

Full Length Research Paper

Beekeeping sub sector challenges and constraints in Atsbi Wemberta District of eastern zone, Tigray Region, Ethiopia

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Accepted 6 November, 2010

Though beekeeping is a common farming enterprise and income generating activity in Atsbi Wemberta, and promotional efforts were made to improve it, no systematic study has been undertaken to evaluate the promotional efforts and people's response to it. The objectives of the study were to identify beekeeping sub sector constraints; and to assess perception of beekeepers towards improved beekeeping practices. Ranking revealed that drought, honeybee pests and disease, shortage of beekeeping materials, death of colony, lack of adequate extension support, marketing problem, shortage of bee forage, lack of skill and reduction of honeybee colonies were found to be the major constraints in this sub sector development of the district. Perception of beekeepers was also found to be positive towards improved practices. Extension, research and NGOs should enhance research and extension activities on absconding management, selecting moisture stress tolerant bee forage, developing a technology from locally available materials.

Key words: Ethiopia, constraints, improved beekeeping practices, perception of beekeepers.

INTRODUCTION

The performance of the Ethiopian agriculture has been poor and the sector has not been able to feed the nation. About 50% of the Ethiopian population currently lives in absolute poverty (Biological Society of Ethiopia, BSE, 2004). To reduce poverty, focusing on high potential areas of agricultural sector and making them more productive is of paramount importance. Beekeeping is one sub sector where such potential exists.

There is no well-documented evidence that indicates when and where the beekeeping practice started in Ethiopia. However, as described in Ayalew (1978) beekeeping had started in the country between 3500-3000 B.C. In Ethiopia, beekeeping extension was initiated in 1965 with the establishment of Holeta Bee Research Center then Holeta Beekeeping Demonstration Station and other similar stations in different parts of the country. According to Ethiopian Beekeepers Association, EBA

(2005), formally organized beekeeping extension started in 1978. The country has a potential in beekeeping as the climate allows growing of different vegetation and crops, which are a good source of nectar and pollen for honeybees. Due to suitable natural environment of the country, large honeybee colonies, which are estimated to be about 10, million, exist in the country (Ayalew, 1978).

The moderate climate has made Ethiopia one of the most successful countries in the tropics in box hive utilization (Ruttner, 1988). Ethiopia has a share of around 23.58 and 2.13% of the total Africa and world honey production, respectively. The country is the leading honey producer in Africa and one of the ten largest honey-producing countries in the world (Ayalew, 1990). The country is also one of the four largest beeswax producing countries. In Ethiopia, beeswax is one of the 12 major exportable agricultural products (Mammo, 1976). The author also states that in the country about one million farmers are estimated to be engaged in beekeeping.

Beekeeping in Ethiopia plays an important role in income generation for beekeepers (farmers). In the

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country, an average of 420 million Ethiopia Birr is obtained annually from the sale of honey. Honey production of the country meets beverage requirements of the urban and rural population. It is also demanded for its nutritional and medicinal values. The others hive products such as beeswax; royal jelly, propolis, and bee venom have high demand globally. The country produces about 28,500 tons of honey and 5000 tons of beeswax annually (Holetta Bee Research Center, 2004).

Honeybees play a great role in pollinating plants. Particularly, self-sterile plants should get pollinating agents to produce viable seed. The yield of plants pollinated by honeybees can be increased in quality and quantity. According to Crane (1990) honeybees can increase the yield of *Citrus sinensis* by 30.0%, watermelon by 100.0% and tomatoes by 25.0%. Adimasu et al. (2004) also reported that onion yields had increased by 94.0% due to honeybee's pollination. In addition, beekeeping sub sector has a lot of relative advantages. For instance, it does not require fertile land as well as large area. People of all working age groups can practice it. It also requires little initial capital.

Improved beekeeping practices have been introduced and promoted in the country for the last 40 years. However, there was no available study on beekeepers' perception towards this practice. Mainly towards improved beekeeping practices (box hive, feeding, shade construction, honeybee multiplication etc.). In this research was studied beekeepers' perception and constraints associated with improved beekeeping practices in a selected District of Eastern zone, Tigray Region.

MATERIALS AND METHODS

Area of the study

The study was conducted in Atsbi Wemberta District, found in Eastern zone of Tigray Region (Ethiopia) at about 65 km from Mekele regional city. It is located in the northern part of the country at 13°36' N and 39°36' E.

Sampling techniques, data collection and analysis

Purposive sampling was employed to identify peasant associations in which improved beekeeping practice was promoted. Four peasant associations with more beekeepers population were selected purposively. Among the selected peasant associations, the beekeepers were stratified into users and non-users of improved beekeeping practices. The total sample size for the study was 130 beekeepers. Based on their probability proportional to size principle, 45 users and 85 non-users were taken for the study through systematic sampling method.

