

## Beekeeping Practices, Production Potential and Challenges of Bee Keeping among Beekeepers in Haramaya District, Eastern Ethiopia

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### Abstract

Beekeeping is a long-standing practice in the rural communities of Ethiopia and appears as ancient history of the country. A cross sectional study, in which 97 households were purposively included, was conducted in Haramaya district to assess the current beekeeping practices, production potentials and production constraints. Most (99%) of the beekeepers in the study area have owned only traditional hives and produce honey for home consumption. The beekeeping practice was dominated by male. A mild stimulant, *Kate edulis* (khat), is the main income source for the residents. Lack of adequate bee forages, poor market, lack of trained development agents and bee pests are the major problems facing the beekeeping sub sector in the area. The most important constraints of beekeeping in the study area were insecticides, birds and bee diseases (1<sup>st</sup>), Misuse of pesticides (2<sup>nd</sup>), Insecticides, birds and pesticides together (3<sup>rd</sup>), Pests, insecticides and predators (4<sup>th</sup>), lack of training (5<sup>th</sup>), shortage of bee forage (6<sup>th</sup>), shortage of water (7<sup>th</sup>) and absconding (8<sup>th</sup>). There are enormous opportunities to boost the production of honey in the villages. Thus, introducing modern beehives, limiting the use of pesticides in 'khat' production and awareness creation and assistance to empower women in the beekeeping activity are needed interventions.

**KeyWords:** Beekeeping; Constraints; Haramaya; Pests; Production; Traditional hives

### Introduction

In Ethiopia, beekeeping has been practiced for centuries and its potential is well documented. Of all the countries in the world, no country has such a long tradition of beekeeping than Ethiopia [1]. Despite its long history, beekeeping in Ethiopia is still an undeveloped sector of agriculture. The knowledge and skill of honey and beeswax production of Ethiopian farmers is still very traditional [2].

Most of local beehives are hanged over high trees. Honey production from honeybees are very low with an average of 5-6 kg per hive per year, while from the improved one average of 15-20 kg even more is possible. Honey and beeswax are collected after rainy season; starting from October to December. In the South and Eastern parts, in addition to the main, there is minor harvesting period during May-June. According to CSA, the major honey and beeswax producing regions in Ethiopia are Oromia (41%), SNNPR (22%), Amhara (21%) and Tigray (5%) [3]. However, the country is suffering from the ecological degradation of its natural resources and this means the basis for any honey production is threatened and affected. In many regions of the country, beekeeping is considered as one of the income-generating activities for resource-poor farmers including women, youth and the unemployed sectors of the community [4].

About 10% of the honey produced in the country is consumed by beekeeping households. The remaining 90% is sold for income generation; of this amount, it is estimated that 70% is used for brewing 'tej' (local alcoholic beverage) and the balance is consumed as table honey. Additionally beeswax is collected and traded. Honey is a vital factor in job creation and maintaining livelihoods. However, current

honey production estimate represents only 8.6% of the country's production potential [1,2,5,6].

Beekeeping is still operating in the old traditional ways implying the need for modernization. Low productivity and poor quality of bee products are the major economic impediments for rural beekeepers [7]; however, they face another primary economic concern; i.e. lack of skill to manage their bees and bee products. Most of the rural beekeepers cannot afford to invest in modern beekeeping inputs, processing, packaging, and transport their products to market to maximize profit. They produce a low quality product that they are forced to sell locally to wholesale buyers at prices much lower than in domestic commercial markets [8]. The major constraints that hinder beekeeping development in Ethiopia can be stringent rules and conditions set by honey importing countries [2], very limited domestic market, only basic knowledge of honey production and limited access to market information and technologies, unreliable transport, poor storage of products, lack of quality monitoring and control plan in place and inadequate laboratory facilities and poor institutional set-up for assuring quality [1,2,5]. In line with this, the government of Oromia region recently identified potential areas for beekeeping. According to Haramaya district bureau of Agriculture there is no well-established study on the potential and challenges of beekeeping in the district.

Therefore, the objective of this study is to identify the current practices, production potentials and constraints of beekeeping in Haramaya District, Eastern Ethiopia.

