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Full Length Research Paper

Opportunities and challenges of honey production in Gomma district of Jimma zone, South-west Ethiopia

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The study was conducted in Gomma district South west Ethiopia to assess the various opportunities and its constraints of beekeeping in the area. For this study, 6 Peasant Associations (PAs) were selected using systematic random sampling technique and interviewed using pre-tested structured questionnaires. The opportunities for beekeeping in the study areas were the existence and abundance of honeybee, availability of potential flowering plants, ample sources of water for bees, beekeepers' experience and practices and socio-economic value of honey. In addition to this study, it was observed that the major challenges of beekeeping were lack of knowledge, presence of pests and predators, lack of bee forage, pesticide poisoning, absconding, lack of beekeeping equipment and materials. More study is also required to characterize the honey bees of the area and major pests and diseases of economic importance.

Key words: Challenges and opportunities in beekeeping, honey production, predators and disease, poisonous plants.

INTRODUCTION

Ethiopia is one of the countries of the continent that has the largest honey bee population and owns a big potential of honey production owing to its varied ecological and climatic conditions. Ethiopia is home to some of the most diverse flora and fauna in Africa that provide surplus nectar and pollen to foraging bees. There is an ancient tradition for beekeeping in Ethiopia which stretches back into the millennia of the country's early history (Girma, 1998). Moreover, beekeeping is an appropriate and well-accepted farming technology and is best suited to extensive range of ecosystems of tropical Africa. To date, over 10 million of bee colonies are in the country, which include both feral and hived ones (Ayalew, 2001). However, like any other livestock sector, this sub sector has been ceased by complicated constraints. The prevailing production constraints in the beekeeping sub sector of the country would vary depending on the agro-ecology of the areas where the activities is carried out (Ayalew, 1994; Edessa, 2002).

The beekeeping research so far conducted in the country is although encouraging but did not cover the specific issues of various regions and means of utilizing the opportunities in potentially productive regions. However, the great majority of beekeeping production is based on traditional production systems where the results of on-station research may not often be applicable to the local conditions. Likewise, it was not implemented on the basis of identification of potentials, constraints, attitudes and economic level of the communities and as such, it is very essential to identify the potential development constraints.

An investigation indicated that the number of the honeybee colonies in the country has been declining (CSA, 1995). Thus, it requires making efforts to address some of the major problems of beekeeping to keep it productive in a sustainable way. Still, the country has potentials with enormous nectar and pollen resources

