

Challenges and Opportunities of Honeybee Production Systems in Dalle Wabera District of Kellem Wollega Zone, Ethiopia

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Abstract: The study was conducted from November 2019 to May 2019 in selected areas of Dalle Wabera district, Kelem Wollega Zone of Oromia regional state, Western Ethiopia. From the total of 218 sample respondent were interviewed to generate qualitative and quantitative data based on beekeeping activities; 24.8% were female 75.2% were male. This indicates that beekeeping activities are mainly performed by men although it could be done by any sex composition of the respondents. Regarding the religion of the respondents, about 87.3% are protestant and 12.7% are orthodox followers. The survey results indicate that protestant religion is the most dominant religion in the study district. The respondents were purposively selected from four PAs; Waju Gari (33.0%), Fogekombolcha (31.2%), Sago Adami (27.1%) and Kara Jeno (8.7%)] of the district by their order of involvement. The minimum and maximum ages of respondents was 15 and 60 respectively. Regarding the marital status 89.2% of respondents were coupled and the rest 10.8% were single. Based on the survey result, the educational status of the household heads were 22.6%, 43%, 34.4%, for illiterate, basic education (write and reading) and grade 1-12 (including elementary school and high school) respectively. The average family size of the study area was four heads per household and the minimum and maximum households' family size was 2 and six heads per household respectively.

Key words: Challenges • Opportunities • Honeybee • Dalle Wabera • Waju Gari • Sago Adami • Kara Jeno

INTRODUCTION

There are an estimated 30, 000 bee species worldwide. The vast majority of these species is solitary and not produces honey or large nests with young and therefore do not exhibit colonies defense [1-3]. Africa is blessed with numerous types of wild honeybees [4-6]. It is one of the continents in the world, which own huge honey production potential. Owing to its ecological and climatic conditions, Africa is home to some of the most diverse flora and fauna in the world. Its forests and woodlands contain diverse plant species that provide surplus nectar and pollen to foraging bees [7-9].

Ethiopia, with around 23.6% of African and 2.1% of the world production, is leading honey producer in Africa and is one of the ten largest producers in the world [10-12]. It is also one of the four largest beeswax producing countries in the world following China, Mexico and Turkey. Its forests and woodlands contain diverse plant species that provide surplus nectar and pollen to foraging bees.

In Ethiopia, beeswax is one of the 12 major exportable agricultural products and an estimated one million farmers are engaged in beekeeping. The country produces about 28, 500 tons of honey and 5000 tons of beeswax annually [13-16]. Currently, more than 7000 species of flowering plants are estimated to be found in the country of which most of them are honeybee plants [17-19].

Despite the long tradition of beekeeping in Ethiopia having the highest bee density and being the leading honey producer as well as one of the largest beeswax exporting countries in Africa, the beekeepers in particular and the country in general are not benefiting from the subsector [20-22]. Investigation indicated that the number of honeybee colonies in the country has been declining [23-25] and consequently the honey and beeswax production as well as export earnings fell down. This is attributed to drought ever-expanding population pressure and associated vegetation changes and indiscriminate applications of chemicals [26-29]. Although, thousands of tons of honey are produced every year, it is usually poorly managed and unattractive in appearance [30-32].

Beekeeping is a very long-standing practice in the farming communities of the Oromia region and it plays a significant role as source of additional cash income and nutrition for many subsistence farmers. In the region, the apicultural resources are immense, particularly in the western parts of the region.

The natural vegetation coverage is result in this area the honeybee population is dense and production is relatively high [33-36].

Western part of the Oromia region is believed to have diversified type of vegetation and cultivated crops and potential for beekeeping could be one of the major intervention areas to combat food insecurity in drought prone areas [37-40]. However, there is no adequate information on the production status and determinant factors such as major pest and predators, agrochemicals, sex and age characteristics and economic distribution factory of the farmer's adoption for this technology [40-42].

Therefore the socioeconomics, demographics and other technical constraints that affect honey bee production systems has to be identified and this research paper was initiated for this reason.

