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Full Length Research Paper

Assessment of beekeeping practices in Asgede Tsimbla district, Northern Ethiopia: Absconding, bee forage and bee pests

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Ethiopia has a huge natural resource base for honey production. An assessment was conducted to investigate beekeeping constraints and indigenous bee pest protection methods in Asgede Tsimbla district, northern Ethiopia. Five sub districts were selected on the bases of adoption of modern beehives with the assistance of development agents working in the district. A total of 500 beekeepers were randomly selected for structured interview. Data was supplemented with personal observations, focus group discussion and key informant interviews with beekeepers, extension workers and bee experts of the district. Absconding was the second major beekeeping constraints: a total of 429 traditional and 297 modern beehives were without honeybee colonies representing an annual maximum loss of about US$ 28,875 and 54,831, respectively. Bee pests and predators including ants (both black and red), birds, spiders, mites, wax moth, beetle, bee mice, honey badger, cat worm and lizards were identified. Indigenous protection methods were practiced to control these pests and predators, such as the application of ash, rope around entrance of hives (hanging the predator's neck), insect repellents (such as dirty engine oil), use of malathine, mechanical killing of the pests, sanitation etc. Majority (58.4%) of the beekeepers were growing different indigenous bee forage, such as *Parkinsonia aculeate*, *Croton macrostachyus*, *Acacia polyacantha*, *Cordia africana*, *Opuntia ficus indica*, *Musa acuminata*, *Syzgium guineense*, *Agave sissanlana*, *Albizia malacophylla*, *Ziziphus spinachristi*, *Carica Papaya*, *Citrus sinensis*, *Carthamus tinctorius* and *Citrus aurantifolia*. Despite all the constraints, there is a great potential to increase the production and quality of honey in the district. Establishing beekeepers cooperative and enhancing bee forage plantation through introducing Multi-Purpose Trees (MPT) should be encouraged.

Key words: Bee forage, absconding, bee pests, honey, Asgede Tsimbla.

INTRODUCTION

Ethiopia has a huge natural resource base for honey production and beekeeping is traditionally a well established household activity in almost all parts of the country. But the benefit from the sector to the nation and beekeepers is not satisfactory (Beyene and David, 2007). Beekeeping sector provides an employment opportunity for many Ethiopian. Number of farmers engaged in honey production is not well known, but is estimated that around one million farmers are actively involved in honey production throughout Ethiopia using the traditional, intermediate and modern hives (Beyene and David,

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2007). A large number of people participate in honey collection and retailing. Thousands of households are engaged in Tej-making in almost all urban areas, hundreds of processors are emerging and exporters are also flourishing. The density of hives occupied by the honeybees on the land may be the highest, at the present moment, of any country in the African continent (Ayalew and Gezahegn, 1991).

The elimination of good nectar and pollen producing tree species in many areas makes it difficult to maintain bee colonies without feeding (Kerealem, 2005). Shortage of bee forage is mainly resulted in Ethiopia due to population pressure and its ecological impacts such deforestation and shifting cultivation. Beekeeping contributes to conservation of the natural environment since its environmentally sustainable activity can be integrated with agricultural practices. It would be one of the most important for sustainable development of poor countries (Gibbon, 2001). Beekeeping plays a major role in socioeconomic development and natural renounces conservation and pollination.

In Ethiopia Export of honey and beeswax is estimated to contribute an average of 1.6 million USD to the annual national export earnings (Ethiopian Customs Authority and Export Promotion Agency, 2006). It is the leading honey producer in Africa in terms of volumes of honey and one of the ten largest honey-producing countries in the world (Ayalew, 1990). About 10 million bee colonies exist in Ethiopia out of which farmers keep about seven million in traditional and modern hives and the remaining exists in forests and caves (Ethiopian Mapping Agency (EMA), 1981). About 4,601,806 hives exist in Ethiopia out of which about 95.5% was traditional, 4.3% transitional and 0.20% frame hives (Beyene and Davide, 2007). The traditional beekeeping accounts for more than 95% of the honey produced and nearly all the beeswax produced in the country. The present study was undertaken to investigate beekeeping constraints and indigenous bee pest protection methods in Asgede Tsimbla district, northern Ethiopia.

Study area

The study was conducted in Asgede Tsimbla district, northern Ethiopia located at about 900-1800 m.a.s.l. with an estimated area of 2,358 km^2. The rainfall of the area is bimodal with a short rainy season occurring between January and April, and a long rainy season from June to August. Average annual rainfall is about 550-900 mm. The mean maximum temperature ranges between 20°C (November and December) and 35°C (January and March). There are about 29,874 households (23,618 males and 6,256 females) with a total livestock population of 135,661. Our study focused on the sub-districts Lemlem, Brhan, Hntset, Mizan and May Sewhi with 1,610, 1,824, 1,800, 2,122 and 925 households, respectively; selected with the assistant of local development agents based on adoption of improved beehive technology.