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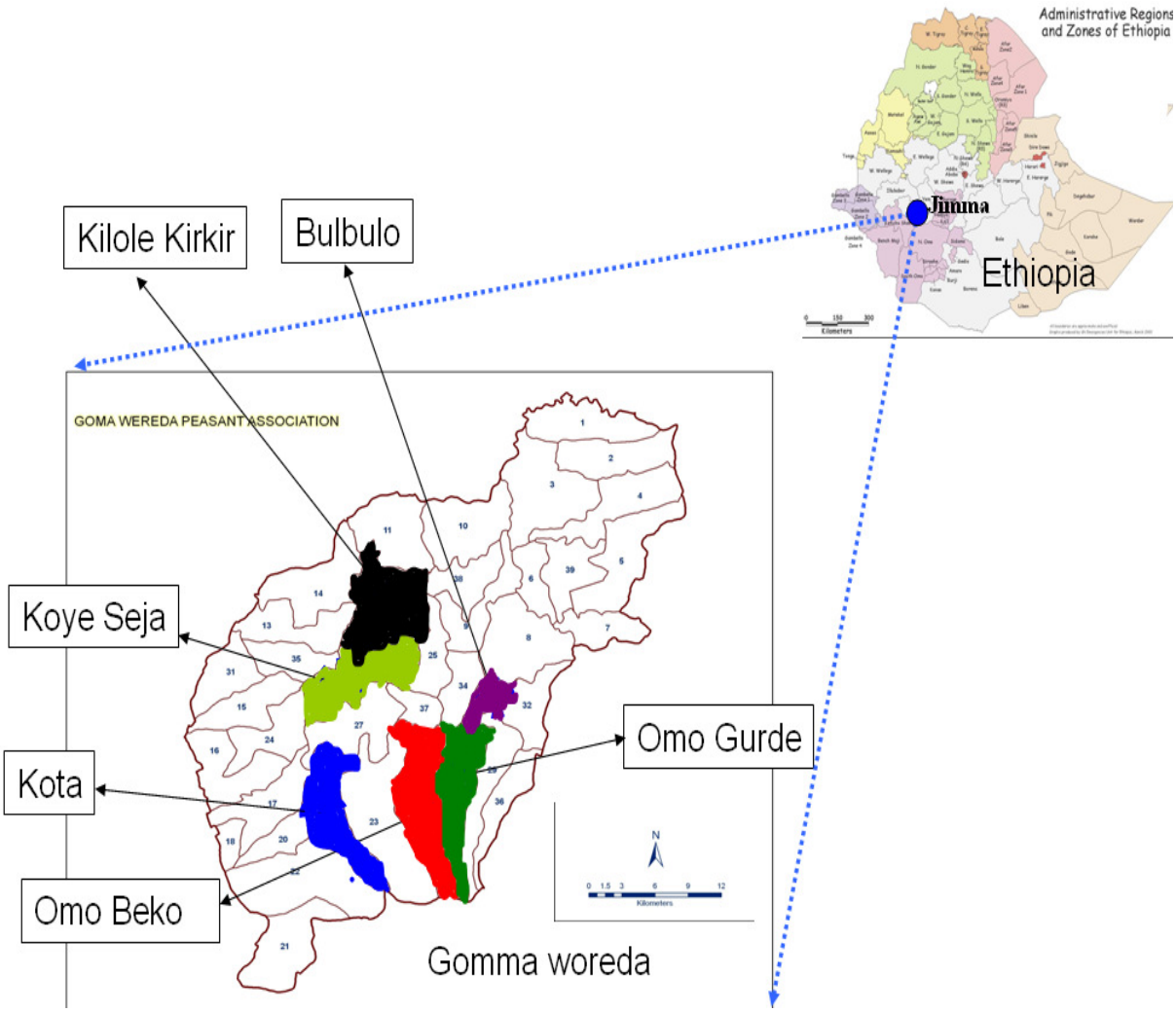

Figure 1. Map of Gomma woreda with sampled Pas. Source: IPMS (2007).

that have not yet been exploited, and beekeeping could probably be a profitable activity to undertake. Gomma district is one of the coffee growing areas in the country having high forest cover that can be used as coffee shade. The presence of forest cover is also expected to provide a good opportunity to have various honey flora, bee genera and probably different quality of honey in the area. However, there was no systematic study being carried out to indicate opportunities and problems associated with bee keeping in this area. This study was therefore designed to assess opportunities, challenges and socio-economic importance of bee-keeping in Gomma district.

MATERIALS AND METHODS

Description of the study area

The study was conducted from September to December, 2009 at Gomma district, located in mid-altitude sub-humid zone of the South western part of Ethiopia. It is one of the administrative regions under Jimma zone of Oromiya regional national State. Gomma district is located at 390 km from Addis Ababa (Improving Productivity and Market Success (IPMS), 2007) and is bordered by six other districts in the zone (Gera in West, Gumay in North West, Limu sinxo in North East, Mana in South East and Seka chokorsa in South). Figure 1 shows the map of Gomma woreda with the location of the study areas indicated by dotted circles. The topography of the study area ranges from gently sloping to hilly lands with ridges and valleys in between. The total surface area of the district is 96.4 km^2 (IPMS, 2007). The rainy season extends from May to September with the highest rainfall usually recorded in August. The mean annual rainfall varies between 1400 and 1650 mm with average maximum and minimum temperatures of 29.9 and 13.4°C respectively, and the altitude ranging from 1400 to 2270 m.a.s.l. The soil type is dark reddish brown and the wide area of the region is covered with vegetation (Elias, 2005).