## Materials and Method

### Study area

The study was conducted in Haramaya district (East Oromia National Regional State) which is found at 508 km east of Addis Ababa and 19 km to reach Harar on the high way from Addis Ababa to Harar. 5% of the area is classified as high land, 85% as midland and 10% as lowland (Figure 1). The estimated animal population in the area is about 63, 723 cattle; 13, 612 sheep; 20, 350 goats; 15, 978 donkeys; 530 camels; 42, 035 chickens and 3331 bee colonies. The production system of the district is mixed type. Topographically, it is situated at an altitude of 1400 to 2340 m above sea level with the mean annual temperature and relative humidity of 18°C and 65%, respectively. There are four seasons; a short rain season (from March to mid-May), a short dry season (from end of May to end of June), a long wet season or humid cloudy season (early July to mid-October) and a long dry season (end of October to end of February) [3].

### Study design and sampling procedure

Cross-sectional study was conducted to collect data using questionnaire survey. Beekeepers in the district represented the study population. Using a purposive sampling procedure, a total of twelve kebeles (villages) were selected based on agro-ecology representation (high-land, mid-land and low-land), honey production potential and accessibility. The sampling units were households keeping honeybee colony. Information about the type of hives used, the number of bee colonies owned, the purpose of keeping honey bees, the marketing system of honey and other hive products, the rate of absconding and swarming and harvesting and processing of hive products and major constraints of beekeeping were collected through interviews using a semi-structured questionnaire.



Figure 1: Placement of traditional hive in Haramaya District, 2014. Hives under shed and hives under tree.

## Results and Discussion

### Distribution of the respondents in agro-climatic zones and gender

Almost all (99%) of the respondents were located in weyan dega (midland) agro-climatic zone. As far as ownership of the beekeeping across gender was concerned, the activity is dominated by male. This indicates the gender disparity in owning the beekeeping economic task in the study area (Table 1). This finding is contradicted with the results of Amsalu et al., and Gezahig that pinpoint beekeeping as one of the income-generating activities for resource-poor farmers including women, youth and the unemployed sectors of the community [4,8].

Agro-climatic zone	Frequency (%)
Weyna Dega (mid-land)	99.0
Dega (high-land)	1.0
Kola (low-land)	0.0
<b>Total</b>	<b>100.0</b>

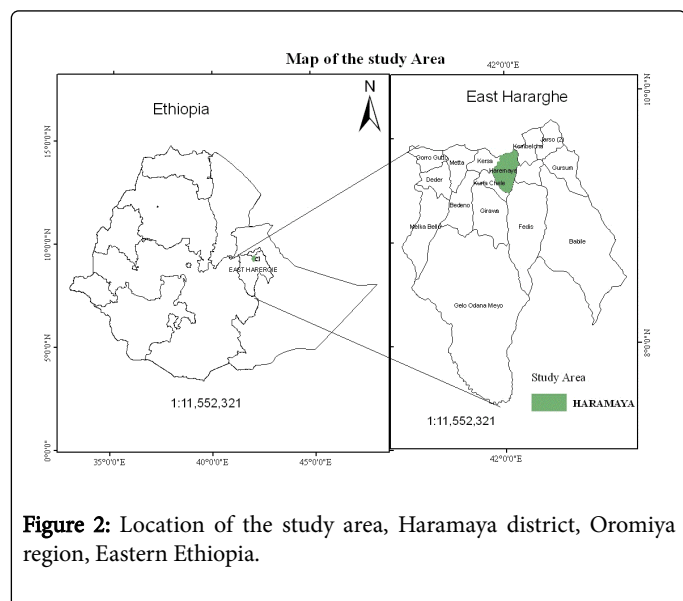
Ownership in gender	
Male	99.00
Female	1.00
Total	100.00
Variables	Frequency (%)
Hive placement	
Back yard of the house	51.0
Inside a simple shelter	32.0
Under the eaves of the house	1.6
Trees in forests	10.5
Trees near home stead	4.9
<b>Total</b>	<b>100.00</b>
Preferred hives by the beekeepers	

Traditional	75.0
Transitional	20.5
Modern	4.5
<b>Total</b>	<b>100.0</b>

**Table 1:** Agro-climatic zones, gender distribution of respondents, Hive placement and preferences, Haramaya district, 2014.