METHODS

Five sub districts were selected on the bases of adoption of modern beehives with the assistance of development agents working in the district. A total of 500 beekeepers were randomly selected. Structured interview schedule was prepared and pre-tested to include all quantitative data pertaining to the proposed study. Data was supplemented with personal observations, focus group discussions and key informant interviews with beekeepers, extension workers and bee experts of the district. Values were translated to US$ at the exchange rate of the time of the study.

RESULTS

Honey yield, absconding, apiary site and source of honeybee colonies

The major honey harvesting period in Asgede Tsimbla district was October to November. October was a peak harvesting month to obtain the largest quantity and quality of honey. Honey was harvested once or twice a year. The potential productivity (the maximum yield) of the modern beehives was (45-50 kg/hive) higher than the traditional beehive (20-25 kg/hive). The mean yield of the traditional beehive was lower than the modern beehive. Absconding was the second major beekeeping constraints in the district (Table 3). There was financial loss due to absconding of honeybees from improved and traditional hives. A total of 429 traditional and 297 modern beehives were without honeybee colonies (Table 1) representing an annual maximum loss of about US$ 28,875 and 54,831, respectively. Considering annual loss in the area, beekeeping sub sector was not exploited to its maximum. From the existing total 726 empty beehives (n=500), it would be possible to earn US$ 83,706 annually from a sale of honey. The majority of the respondents were keeping their bees in backyard and in the house, which accounts 46.2 and 48.5%, respectively. Predominantly, traditional beehives were in houses. In the present study, about 75% of the respondents kept their colonies under the roof and/or in house (Table 2). About 89% of the respondents get their bee colonies through trapping swarms.

Credit, market and training

Exclusively, beekeepers of the district indicated the presence of credit access. Household package and

Table 1. Improved and traditional beehives of adopters in the sub-districts Lemlem (n=100), Brhan (n= 100), Hntset (n=100), Mizan (n=100) and May Sewhi (n=100).

Beehives	Lemlem	Brhan	Hntset	Mizan	May Sewhi	Total
Modern with honeybee colony	155	208	168	187	156	874
Modern without honeybee colony	129	50	42	12	64	297
Traditional with honeybee colony	97	169	80	145	97	588
Traditional without honeybee colony	114	56	93	31	135	429
Total	**495**	**483**	**383**	**375**	**452**	**2188**

Table 2. Apiary site and sources of honeybee colony of adopters in the sub-districts Lemlem (n=100), Brhan (n= 100), Hntset (n=100), Mizan (n=100) and May Sewhi (n=100).

Apiary site	Lemlem	Brhan	Hntset	Mizan	May Sewhi	Total	%
Under the roof	31	23	7	64	25	150	30
In the house	3	0	67	8	3	81	16.2
In forest	5	0	0	0	0	5	1
Backyard	0	1	1	16	0	18	3.6
Under roof and in house	57	65	25	12	70	229	45.8
In forest and in house	1	0	0	0	1	2	0.4
In forest and under roof	3	11	0	0	1	15	3
Total	100	100	100	100	100	500	100
Means of colony getting	**Lemlem**	**Brhan**	**Hntset**	**Mizan**	**May Sewhi**	**Total**	**%**
Catching the swarm	83	91	88	91	91	444	88.8
Inheritance	4	1	0	3	3	11	2.2
Purchasing	9	0	1	3	3	16	3.2
Catching and purchasing	2	0	0	2	2	6	1.2
Catching and inheritance	2	8	11	1	1	23	4.6
Total	100	100	100	100	100	500	100

Dedebit Credit and Saving Institution (DCSI) provide a maximum of US$ 769 and 385, respectively to a farmer who requires credit with an interest rate of 15 and 9%, respectively in the district. There was no ready market that absorbs the honey produced in sustainable way. Beekeepers were supplying their honey to market in a nearby town, Endabaguna. With regard to training, among the 500 beekeepers, only 182 got training. The training coverage was low and was about 36%.

Beekeeping constraints and bee forage plantation

Prioritization of the problems was made to identify the most important constraints that hinder the development of beekeeping in the district. As indicated in Table 3, disease, pest and predators were the primary constraint followed by absconding and shortage of bee forage. The beekeepers grow different bee forages. Accordingly, 58.4% of the beekeepers were growing different indigenous bee forage, such as in Tigrghna (local language), Shewit Hagay (*Parkinsonia aculeate)*, Tanbok (*Croton macrostachyus*), Gemoro (*Acacia polyacantha*), Aki (*Cordia africana*), Beles (*Opuntia ficus indica)* , Banana (*Musa acuminata*), Liham (Syzgium guineense), Eka (*Agave sissanlana*), Chugene (*Albizia malacophylla*), Gaba (*Ziziphus spinachristi*), Papaye (*Carica Papaya*), Aranshi (*Citrus sinensis*), Suf (*Carthamus tinctorius*), and Lemin (*Citrus aurantifolia*).

Bee pests, predators and protection techniques

Exclusively, beekeepers indicated the presence of bee pests and predators, which include ants (both black and red), birds, spiders, mites, wax moth, beetle, bee mice, honey badger, cat worm and lizards. Indigenous protection methods were practiced to control these pests

Table 3. Ranking of beekeeping constraints of adopters in the sub-districts Lemlem (n=100), Brhan (n= 100), Hntset (n=100), Mizan (n=100) and May Sewhi (n=100).

