

Full Length Research Paper

Opportunities and constraints of beekeeping in Wolaita and Dawro zones, Southern Ethiopia

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This study was conducted in districts of Wolaita and Dawro zones, Southern Ethiopia with objectives of assessing constraints and opportunities for beekeeping production. Multistage purposive sampling procedure was employed for 180 respondents. Data were analyzed using SPSS version 20. The results showed that majority of the respondents kept honey bees for consumption and income generation, while very few reported they kept honey bee for consumption, income generation, teaching and income generation. Major of the constraints for beekeeping included but not limited to honeybee pests and diseases, lack of modern equipments, absconding, swarming, bee predators, lack of skilled man power, lack of appropriate apiary site, finance limitation, lack of market, agro-chemicals, shortage of water availability and shortage of bee forages. On the other hand, major opportunities for beekeeping were reported to be suitable climate, availability of bee forages, sufficient rainfall, water availability as well as bee colony and race availability. Regardless of the presence of a number of constraints facing beekeeping such as pests and diseases and limitation to modern equipments' input, there are also opportunities which, proves their importance. It was therefore, recommended that modern beekeeping production system should be introduced to farmers in order to help them improve the quantity and quality of honey production.

Key words: Assessment, beekeeping constraints, honey, honeybee, opportunities.

INTRODUCTION

Bee keeping is one of the agricultural sub-sectors that most suits the rural poor people. It is simple and relatively cheap to start, as it requires a very low level of inputs such as labor, capital and knowledge (Gemechis et al., 2012). Beekeeping does not depend directly on soil and it can be a single means of living for families with very little or no soil. The bee keeping sub-sector has a lot uses for improvement of the livelihood of communities as it creates job for many people who engage in the

production, trading and processing of bee products at different levels of market linkage and industry cottages (ARSD, 2000; Gezahegn, 2001; Gemechis et al., 2012). Moreover, beekeeping has contributions in sustainability and balancing the natural resources by assisting plants pollination and in turn, the activity in bee keeping is environmentally friendly and has no impact on the environment, rather it stabilizes fragile areas and helps in retrieving degraded lands and increases biodiversity

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balance (Gemechis et al., 2012).

In bee keeping, Ethiopia has a huge potential. There are various conducive ecological zones which, owns over 7000 species of flowering plants, such zones have supported the existence of large number of bee colonies in the country (Beyene and David, 2007; MoARD, 2007; CSA, 2009). It has also the largest bee population in Africa with over 10 million bee colonies, out of which about 5 to 7.5 million are estimated to be hived while the remaining exist in the wild (MoARD, 2007; CSA, 2009).

Due to constraints of skilled manpower and training institutions, low level of technology used, poor quality of honey harvesting, absconding, drought, poor society awareness about beekeeping practice, shortage of bee flora, pesticides, poisoning, honeybee diseases, shortage of bee colonies, shortage of modern bee hives, and marketing problems among others factors (Abadi et al., 2016; Nebiyu and Messele, 2013; Chala et al., 2012; Arse et al., 2010; Kerealem et al., 2009; Gidey and Mekonen, 2010; Workneh et al., 2008), the honey productivity has been very low from the expected potential. This has led to low utilization of hive products domestically and relatively low export earnings. Thus, the beekeepers have benefited less and the contribution of beekeeping sub-sector to the state gross domestic products has been limited (Tessega, 2009). To mitigate such hindering factors and to improve honey production and to increase household livelihoods with modern beekeeping, and honey production, technical training and equipment to local bee keepers have to be provided to support their transition from traditional beekeeping to more modern techniques of beekeeping (Eugenia, 2016).

An attempt research is necessary to improve both the production and quality of honey, since it enables to identify some of the major constrains that are obstacles to the possible maximization of benefits by producers and the whole national economy. Moreover, research can help in transforming and addressing technologies on the beekeeping system, processing and marketing bee products. It is also the fact that research can play an important role in designing and establishing the appropriate bee keeping development strategies and policies in the country particularly in the study region. Accordingly, policy makers would detect the possible intervention area of bee keepers to improve the overall performance of honey yield in terms of quality and quantity.