Method of data collection and analysis

Based on the information obtained from secondary data of district Agricultural office, Gomma district was categorized into high (more than 3000 bee colonies), medium (between 1300 to 3000 bee

Table 1. Peasant association selected for the study.

No.	Production category	Name of PAs	Number of bee colonies	Number of house hold beekeeper
1	High	Kota	4146	458
		Omo Beko	3014	789
2	Medium	Omo Guride	2014	267
		Koye Seja	1338	265
3	Low	Kilole Kirkir	1064	119
		Bulbulo	719	150

No = Number; PAs = peasant associations.

Table 2. Socio-economic characteristics of the respondents in the study areas.

Socio-economic indicators of respondents (Average)	Beekeeper mean	SD
Age of households	40.47	10.40
Experience (years)	5.66	3.54
Family size (person)	5.6	2.77
Land holding (hectare)	1.73	1.34

colonies) and low (between 700 to 1300 bee colonies) in terms of its potential for beekeeping. Accordingly, Kota and Omo beko were selected as high potential while Omo Guride and Koye Seja as medium and Kilole Kirkir and Bulbulo as low honey production category. Therefore, six representative peasant associations (*kebeles*) were selected by systematic random sampling technique based on their honey production potential; two peasant associations from each production category (high, medium and low) having thirty individuals each (total of 180 beekeepers (Table 1) (Patton, 1990).

The selected beekeepers were interviewed by using semi-structured questionnaires which was pre-tested, and translated into local language (*Afan Oromo*). The primary data such as socio-economic parameters, numbers of bee colonies, types of honey bee flora, types of beekeeping, honey production potentials and constraints were collected from respondent farmers through structured questionnaire and the vernacular name of honey bee flora were obtained from secondary data. Data were summarized by descriptive statistics using SPSS version 16 (SPSS, 2007).

RESULTS AND DISCUSSION

Socio-economic characteristics

The mean age of the beekeepers at Gomma woreda was 40.47 years (Table 2). This survey result showed that people in the most productive age are actively engaged in beekeeping activities with an average experience of 5.66 years. This is what one would expect in a situation where people are actively engaged starting from an early age in helping older beekeepers to undertake basic tasks. Based on this exposure, young people gradually move on to becoming independent beekeepers as soon as they can obtain their own hives (Gichora, 2003). They continue accumulating experience by seeking technical advice from fellow beekeepers and development agents (DAs) whenever necessary. Out of the 180 beekeepers interviewed, only 13 cases were women beekeepers while the rests 167 were male beekeepers. Males can climb easily on the trees for hanging the traditional hives while it is considered as a taboo for females. The mean land holding per beekeeper household was estimated to be 1.73 ha. Generally, the average land holding in the district showed insignificant difference but slightly higher than the national average household land holding of 1.0 to 1.5 ha (ASE AIFSP, 2002).

Opportunities for beekeeping

According to the respondents, the major opportunities for bee keeping in Goma woreda include: existence and abundance of honeybee, availability of potential flowering plants, ample sources of water for bees, beekeepers' experience and practices, socio-economic value of honey and marketing situation of bee products (Table 3). The result is in agreement with Crane (1990), Ayalew (1994) and EARO (2000).

Honeybee plants

Vegetation characteristics of the study areas were considered to be an important indicator for potentialities

Table 3. Opportunities identified by respondent beekeepers in the study Woreda's.

Opportunity	Percent of beekeepers who experience Opportunities
Abundance of honey bee	31.3
Availability of potential flowering plants	22.5
Water availability	18.2
Indigenous beekeepers knowledge & experience	11.3
Socio economic value	6.4
Market demand for bee products	5.2
Establishment of Ethiopian beekeeping Association	3.1
Presence of Gov. and NGOs who are involved in beekeeping activity	2
Total	100

Table 4. List of some major honeybee floras in the study areas.