Objectives

General Objectives:

- The overall objective of this research is to demonstrate challenges and opportunities of honeybee production systems in the study area.

Specific Objectives:

- To identify the types of honeybee production systems
- To exploit the major challenges that affect honeybee production
- To assess the existing and future opportunities on honeybee production systems

MATERIALS AND METHODS

Description of the Study Area: The study was conducted from November 2019 to May 2019 in selected areas of DalleWaberaworeda, KelemWollega Zone of Oromia regional state, Western Ethiopia. The woreda (DalleWabera) is located at 585km from Addis Ababa to the west. The approximate geographical location of the area is between latitude and longitude of 7°51'N 36°35'E?/ 7.85°N 36.583°E Coordinates: 7°51'N 36°35'E?/ 7.85°N

36.583°E and an elevation of 1560 meters above sea level. The district has twenty two kebeles (PAs) and one town administration called DalleWabera woreda which is the center of Kake district administration specifically. The average temperature in the area is 26°C.

The study area was bounded by Aira and Gulisoworeda to the north, Yemalogi Welelworeda to the south, Dalle Sadi and Sadi Chankaworeda to the east, Gawo Kebeworeda to the west. The topography of the study area ranges from gently sloping to hilly lands with ridges and valleys in between Sadi Chanka ecologically. Dalle Wabera district is classified as 96% wet *Weina Dega* (wet midland) and 4% *kola* (lowland). The total surface area of the district is 196.4 km².

The demographic features of the district, the total populations of the woreda were 25, 000; from these populations 10, 600 were men and 14, 400 were women. The total number of households in the district are 12, 087 were the numbers of male and female households are 11, 316 and 771 respectively. The total number of beekeepers in four kebeles is 1, 326 farmers. The total numbers of bee hives in district are 95, 286 from these:-traditional 70, 936, transitional 777 and modern 586 hives.

Study Methodology

Study Design: Questionnaire survey was carried out by interviewing voluntary honeybee keepers. For this study, structured Questionnaire was designed to collect information related to challenges and opportunities of honeybee production systems in the study area.

Sampling Techniques: A multi stage sampling technique was used in this study. In the first and second stage, honey bee potential of the districts has been identified purposively. The four peasant associations of the district were selected for the study following purposive sampling approach by considering potential in honey bee production. Similar to the selection of the kebeles, the sample units are purposively selected considering the engagement of the beekeeper accessibility.

Sample Size Determination: The target study population was voluntary honeybee house holders and micro cooperatives found in the study area. A total of 218 individuals including micro cooperatives were interviewed in which convenience methods employed. The study using the proportion beekeepers in the kebeles, 59 beekeepers from Sago Adami, 19 beekeepers from Kara Jeni, 68 from Foge Kombolcha and 72 beekeepers from Waju Gari were selected.

Data Sources and Methods of Collection: Both primary and secondary sources of data were used in this study. Primary data was collected primarily from individual beekeepers and micro cooperation's through interviews and focuses group discussions.

Secondary data were obtained from reports of district Agricultural Development Office. Focus group discussion is conducted with key informants from beekeepers. Visual observation will also parts of data collection.

Data Managements and Statistical Analysis: The collected data was coded and tabulated for analysis. The statistical analysis used in the study was varied depending on the type of variable and information obtained. However, since the survey study based on 'single-visit-multiple-subject formal survey' methodology, descriptive statistics using appropriate statistical packages for social sciences (SPSS) software version 20.0 is mainly applied such as mean and frequency. Moreover ranking of beekeeping constraints also used to identify prioritize the beekeeping challenges to beekeeping development in the study area.