MATERIALS AND METHODS

Description of the study areas

The study was conducted in Wolaita and Dawro zones of Southern Nations, Nationalities and Peoples Region (SNNPR). Wolaita is located at 390 km to southwest from the capital city of the country, Addis Ababa along the main road that passes through Shashamane to Arbaminch. It is bordered on the south by Gamo Gofa, on the west by the Omo River which separates it from Dawro, on the northwest by Kembata Tembaro, on the north by Hadiya, on the

northeast by the Oromia Region, on the east by the Bilate River which separates it from Sidama, and on the south east by the Lake Abaya which separates it from Oromia Region. Wolaita zone has three agro-ecologies namely Dega (3%), Weina-dega (57.96%) and Kolla (40%); an altitude ranging from 1200 to 2950 m above sea level; average annual temperature of 15.1°C and mean annual rainfall ranging from 1200 to 1300 mm. With regard to land utilization, 261,000 hectares (ha) was used for cultivation, 5318 ha for grazing, 8261 ha is Bush-land and the remaining 35382.5 ha is a cultivable land. The total population of the zone is estimated to be about 1721339 with a density of 385 inhabitants per square kilometer (CSA, 2007).

Dawro Zone has a total land area of 4,814.52 sq km and is located at about 500 km in south western of Addis Ababa, the capital of Ethiopia and 275 km of Hawassa, the capital of SNNPR. It is bordered to the south by Gamo Gofa, to the west by the Konta special woreda, the Gojeb River which, defines its boundary with the Oromia Region is found to the north. Dawro Zone has a total population of 489,577, out of which 249,263 are men and 240,314 women. Dawro has a population density of 101.69, whereby, 35,044 (7.16%) are urban inhabitants, and 14 individuals are pastoralists. A total of 89,915 households were counted in this zone, which resulted in an average of 5.44 persons per household, and 86,642 housing units (CSA, 2007).

Sampling size and sampling techniques

Multistage purposive sampling methods were employed in undertaking this study. Wolaita zone has twelve woredas and Dawro zone has five woredas. In consideration of the number of woredas in each zones and potentiality of honey bee production, Offa and Boloso -Sore woredas and Tocha woreda were selected purposively from Wolaita and Dawro zones, respectively. In the same manner, two kebeles from each selected woredas were selected purposively; thereby, a total of six kebeles were obtained. From each selected kebeles, 30 households were selected purposively, giving the total sample size of the study as 180 households.

Data collection

Both primary and secondary sources were used for data collection. Structured and semi-structured questionnaires were employed. The questionnaires were pre-tested before the actual data collection implementing so as to evaluate the clarity of the questions, and interpretation of the questions by the farmers and time required for an interview. Results from the pre-test were used to re-frame the final questions. The interviews were conducted by trained research assistants under close supervision by researchers. Moreover, direct observation, focus group discussions and key informant interviews were also conducted with beekeepers, extension workers and bee experts. Enumerators who have know-how on beekeeping were recruited and trained to collect data using the interview schedule, under the close supervision of the researchers. The researchers monitored the enumerators during data collection. In the survey study, parameters like bee keeping production, constraints and opportunities were studied. Secondary data were collected from different sources such as books, research publications, journals and office reports/unpublished data.

Data analysis

Depending on the type of information collected, different analysis methods were applied using SPSS statistical package (version 20). Qualitative data were presented using descriptive statistics such as percentages and frequencies, while quantities data were analyzed

Table 1. Household size, land size and beekeeping purposes.

Parameters	Category	Boloso-Sore (N=60%)	Offa (N=60%)	Techa (N=60%)	Total (N=180%)
Household size	Male	3.383±.274 ^a	3.7±.274 ^a	3.267±.274 ^a	3.450±.158
	Female	3.1±.202 ^a	3.932±.203 ^b	3.211±.207 ^a	3.414±.182
	Total	6.483±.406 ^{ab}	7.567±.406 ^b	6.317±.406 ^a	6.789±.235
Land size		0.708±.145 ^a	0.721±.145 ^a	2.035±.145 ^b	1.154±.084
	For consumption	6.7	8.3	11.7	8.9
Purpose	For income generation	1.7	1.7	10	4.4
	For consumption and income generation	91.7	90.0	76.7	86.1
	For teaching and income generation			1.7	0.6

and presented using general liner model. The differences between means were separated via Ducan test.