Botanical name	Vernacular or common name	Flowering period
Tree		
Eucalyptus sp.	Bargamo	March - April
Cordia Africana	Wanza / Wadessa	Jan. - July
Acasia sp.	Grar/Lafto	March - September
Sterospermum kunthianum	Botero	Dec. – Feb.
Croton macrosttachys	Besana / Bakanissa	Feb. - April
Ficus vasta	Warka / kiltu	Oct. – Dec.
Schinus molle	Turi man tturi	Sep. - Dec.
Schefflera abyssinica	Geteme	March - May
Ekbergia capensis	Sombo	Sept. – Nov.
Malva verticillata	Dkma	Not known
Shrubs and herbs		
Vernonia sp.	Grawa / Ebicha	Dec. – Feb.
Trifolium sp.	Clover / sidissa	July – Oct.
Bidens sklp	Meskel /Ababo meskela	August – Oct.
Horticultural crop		
Persea Americana	Avocado	Sept. – Dec.
Mangifra indica	Mango	Sept – Dec.
Musa paradisca	Banana	Sept. – Oct.
Field crop		
Coffee Arabica	Coffee	April – May
Zea mays	Maize	Sept. – Oct.

of the area for beekeeping. According to the results of this survey, the honeybee plants of the study area 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 (Table 4).

Beekeeping is more dependable on ecological suitability of an area than any other livestock production (Nuru, 2002). This author also noted that, the honeybee population and their productivities in general are mainly influenced by the nature of honeybee flora of an area. The resources supplied by plants are important sources of nectar, pollen and propolis; some are also important for hive construction while others used in local procedures for scenting new hives to attract swarms.

Table 5. Major constraints identified by respondent beekeepers in the study districts.

Constraint	Number of respondent	Percent (%)
Lack of knowledge	58	32.2
Pest and predator	52	28.9
Lack of beekeeping equipment	19	10.5
Market problem	17	9.4
Lack of bee forage associated with deforestation	16	8.9
Absconding	8	4.4
Application of chemicals	5	2.8
Disease	2	1.1
Poor storage facilities	1	0.6
Poor extension service	1	0.6
Drought	1	0.6
Total	180	100

The honeybee flora compositions of Gomma district are perennial crops (especially Coffee), annual herbs, and some natural trees having significant contribution for beekeeping. This variation in vegetation characteristics of the area could be potentially suitable for effective distribution of honey production at various seasons. The annual honey production in study area comes from "*Bisana*" *(Croton macrostachys)* which usually flowers between February and March. 44.4% of the farmers explained that honey produced in February-March is usually mixed with honey from coffee flower, particularly in areas near to the large state coffee farms and 25% of the respondents said that when hives are placed very near to a coffee farm, honey from that hive could totally be from coffee flower. This has distinct color and thickness when compared to honey from "*Grawa*" (*Vernonia* spp.) and this could be an area to look for specialty of honey.

Challenges to beekeeping in the study areas

According to the results of the present work, the major problems in beekeeping arise from bee characteristics or environmental factors that are beyond the control of the beekeepers, the others problems mentioned by the respondents were poor marketing infrastructure and storage facilities (Table 5). Each beekeeper involved in the study was requested to prioritize the challenges mentioned earlier. Accordingly, lack of knowledge (Technical short comings) and pest and predators were found to be the top two challenges for beekeeping in the area, the detailed result is summarized in Table 5. These problems may lead to poor quality honey production and inefficient utilization of the modern bee hives distribution. Because of lack of knowledge on application of chemicals against ants, some farmers complained their bee hives are being affected. Despite the high rainfall in the area, bees sometimes migrate during the drought period.

Out of the respondents, 32.2% indicated absence of technical support from woreda experts, because of the reason that people who are working in beekeeping are paid low salary and thus change their profession for better salary (IPMS, 2007).

