded in district Karak (935000 Rs.) followed by Bannu (680000 Rs.), while the minimum annual cost of beekeepers was recorded from district Kohat (595000 Rs.). The annual net income from honey sell was Rs. 694333.33, the highest cost was recorded in district Karak (885000 Rs.) followed by Bannu (640000 Rs.), while the minimum annual cost of beekeepers was recorded from district Kohat (558000 Rs.). This statistic is in line with Al-Ghamdi's (2010) research, which said that beekeeping serves as the primary source of income for 5,000 households in the Kingdom of Saudi Arabia.

Table 1: Demographic profile of beekeepers from different district of KPK (n=110).

Age grouped	Karak		Bannu		Kohat	
	F	**%**	**f**	**%**	**F**	**%**
20-30 years	25	41.7	15	50.0	10	50.0
31-40 years	10	16.7	3	10.0	4	20.0
41-50 years	20	33.3	10	33.3	5	25.0
Above 50 years	5	8.3	2	6.7	1	5.0
Total	60	100.0	30	100.0	20	100.0
Education status						
Illiterate	30	50.0	12	40.0	9	45.0
Primary Literate	5	8.3	3	10.0	2	10.0
Middle Literate	2	3.3	2	6.7	1	5.0
Secondary Literate	8	13.3	4	13.3	3	15.0
Graduate	15	25.0	9	30.0	5	25.0
Total	60	100.0	30	100.0	20	100.0
Family size						
1-5	10	16.7	05	16.7	03	15.0
6-10	20	33.3	10	33.3	7	35.0
Above 10	30	50.0	15	50.0	10	50.0
Total	60	100.0	30	100.0	20	100.0

Table 2: Association between the number of hives and problems faced with beekeepers

No. of Hives	Disease						Pest					
	Karak		Bannu		Kohat		Karak		Bannu		Kohat	
	f	%	f	%	F	%	f	%	f	%	f	%
10-40	15	25.0	8	26.7	5	25.0	15	25.0	7	23.3	6	30.0
41-80	7	11.7	2	6.7	2	10.0	10	16.7	4	13.3	2	10.0
80-120	25	41.7	15	50.0	10	50.0	22	36.7	15	50.0	8	40.0
120 above	13	21.7	5	16.7	3	15.0	13	21.7	4	13.3	4	20.0
Total	60	100.0	30	100.0	20	100.0	60	100.0	30	100.0	20	100.0

Table 3: Frequencies of colony migration, honey harvesting and productivity by hive types in the sampled regions

Region	Frequency of colony migration/year	Frequency of honey harvest/year	Productivity (kg) of box hive/harvest	Annual productivity (kg)/ box hive
Karak	5	4	10	20
Bannu	3	2	8	13
Kohat	3	2	6.5	11
Cumulative average	3.66	2.66	8.16	14.66

Table 4: Average cost of production and net annual income of beekeeping ventures per apiary

Region	Total annual production (kg)	Total annual cost C	Gross annual income from honey sale D	Annual net income from honey sell D-C
Karak	1100	50000	935000	885000
Bannu	800	40000	680000	640000
Kohat	700	37000	595000	558000
Total average	866.66	42333.33	736666.66	694333.33

Average market rate= 850

Conclusions and Recommendations

Despite several obstacles, beekeeping is a successful industry that greatly raises and diversifies the income of numerous rural families in the State. Additionally, apiculture offers many families a way to start their own side businesses and self-employment options. The following aspects should be taken into account to improve the growth of the subsector: Strong research and extension efforts to advance development; consideration of the biology and ecology of the local race in technology adoption and selection; conservation and rehabilitation of vegetation with beekeeping integration; organisation of beekeepers for effective marketing of bee products; establishment of colony multiplication centres; and multiplying, dispersing, and conserving the native honeybee race would all be crucial.

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