The data were collected from beekeepers and extension workers of the district using structured interview schedule, observations and personal interviews. The data that were collected from the beekeepers were beekeeping practices, perception of beekeepers towards beekeeping practices and main constraints of beekeepers in the study area. The data that were collected from extension workers were similar with that of beekeepers as its main purpose

was for triangulation. The tools for data analysis were descriptive statistics, T-test and ranking. Descriptive statistics was used to clearly describe using percentage beekeeping practices of the respondents. T-test is used to assess the variation between positive and negative statements used to identify the perception that the respondents have towards improved beekeeping practices. High yield, ease for inspection, ease of harvesting of products and honey quality are the major relative advantages of improved box hive, where as hand, high cost, need of high skill, need of accessories, and unavailability of the technology are the main relative disadvantages of improved box hive.

RESULTS AND DISCUSSION

Major improved beekeeping practices by sample respondents

Under this sub topic, major improved beekeeping practices such as feeding, bee forage planting, colony multiplication etc. have been discussed.

Honeybee feeding and bee forage planting practices

In this study, the respondent provided supplementary feed from user and non-user categories respectively (Table 1). The supplementary feed included sugar, barley flour, peas and beans flour. Both users and non-users were providing supplementary feed to their honeybee colonies.

In the study area, there was no improved bee forage promotion. However, there was an extension activity, which encourages beekeepers to grow indigenous bee forage such as (in Tigrigna) `gribiya` (*Hypostus auriculata*) and `tebeb` (*Basium claudiforbium*). These plants are herbaceous and contribute high in honey production of the area. The beekeepers also grow different bee forages (Table 1).

Hive shading construction and ant protection practices

Hive shading is one of the practices that are recommended to protect the honeybees from high temperature, wind and rain. Among the users of improved box hive more were adopting the practice whereas significant numbers of non-users were constructing hive shade (Table 1).

Among the beekeepers that adopted improved box hive, more than half used improved ant protection method. On the other hand, non-users were not using improved ant protection method (Table 1). There are different ant protection methods. Only users used all types of ant protection methods. In addition to the aforementioned practices, the respondents were also practicing colony multiplication. It serves both to increase the number of honeybee colonies and to earn additional

Table 1. Improved Beekeeping practices utilization status of sample respondents.

No	Practices	Response	NU	U	Total of NU and U
1	Hive shading	No	21 (24.7)	1 (2.2)	22 (16.9)
		Yes	64 (75.3)	44 (97.8)	108 (83.1)
2	Supplementary feed	No	26 (30.6)	9 (20)	35 (26.9)
		Yes	59 (69.4)	36 (80)	95 (73.1)
3	Bee forage	No	53 (63.9)	7 (15.6)	60 (46.2)
		Yes	30 (36.1)	38 (84.4)	68 (53.8)
4	Improved ant protection	No	81 (97.6)	20 (44.4)	101 (78.9)
		Yes	2 (2.4)	25 (55.6)	27 (21.1)
5	Honeybee colony multiplication	No	39 (45.9)	21 (46.7)	60 (46.2)
		Yes	46(54.1)	24 (53.3)	70 (53.8)
6	Post harvest handling	No	50 (73.1)	---	50 (38.5)
		Yes	35 (26.9)	45 (100)	80 (61.5)

()-percent, NU- non user, U-user.

Table 2. Uses of different ant protection methods by sample respondents.

No.	Ant protection materials	NUs	Us
1	Cone shaped metal sheet	-	14 (56)
2	Engine oil	--	1 (4)
3	Cone shaped inner tube of rubber	-	10 (40)

()-Percent, NU- non-user, U-user.

income by selling honeybee colonies.

It was found that nearly equal proportions of the users and non-users used colony multiplication practices (Table 1). They were using different colony multiplication techniques among which overcrowding was the dominant practice.

The effectiveness of the practices depends on the quality of the products. Hence, importance of sanitation is unquestionable in hive products so as to keep the quality of honey and to be competent in the market. Honey is a food item, which is mostly consumed directly. Hence, the honey should be unadulterated and uncontaminated during harvesting, extracting, and storing. Traditionally, beekeepers store the honey in clay pot, gourd (made of cucumber), small '*tasa*', plastic bag (sack of fertilizer), and bags made of animal skin etc. These equipments decrease the quality of the honey. In the study area, all the users were storing their honey in plastic bucket,

which is the recommended material to maintain the quality of honey (Table 1). The beekeepers who decided to adopt improved box hive more incorporated appropriate post harvest handling of hive products.

Table 2 summarized that of the respondents used cone shaped metal sheet, inner tube of rubber and used engine oil. The beekeepers who did not adopt improved box hive protect their honeybees using traditional methods of ant protection, which is mainly adding ash under the hive stand.