RESULTS

Socio-Demographic Characteristics of the Respondents:

From the total of 218 sample respondent were interviewed to generate qualitative and quantitative data based on beekeeping activities; 24.8% were female 75.2% were male (Table 1). This indicates that beekeeping activities are mainly performed by men although it could be done by any sex composition of the respondents. Regarding to the religion of the respondents, about 87.3% are protestant and 12.7% are orthodox followers. The survey results indicate that protestant religion is the most dominant religion in the study district. The respondents were purposively selected from four PAs; Waju Gari (33.0%), Fogekombolcha (31.2%), Sago Adami (27.1%) and Kara Jeni (8.7%) of the district by their order of involvement. The minimum and maximum ages of respondents were 15 and 60 respectively. Regarding the marital status 89.2% of respondents were coupled and the rest 10.8% were single. Based on the survey result, the educational status of the household heads were 22.6%, 43%, 34.4%, for illiterate, basic education (write and reading) and grade 1-12 (including elementary school and high school) respectively. The average family size of the study area was four heads per household and the minimum and maximum households' family size was 2 and six heads per household respectively.

Opportunities of Beekeeping in the Study Area:

According to the respondents, the of Opportunities for beekeeping in the study area were include existence and abundance of honeybee, availability of potential flowering plants, ample sources of water for bees, increasing support by the government and different NGOs to the beekeeping sector, socio- economic value of honey and marketing situation of bee products.

The study result particularly indicated that sustainable market for honey and its byproducts as aa major opportunity in the study districts. Most of respondents (96.7%) explained that the price of honey increasing from time to time. This is due to the existence of good accesses to the market information, market infrastructure, road and mobile telephone networks, in the study area.

Some major honeybee floras considered as opportunity and their flowering periods are indicated in Table 2 below.

Challenges to Beekeeping in the Study Areas:

The major challenges that hinder the untapped potential of beekeeping were pests and predators, agro- chemical poisoning by pesticide and herbicide applications, absconding, lack of training regarding to then the sector, lack of beekeeping equipment, lack of additional bee forage and lack of honey storage facilities.

Based on the result of this study, the existence of pests was a major challenge to the honeybees and beekeepers. The farmers indicated that ants, small hive beetles (*Aethinatumida*), bee-eater birds and honey badger were the most harmful pests in decreasing order of importance.

Honeybee colonies abandoned their hives at any season of the year for different reasons. According to the response of the respondents, 69.3% (24.8% from and 13.3% from and 6.4% from) were recorded, while 30.7% (13.8, 2.3, 6.4 and 8.3) were recorded as no incidence of absconding from and respectively. 70% of absconding incidences of honeybee colonies were recorded in traditional hives, while incidence from transitional and modern hives were 18% and 12% respectively. The reported reasons for absconding of bee colonies as indicated by respondents were incidence of ants (21.1%), pests and predators (9.2%), birds and insects (22.9%), birds, beetles and ants from and (6.9%) were recorded while (39.9%) lack additional bee forage, bad weather condition and swarming in general. The mean number of bee colony absconded in the sample respondents was 2.60 per household with a minimum of

Table 1: Socio - demographic characteristics of the respondents

Categories	Waju gari	Fogekombolcha	Sago adami	Kara jeno	Average
Sex					
Male	26.1	24.8	17.0	7.3	75.2
Female	6.9	6.4	10.1	1.4	24.8
Age					
< 30	21	18	20	8	30.7
>30	51	50	39	11	69.3
Education					
Illiterate	22	32	28	10	42.2
Basic education	39	26	27	6	45.0
Grade 1-12	28	10	4	3	12.8

Table 2: List of some major honeybee floras; their scientific name and their flowering period in the study area

Botanical Name	Vernacular/ common name	Flowering period
Tree		
<i>Croton macrostachy</i>	Bessana/Bakanissa	Feb - April
<i>Cordia africana</i>	Wanza / Wadessa	Jan - July
<i>Eucalyptus</i> sp.	Bargamo	March - April
<i>Acacia</i> sp.	Grar / Lafto	March - September
<i>Ficus vasta</i>	Warka / Kiltu	Oct - Dec
Shrubs and herbs		
<i>Vernonia</i> sp.	Grawa / Ebicha	Dec - Feb
<i>Bidens sklp</i>	Meskel / Ababomeskela	Aug - Oct
Horticultural crop		
<i>Musa paradisica</i>	Banana	Sept - Oct
Crop		
<i>Zea mays</i>	Maize	Sept- Oct
<i>Coffea arabica</i>	Coffee	April – May