Honey bee pests and predators

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, wax moth *(Galleria mellonella)*, bee-eater birds, spider, bee lice (*Braula coecal.),* honey badger (*Mellivora capensis*), monkey, small hive beetles (*Aethina tumida*) and lizard were the most harmful pests in decreasing order of imporatnce (Table 5). Similar findings were reported by Desalegn (2001) and Solomon (2009) in the central and Southeast highlands of Ethiopia respectively. This survey revealed that 52.1% of respondents had observed honeybee ants in their beehives (Table 6). The bee-keepers also witnessed that their bee colonies suffered from ants which resulted in death of adult honeybees in the hive and absconding of bee colony. Twenty-five percent of the respondents reported that the second most serious bee enemy was the presence of wax moth (Table 6).

The beekeepers recognized that their bees could suffer from disease locally known as '*busa'* which results in mass death of adult honeybees in the hive. However, the beekeepers did not know the real causes. Some beekeepers also responded as if they observed brood disease, which results in bad smell of the hive and formation of worms.

Poisonous nectar and pollen sources

Only experienced beekeepers listed few poisonous plants

Table 6. Major pests and predators of the study Gomma district.

Major pest and predator	Total sample (n=120)	
	Percent	Rank
Ants	52.1	1
Wax moth	25	2
Bee lice	1.2	3
Beetles	1.7	4
Spiders	1.9	5
Wasps	1.7	6
Prey mantis	1.7	7
Lizard	0.8	8
Birds	4.4	9
Hamagot /*shelemetmat*/	8.3	10
Monkey	0.7	11
Snake	0.5	12

in their locality. These can be plants whose nectar or pollen is toxic to the bees themselves, and those in which the honey produced from their nectar are toxic to humans. Nuru (2002) reported some poisonous bee plants from Northern regions of Ethiopia, and pollen grains of nine poisonous species of bee plants from the families Ranuculaceae, Solanaceae, Acanthacae, Euphorbiaceae and Phytolacaceae were analyzed and documented. Keralem (2005) also noted that Gumero, Yeferenj Digit (Cassia siamea), *Bisan (Croton macrostachyus*), *Iret* (*Aloe brahana*), *Foch* (*Zizyphus mucronata*), *Endod (Phytolacca dodecandra*) and *Susbania* species are suspected as bee's poisonous plant.

Absconding and migration

Honeybee colonies abandoned their hives at any season of the year for different reasons. According to the response of the respondents, 70.0, 20 and 10% of absconding incidence of honeybee colonies were from traditional hives namely; frame hives and top bar bee hives respectively. The reported reasons for absconding of bee colonies as indicated by respondents were lack of forage (35.3% of the cases), incidence of pests and predators (25% of the cases), during harvesting (12.5%), sanitation problem (12.9%), bad weather condition (8.8%) and bee diseases (5.5%).

Migration of bee colonies first occurred from March to May, (63.3%) and was followed by June to August (26.7%), September to November (5.6%) and December to February (4.4%). The reason why there is high migration in the months from March to May could be associated with lack or scarcity of bee forage in the area (personal observation).

In conclusion, this study revealed that Gomma district has adequate natural resources and a long tradition and culture of beekeeping as observed during the interview and secondary data collection. The major constraints to exploit the untapped potential of beekeeping activity in the district are lack of beekeeping equipment, lack of knowledge regarding colony management, shortage of bee forage, and incidence of pest and diseases. Most of the beekeepers follow traditional colony management, harvesting and processing methods to produce honey and most of them are not in use. Despite all the constraints and challenges currently facing the bee-keeping subsector, there are still enormous opportunities and potentials to boost the production and quality of honey production in the district. Based on this study, the following possible recommendations can be forwarded:

1. Strengthening the extension activity of the area in bee keeping to exploit the potential of the area.
2. Conduct study on the existing apiculture input supply system to develop innovative methods of input supply system in study woreda.
3. Honeybee diseases and pests which were explained locally by farmers should be confirmed by scientific research.
4. Further studies shall be under taken for confirming poisonous plant to honey bees.

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