Generally, the success of effective utilization of improved box hive depends on incorporation of other improved beekeeping practices. These improved practices are hive shade construction, supplementary feed, colony multiplication, appropriate post harvest handling of hive products, bee forage planting; and improved ant protection methods (Table 3). The beekeepers that adopted improved box hive relatively more integrated other improved beekeeping practices to their bee farm. However, other combinations of components were used mainly by the non-users (Table 3). Beekeeping extension was also addressing non-users so as to incorporate improved beekeeping practices in their bee farm. In all combination of practices almost post harvest handling practice existed. The beekeepers were paying due attention to hive product quality and enables them to be competent in hive product marketing. The result of participant observation also confirmed that the beekeepers were storing the honey using plastic jar, in moisture free area. This gave extra value to their honey, which is white and preferable by the consumer.

Table 3. Combination of beekeeping practices.

Practices in combination	Response	Us (n=45)	NUs (n=85)
Shade, feed, post harvest handling	No	44 (97.8)	74 (87.1)
	Yes	1 (2.2)	4 (12.9)
Shade, feed, colony multiplication,	No	44 (97.8)	64 (75.3)
	Yes	1 (2.2)	21 (24.7)
Shade, feed, flora, colony multiplication	No	38 (84.4)	74 (87.1)
	Yes	7 (15.7)	11 (12.9)
Shade, feed, flora, post harvest handling	No	44 (97.8)	71 (83.5)
	Yes	1 (2.2)	14 (16.5)
Shade, feed, colony multiplication, post harvest handling	No	30 (66.7)	7 (8.2)
	Yes	15 (33.3)	78 (98.8)
Shade, colony, post harvest handling	No	45 (100)	84 (98.8)
	Yes		1 (1.2)
Feeding, bee forage, colony multiplication, ant protection, hive shading, post harvest handling (all practices)	No	33 (73.3)	85 (100)
	Yes	12 (26.7)	-
Feeding, bee forage, ant protection, hive shading	No	39 (86.7)	85 (100)
	Yes	6 (13.3)	--
Shade, feed, ant protection	No	41 (95.3)	85 (100)
	Yes	2 (4.7)	--

()-Percent, NU- non-user, U-user.

Perception of beekeepers about improved box hive

The rate of adoption is influenced by the farmers' perception of the characteristics of the innovation (Ban and Hawkins, 1996). It was found important to identify perceived relative advantage of improved box hive and its relative disadvantage so as to get the general perception of beekeepers about improved box hive.

High yield, ease for inspection, ease of harvesting of products and honey quality are the major relative advantages of improved box hive, which were identified by the majority of beekeepers. On the other hand, high cost, need of high skill, need of accessories, and unavailability of the technology are the main relative disadvantages of improved box hive. The respondents were provided with both categories of relative advantages and disadvantages to rate on scale of five. The result of each category was summed up separately. The difference of the total relative advantage and disadvantage was found to be positive (Table 4).

It was also found that the total attributes of perception were highly correlated with users of improved beekeeping

practices. This implies that the beekeepers in the study area positively perceived about improved box hive which is a good opportunity for beekeeping extension intervention. Similarly, statistically it is significantly different at $P < 0.01$ with t -value=4.008. The result reveals that beekeepers who had positive perception of the technology adopt the technology more. The finding is supported by Shiferaw and Holden (1998) who find that perception influences adoption positively. The result is also in agreement with study of Tadesse and Belay (2004) on factors influencing adoption of soil conservation measures in south Ethiopia, Gununo area that explains perception of soil conservation problem influenced positively and adoption of soil conservation technology.

Drought is the primary constraint in beekeeping sub sector in the study area. It affected their feed sources (bee forage and water). As a consequence, the honeybee colony absconded to areas where resources are available for their survival. The existence of honeybees' disease and pests affected the honeybees' life that, in turn, also led them to absconding. The remaining

Table 4. Perception of respondents towards improved box hives.

No.	Us (n=45)	NUs (n=85)	T-value	r _s	P
1	M= 16.4 SD=2.6	M=13.8 SD=3.9	4.008***	0.199**	0.023

M=mean, SD= Standard Deviation, ***, **- significant at P<0.01, P<0.05, NU- non-user, U- user.

constraints (absconding, lack of beekeeping materials, death of colony, lack of extension support, marketing problem, shortage of bee forage, and reduction of honey bee colony) affected the hive products of the study area, though their degree of influence varied.

CONCLUSION AND RECOMMENDATIONS

Utilization of improved beekeeping practices were influenced by different constraints. Ranking revealed that drought; honeybee pests and disease; shortage of beekeeping materials, death of colony, lack of adequate extension support, marketing problem, shortage of bee forage, lack of beekeeping skill and reduction of honeybee colonies were found to be the major constraints in the beekeeping development of the district, in their order of importance. Perception of beekeepers was also found to be positive towards improved beekeeping practices. Hence, it is recommended that beekeeping extension, Research and NGOs should enhance research and extension activities on absconding management, selecting moisture stress tolerant bee forage, developing a technology from locally available materials, promotion of ant protection methods and organizing apiary demonstration.

ACKNOWLEDGEMENTS

The authors wish to express their thanks to International Livestock Research Institute (ILRI), Improving Productivity Market Success (IPMS) for financial and logistic support to conduct the study.

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