Constraints	Frequency						
	Lemlem	Brhan	Hntset	Mizan	May Sewhi	Total	Rank
Disease, pest and predators	88	98	95	96	91	468	1
Absconding	82	24	92	72	63	333	2
Shortage of bee forage	36	82	31	66	59	274	3
Lack of beekeeping materials	44	24	67	84	47	266	4
Drought	40	70	27	66	56	259	5
Beekeeping skills	80	14	31	37	73	235	6
Reduction of honeybee colony	17	16	56	71	36	196	7
Death of colony	2	70	38	46	10	166	8
Indiscriminate application of chemicals	14	9	10	35	19	87	9
Marketing problem	5	0	1	56	3	65	10
Apiary	30	13	6	3	2	54	11
Lack of extension support	19	3	7	6	11	46	12

and predators including the application of ash, rope around entrance of hives (hanging the predator's neck), insect repellents (such as dirty engine oil), use of malathine, mechanical killing of the pests, sanitation etc.

DISCUSSION

The major honey harvesting period in Asgede Tsimbla district was October to November. Haney harvesting period matches with peak flowering period. In Ethiopia, there are two major honey harvesting periods, November to December in the lowlands and midlands and from April to May in the highlands (Beyene and Davide, 2007). Predominantly, traditional beehives were placed in houses, which would be important for regular inspection and feeding. Beekeepers have accumulated indigenous knowledge on yield harvesting, inspection and pest protection. Beekeeping does not require fertile land and uncultivated area is suitable for beekeeping: for landless farmers, having apiary site is sufficient for engaging in the activity (Workneh, 2007). In northern Ethiopia, some beekeepers keep honeybee colonies inside living rooms and honeybees are sharing the same doors with members of the family (Nuru, 2002). Beekeepers hang their beehives inside their living rooms and provide entrances on the sides of the walls. According to Amsalu (2002) in the south western part of Tigray, beekeepers use natural forest only for beekeeping purposes. In the present study, forest beekeeping accounted only 1%. Forests have been completely converted into agricultural lands throughout Tigray over centuries, except for patchy remnants of old-aged Afromontane forests around old most Ethiopian Orthodox Tewahido Churches (Aerts et al., 2007; Alemayehu, 2007).

Exclusively, beekeepers of the district indicated the presence of credit access. Credit programs may enable farmers to purchase inputs (Feder et al., 1985). The Agricultural Development Led Industrialization (ADLI) strategy of Ethiopia focuses on improved agricultural packages, proper use of land and water resources, access to improved rural finance, better functioning markets and better roads. The training coverage was low and was about 36%. Need based beekeeping training could back promotion of beekeeping technology so as to obtain the intended amount of hive products (Workneh, 2007). The beekeeper cannot be the beneficiary of the technology, as it requires skill. Rahman, (2007) also stated that training might have inculcated technical competency, more exposure to the subject matter and convinced to adopt the improved technologies in the farms.

Disease, pest and predators were the primary constraint followed by absconding and shortage of bee forage. Identifying the existing constraints for beekeeping and searching for solutions are of paramount importance. The existence of honeybees' disease and pests affect the honeybees' life, which leads them to absconding (Workneh, 2007). Absconding (the total movement of honeybee colony by leaving the hive) can happen due to different reasons. Lack of feed, honey bee pests and drought are the main problems that may cause absconding (Workneh, 2007). Shortage of bee forage cause the honeybee colony to absconds to areas where resources are available for their survival. The existence of more bee forage results in high honey production provided that other factors are suitable for honey production. The elimination of good nectar and pollen

producing tree species in many areas makes it difficult to maintain bee colonies without feeding (Kerealem, 2005). Based on the results of rural households' socio-economic baseline survey, shortage of bee forage was the major constraint of beekeeping in the Amhara Region (Oromiya Bureau of Finance and Economic Development (BoFED), 2002, 2004).

Ants and mites cause a significant effect on honey yield since they highly hinders or limits the activity of bees or causes absconding. Major bee pests in the highlands of southeast Ethiopia are honey badger, ants, spiders, mites, birds and wax moth (Desalegn and Amsalu, 2001). According to Kerealem (2005) ants, honey badger, bee-eater birds, wax moth, spider and beetles were the most harmful pests and predators in order of decreasing importance. In Ethiopia, the land is not only favorable to bees, but also for different kinds of honeybee pest and predators (Desalegn, 2001). Pests and predators may result in a great damage on honeybee colonies with in short period of time.

In conclusion, bee pests and predators, absconding and shortage of bee forage were the major constraints affecting the honey sub sector in the district. There is a great potential to increase the production and quality of honey in the district. Pests and predators of honeybees are protected by implementing traditional means. Majority of the respondents were keeping their bees in backyard and in the house. Provision of sufficient training about beekeeping management, establishing beekeepers co-operative, enhancing bee forage plantation through intro-ducing Multi-Purpose Trees (MPT) are recommended.

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