Table 3: Major pests and predators and their ranks according to their effect

Major pest and predators	Respondent %	Rank
Ants	53.7	1
Honey badger	19.2	2
Bees eater	18.9	3
Small hive beetles	4.6	4

3 colony and maximum of 8 bee colonies. According to the sample respondents 68.5% of the bees poisoning occur due to agro- chemicals mainly insecticides and herbicides starting July to October for the purpose of crop pests', weeds and house pest control. The chemicals used for crop protection are the main pesticides that kill the bees. The use of chemicals and pesticides brings in to focus to the real possibility of damaging the delicate equilibrium in the colony, as well as contamination of hive products.

DISCUSSION

For this study, the involvements of females in beekeeping were relatively high (24.8%), which is disagree with result conducted Burie district of Amhara region by in which, the involvements of female is low; 1.7% and males were 98.3%. This different is due to extension done

on women's to boost the engagement of them in beekeeping cooperation. The minimum and maximum age of respondents was 18 and 65 respectively while the average age was 39. Majority of them about 69.3% are more than 30 years, 30.7% was less than 30 years. This is because; most young people needs to live in urban area and looks beekeeping as the work of old people only. In similar way, majority 89.2% of the respondents were married people who involved in the sector and the rest 10.8% single. This indicates that more of married people are actively engaged in beekeeping for income generations to house expense and as additional feeds.

The current survey result indicated, the educational status of the household heads was 22.6%, 43%, 34.4%, for illiterate, basic education (write and reading) and grade 1-12 (including elementary school and high school) respectively. This indicates, more of the respondents are in the category of basic education (write and reading), who gets knowledge by their own practice and who do not have training or full technological knowledge about the sector according to the results of this survey, the major reasons for involvement of the farmers in beekeeping are: income generating activities (53.2%). This is why beekeeping activities are more practiced by older peoples.

Vegetation characteristics of the study areas were considered to be an important indicator for potentialities of the area for beekeeping. According to the results of this survey, the honeybee plants of the study areas comprise of trees, shrubs, herbs and cultivated crops which are a source of nectar and pollen. Some important honeybee plants of the study areas were recorded in vernacular (common) and scientific names with their flowering periods.

The result showed that 70% of absconding incidences of honeybee colonies were recorded in traditional hives, while incidence from transitional and modern hives 18% and 12% respectively due to insects like ants, beetles and birds. Ants are more prevalent at

year round in the in all the study areas. Similar findings were reported in the central and southeast highlands of Ethiopia respectively. About 68.5% of the bees poisoning occur due to agro chemicals mainly insecticides and herbicides starting from July to October for the purpose of crop pests, weeds and house pest control.

CONCLUSION AND RECOMMENDATIONS

Dalle Wabera woreda has adequate natural resources and a long tradition and culture of beekeeping. However, mainly because of lack of technological changes, institutional supports and access to full materials, the district in general and the rural beekeeping households in particular have not been sufficiently benefited from the subsector. Yet, despite all the constraints and challenges currently facing the beekeeping subsector, there are enormous opportunities and potentials to boost the production and quality of honey products in the study area. This was reflected by the production of quality honey and diverse distribution of honeybee floras (in most parts of the study area), bee product processing and handling and presence of different types of honeybees in the area. Based on the above conclusion, the following recommendations are forwarded;

- Further studies should be under taken for detail and additional information on opportunity and future perspective
- Governmental and nongovernmental concerned sectors should encouraged increased use of transitional and introducing modern beehives with full packages (sufficient training of the use and providing all the required accessories), facilitating participatory research and extension
- Attention should be given to the subsector by the agricultural office; particularly focusing on challenging intervention methods.

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