RESULTS AND DISCUSSION

Household size, land size and beekeeping purposes

Table 1 presents family and land size and beekeeping findings. In average, the households had 6.789 (\pm .235) and 1.154 (\pm .084) households size and land size, respectively and these were significantly different among districts in the study area. Of the study districts, Offa and Techa woredas revealed significant average households size and land size, respectively. However, in Burie, Amhara Region Ethiopia, Tessega (2009) reported the average land size of 1.77 hectares and national average households land holding of 1.0 - 1.5 hectares.

Result further showed that most of households kept honey bee for the purposes of both consumption and income generation (86.1%), while the rest kept if for consumption (8.9%), income generation (4.4%) as well as teaching and income generation (0.6%). These result were supported by Nebiyu and Messele (2013) who reported on the uses in Gamo Gofa zone of Southern Ethiopia as income generation (16%), home consumption (9%) and both for income and households consumption (75%). Findings from Tessega (2009) indicated the main reasons for involvement of the farmers in beekeeping in Burie district, Amhara region, in Ethiopia as income-generating activity (79.2%), easy to perform with other agricultural activities (10.0%), source of income used for different house expenses (5%), inheritance from parents (4.2%) and due to training (1.6%).

Opportunity of beekeeping in the study area

Beekeeping is highly significant in sustainability of natural resources and agriculture, since this sub-sector can assist in conserving native habitats and by increasing the yield of crops and forage production through efficient

pollination. Honeybees also have great contribution in maintaining the equilibrium of the nature by interacting with different biotic ecosystem (Kerealem et al., 2009; Mekonen et al., 2011). Major opportunities of beekeeping (Table 2), included suitable climate, bee forage plants availability, sufficient rainfall, available of water, bee colony as well as race availability. Supporting beekeeping sector by non-government and government institutions through marketing access, modern equipment access, skilled manpower, extension service and credit access were also said as major opportunities by some respondents in the current study area. In Gamo Gofa Woreda Southern region, Ethiopia beekeeping production has good opportunities since the government has advocated self-contained program to beekeepers; there is expansion of micro finance institution for credit facility and beekeeping training center; availability of local bee hives and suitable environment for beekeeping. There is also a high market demand for crude honey for domestic consumption and export (Nebiyu and Messele, 2013).

Moreover, study in Kewet district of Amhara Region, Ethiopia by Beyene (2015) has found presence of natural resources like a place to keep bee colony, biodiversity and environmental conditions and human capital, beekeepers indigenous knowledge, cultural practices and local innovations, and marketing expertise, water availability, establishments of beekeeping association and government attention to improve beekeeping sub-sector as major opportunities. In Negelle and Shashemene districts, Oromia Region in Ethiopia, the major opportunities for honey bee production included: access to new technologies, vegetation coverage potential, high demand for bees' products in markets, good government and non-government sector policy (Mekonen et al., 2011).

Constraints of beekeeping in the study area

Critical constraints affecting honey production in the study area were reported to be honeybee pests and

Table 2. Opportunities of beekeeping (multiple responses)

Opportunities	Boloso-Sore (N=60%)	Offa (N=60%)	Techa (N=60%)	Total (N=180%)
NGO support	16.7	5	10	10.5
Availability of water	66.7	73.3	70	69.6
Skilled manpower	26.7	3.3	25	18.2
Extension service access	41.7	13.3	36.7	30.4
Marketing access	50	58.3	38.3	48.6
Credit access	36.7	8.3	28.3	24.3
Modern equipments access	40	11.7	5	18.8
Suitable climate	100	88.3	90	92.3
Bee colony and race availability	61.7	60	66.7	62.4
Good government policy	31.7	51.7	38.3	40.3
Bee forage plants availability	71.7	75	81.7	75.7
Sufficient rainfall	93.3	60	65	72.4

Table 3. Constraints of honey bee production in the study area (multiple response)