### Placement of hives and beekeepers preference of hives

51% of the beekeepers in the study area kept the traditional bee hives at the back yard of the house, 32% kept inside a simple shed built for hive placement, 1.6% kept under the eaves of the house, 10.5% kept on trees in forests and 4.9% kept on trees near home stead (Figure 2). According to Kerealem most beekeepers of Amaro wereda kept their bee colonies by hanging on trees near homestead and in forest areas [9]. Majority (75%) of the beekeepers of the study area preferred traditional hives over transitional (20.5%) and modern hives (5.5%). This is mainly because of the high cost of constructing and purchasing of modern and transitional hives and due to lack of harvesting and processing equipment's to use modern and improved hives. Similarly, Mehari reported that in east Tigray modern beekeeping require more expensive establishment cost, accessories, (further cost) and skill training although yield better quality and quantity honey [10].



**Figure 2:** Location of the study area, Haramaya district, Oromiya region, Eastern Ethiopia.

### Food source for bees and trend of colony population

As the type and source of food determines the success of beekeeping, the respondents were asked to indicate the source of feed

Reason for not Extracting honey (n=97)	%	Reason for not collecting Beeswax (n=97)	%
Amount of honey will be reduced	55.0	Lack of knowledge	77.7
Lack of material	24.5	Lack of processing skills	12.0
Lack of knowledge	20.5	Lack of market	5.3

for their bees. Accordingly, 94% of them indicated foraging as the main source of food for their bees. As far as the colony population is concerned, only 5% of them indicated a decreasing trend (Tables 2 and 3). 45.4% of the respondents in the study area responded that trend of colony population is decreasing over the years due to absconding, lack of using improved bee hives, pests and predators, drought and lack of bee forage. Similarly, a result reported by Tessega in Bure district indicated that hive products were in a decreasing trend due to shortage of bee forages, drought, pesticides and herbicide application, lack of water and poor management in order of importance [11].

Feed sources	Frequency	Percent
Foraging	91	93.8
Supplementary feeding	3	3.1
Others	3	3.1
<b>Total</b>	<b>97</b>	<b>100.0</b>

Trend of colony population/ by absconding		
Decreasing	44	45.4
Increasing	45	46.4
No difference	8	8.2
<b>Total</b>	<b>97</b>	<b>100.0</b>

**Table 2:** Frequency distribution of feed source colony population.

### Harvesting and processing of hive products

This study pointed out that the only hive product harvested and utilized by beekeepers of the study area was honey. During harvesting they mainly use fire as a smoking material. None of the beekeepers in the study area extract the harvested comb honey. Their main reasons for not extracting were due to the reduction in the amount of honey after harvesting (55%), lack of knowledge on how to extract crude honey (20.5%) and lack of extracting materials (24.5%). None of the beekeepers of the study area collect crude beeswax. According to the respondents the main reasons for not collecting beeswax were lack of knowledge on the importance of bees wax as an income generating hive product unlike honey (77.7%), lack of processing skills (12%), lack of market for wax in their locality (5.3%) and lack of processing material (9.6%) (Table 2). The finding was similar to that of Wilson RT and Tallonitire A that lack of appropriate production technologies, weak market and absence of value chain development largely resulted in much lower contribution of the honey production sub-sector and much lower than its potential [12,13].