Constraints	Boloso-Sore (N=60%)	Offa (N=60%)	Techa (N=60%)	Total (N=180%)
Honeybee pests and diseases	88.3	85	88.3	86.7
Honey bee forage	28.3	25	18.3	24.3
Water availability	33.3	26.7	30	30.4
Absconding	86.7	81.7	65	77.3
Swarming	76.7	71.7	81.7	76.2
Finance limitation	68.3	41.7	58.3	55.8
Marketing limitation	50	41.7	61.7	51.4
Manpower skill	61.7	46.7	83.3	63.5
Bee predators	76.7	63.3	68.3	69.1
Bee colony	38.3	40	33.3	37.6
Lack of labour	16.7	28.3	6.7	17.1
Modern equipments in put	60	88.3	95	81.2
Bee colony agro-chemicals	50	46.7	43.3	46.4
Beehives (modern)	46.7	55	48.3	49.7
Apiary site limitation	41.7	60	70.0	56.9

diseases (86.7%), modern equipment input limitation (81.2%), absconding (77.3%), swarming (76.2%), bee predators (69.1%), lack of manpower skill (63.5%), apiary site limitation (56.9%) and finance limitation (55.8%). Others were marketing limitation (51.4%), lack of modern beehives (49.7%), bee colony agro-chemicals (46.4%), bee colony (37.6%), water availability (30.4%), honey bee forage limitation (24.3%) and lack of labour (17.1%) (Table 3).

Due to different predators like ants, wax moth, bee lice, beetles, spiders, wasps, lizards, snakes, birds and monks of bee colony, the yield of honey is highly affected because such predators reduce survival powers of bee colonies and sometimes kill them. Moreover, swarming and absconding of bee colonies were commonly observed in the study area. This could be either due to delay in harvesting the honey yields; or when they face

deficit of water and bee forage especially during dry season; when frequently disturbed while harvesting honey, predators interference or sometimes due to improper inspecting manner by human.

Limitations of modern equipments like wax, wax printer, kenya/Germany hives model form; trained man power and other inputs to transform and scale-up the honey beekeeping into modern production system were the major challenges. Lack of good marketing place, selling of honey at low price in local market by farmers and many of them used traditional honeybee production. To some extent, limitation of bee colony, apiary site, bee forage and water, bee colony agro-chemicals were also major challenges reported in the study area.

Supporting the above findings, Arse et al. (2010), in West Arsi zone of Oromia, Ethiopia reported on the shortage of honeybee forages, shortage of honeybee

colonies, poisoning of agro-chemicals, shortage of modern hives, prevalence of honeybee enemies and market problems. They also reported on the shortage of improved bee equipments, absconding and swarming problems, prevalence of honeybee diseases, lack of knowledge of the right harvest time and theft problems are the major beekeeping. Chala et al. (2012) in Gomma District, South Western Ethiopia also reported that lack of beekeeping knowledge, shortage of trained manpower, shortage of beekeeping equipment, pests and predators, fires, pesticide threat and inadequate research works to support development programs were major constraints that affected apiculture production in area. The prevailing production constraints in the beekeeping development in the country were found to be complex and to a large extent varied between agro-ecological zones and production systems. Variations of production constraints also extended to socio-economic conditions, cultural practices, climate (seasons of the year) and behaviors of the bees (Adjare, 1990; Kerealem et al., 2009).

HBRC (1997) and Edessa (2002) reported the major constraints in the beekeeping sub-sector as unpleasant behaviours of bees (aggressiveness, swarming tendency and absconding behaviors); lack of skilled manpower and training institutions; low level of technology used; high price of improved beekeeping technologies, drought and deforestation of natural vegetation; poor post-harvest management of beehive products and marketing constraints and indiscriminate application of agro-chemicals. Other constraints according to them were honeybee disease, pest and predators; poor extension services; absence of coordination between research, extension and farmers; absence of policy in apiculture; shortage of records and up to date information, and inadequate research institutions to address the problems.

Conclusion

Beekeeping is highly significant in sustainability of natural resources and agriculture. It has also great contribution in maintaining the equilibrium of the nature by interacting with different biotic ecosystem. Households kept bee honey mainly for consumption and income generation. The major constraints of beekeeping were honeybee pests and diseases, modern equipments input limitation, absconding and swarming. Regardless of availability of constraints, beekeeping was found to have a number of opportunities which demands for the sub-sector to be encouraged in the study area.