		Lack of processing material	5.0
<b>Total</b>	100.0		100.0

**Table 3:** Reasons for not extracting honey and collecting bees wax.

### Economic dependence and major constraints

The result of this study identified beekeeping practices is very traditional in Haramaya district with very low production, producing only for home consumption. Thus, economically the respondents depend mainly on non-bee keeping economic activities (Table 4). Since the produce is insufficient there is no market chain for honey and honey products in the district. According to Tessega in Bure district of Amhara region the main purposes of keeping bees were for source of income and home consumption [14]. Apart from this statement Paulos stated that pollination of crops and natural vegetation yields more than honey, both per hive and per hectare [5]. Moreover; even if more than half of the respondents are having different sources of income, most of them (44.3%) were relying on 'Khat'. Besides, there is no household that indicated beekeeping as the only income source. Rather, it is used as a supplementary to livestock, vegetable and fruits, and poultry income sources. Major constraints in beekeeping were also identified as, insecticide usage and birds constitute the highest share followed by misuse of pesticides. This is mainly due to expansion in 'khat' production which uses heavy application of pesticides that adversely affect the beekeeping practices (Table 5). Therefore the most important constraints of beekeeping in the study area were insecticides, birds and diseases (1<sup>st</sup>), misuse of pesticides (2<sup>nd</sup>), insecticides, birds and pesticides together (3<sup>rd</sup>), pests, insecticides and predators (4<sup>th</sup>), lack of training (5<sup>th</sup>), shortage of bee forage (6<sup>th</sup>), shortage of water (7<sup>th</sup>) and absconding (8<sup>th</sup>). According to SOS-Sahel-Ethiopia the major constraints in Ethiopia are lack of beekeeping knowledge, shortage of trained manpower, shortage of beekeeping equipment, pests and predators and inadequate research and extension services to support apiculture development programmes [14].

Kebeles/villages	Non-beekeeping Economic activities					Total
	Crop	Crop and livestock	Trade	Crop and trade	All	
Amuma		4			2	6
Baatee	5	2	1	1		9
Fandisha Leencaa	1					1
Daamota	4					4
Iffa Oromia	18	6				24
T/Gabisaa	19					19
B/Gadaa		9				9
I/Balinaa		7				7
Haaqa	1	12				13
A/Baatee	1					1
Kuroo	1					1

Bacaqee	3					3
<b>Total</b>	53	40	1	1	2	97

**Table 4:** Economic dependence of activities in the villages, Haramaya district, 2014.

Major problems	Frequency	Percent
Insecticides	9	9.3
Birds	2	2.1
Misuse of pesticides	17	17.5
Lack of bee forage	6	6.2
"Hamma" (honey badger)	1	1.0
Insecticide, birds and diseases	27	27.8
Insecticides and pesticides	3	3.1
Insecticides and lack of bee forage	5	5.2
Insecticides and dry spell	2	2.1
Birds and pesticides	1	1.0
Pesticides and lack of bee forage	9	9.3
Insecticides, birds and pesticides	12	12.4
Insecticides, birds and "Hamma" (honey badger)	1	1.0
Insecticides, pesticides and dry spell	2	2.1
<b>Total</b>	97	100.0

**Table 5:** Major beekeeping problems in the Haramaya district, 2014.

### Opportunities of beekeeping

Currently the government is highly supporting self-contained watershed developing program in which beekeeping is part and parcel. Low cost modern hives is being produced using locally available materials and efforts are being made to organize farmers in groups and link them with local carpenters who produce modern bee hive. Farmers of the study area are currently obtaining beekeeping training by the community development works of Haramaya University in selected kebeles. There is an increasing demand for honey for domestic consumption and export by different customers and organizations. Though scarce in dry seasons, there are many bee forage species throughout the year in most part of the study area. Availability of rich culture and tradition of beekeeping, suitable environment with different agro ecology, availability of farmers having indigenous knowledge, skills and keen interest to adopt improved technologies and to undertake beekeeping as a way of life are among the few to mention.

## Conclusion and recommendations

Majority of the beekeepers in the study district produce honey for home consumption than for the market. The most widely used type of beekeeping in the study area is traditional due to the high cost of the improved hives and their accessories. From the study it was understood that the colony population is decreasing from time to time due to destruction of forest areas for crop cultivation and different constraints particularly insecticides, predators and bee diseases. With the expansion and reliance of the households in 'khat' production in the study district, insecticide and birds as well as misuse of pesticides are constraining the beekeeping practices. Unless some measures and regulations are put in place on type of pesticides to be used for 'khat' production, the continuity of beekeeping remains in challenge. There is a need of intervention in introducing modern beehives that can make households produce more for market than home consumption. Awareness creation and assistance is needed to empower women in the beekeeping activity. Introducing the modern beehives in the study district is needed to supplement the household's income sources from beekeeping. Finally, there is a need for limiting the use of pesticides in 'khat' production and proper identification of bee diseases and their prevention measures to sustain the beekeeping activity.

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## Competing Interest

We declare that we have no any financial or personal interest that inappropriately influences writing this article.

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