RECOMMENDATIONS

Based on the above findings, it was recommended that:

1. The regional government, bureau of animal and fishery production, and NGOs should formulate policy with

regard to honeybee pests, diseases and predators control, introducing/dissemination of modern equipments, absconding and swarming control.

2. Moreover, inspiring training on modern beekeeping practice should be given frequently for farmers and health care professionals.

CONFLICT OF INTERESTS

The authors did not declare any conflict of interests.

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REFERENCES

- Abadi B, Abebe A, Delenasaw Y (2016). Community Perception on Beekeeping Practices, Management, and Constraints in Ternaber and Basona Werena Districts, Central Ethiopia. Hindawi Publishing Corporation. Adv. Agric. Article ID 4106043 9 p.
- Adjare SO (1990). Beekeeping in Africa. Food and Agriculture Organization of the United Nations. Rome, Italy. <http://www.fao.org/docrep/t0104e/t0104e00.htm>.
- ARSD (Apiculture Research Strategy Document) (2000). Apiculture research strategy document. EARO (Ethiopian Agricultural Research Organization), Addis Ababa, Ethiopia.
- Arse G, Tesfaye K, Sebsibe Z, Tekalign G, Gurmessa U, Tesfaye L, Feyisa H (2010). Participatory rural appraisal investigation on beekeeping in Arsi Negelle and Shashemene districts of West Arsi zone of Oromia, Ethiopia. Livest. Res. Rural Dev. 22:120.
- Beyene G (2015). Honeybee production systems in Kewet District of Amhara, Ethiopia. Livest. Res. Rural Dev. 27:95.
- Beyene T, David P (2007). Ensuring Small Scale Producers in Ethiopia to Achieve Sustainable and Fair Access to Honey Markets. Paper Prepared for International Development Enterprises (IDE) and Ethiopian Society for Appropriate Technology (ESAT), Addis Ababa, Ethiopia.
- Chala K, Taye T, Kebede D (2012). Assessment of Honey Production and Marketing System in Gomma district, South Western Ethiopia. Greener J. Bus. Manage. Stud. 3(3):099-107.
- CSA (2009). Statistical Abstracts. Central Statistical Agency. Addis Ababa, Ethiopia.
- CSA (2007). Unpublished statistical Abstracts. Investment Opportunities in Southern Nations, Nationalities and People's Regional State Addis Ababa, Ethiopia.
- Edessa N (2002). Survey of Honey Production System, in West Shewa zone. In: Proceedings of the 4th Ethiopian Beekeepers Association, held in Addis Ababa, Ethiopia, October 25-26, 2002.
- Eugenia M (2016). Final Report for WEEMA International. SIPA's Economic and Political Development Workshop in Development Practice Improving Household Livelihoods with Modern Beekeeping and Honey Production in Ethiopia. School of International and Public Affairs, Columbia University.
- Gemechis L, Kibebew W, Amssalu B, Desalegn B, Admassu A (2012). Apiculture Research Achievements in Ethiopia, Oromia Agricultural Research Institute, Holeta Bee Research Center, 2012, Holeta, Ethiopia.

- Gezahegn T (2001). Beekeeping (In Amaharic), Mega Printer Enterprise, Addis Ababa, Ethiopia.
- Gidey Y, Mekonen T (2010). Participatory Technology and Constraints Assessment to Improve the Livelihood of Beekeepers in Tigray Region, Northern Ethiopia. *CNCS Mekelle University* 2(1):76-92
- HBRC (1997). (Holeta Bee Research Center).Beekeeping Training Manual (unpublished), HBRC, Holeta, Ethiopia.
- Kerealem E, Gebey T, Preston TR (2009). Constraints and prospects for apiculture research and development in Amhara region, Ethiopia. *Livest. Res. Rural Dev.* 21:172.
- Mekonen T, Gidey Y, Tewelde H, Solomon A (2011). Prospects of Beekeeping in the Northern Ethiopian Highlands. *Sci. Res. Essays* 6(29):6039-6043.
- MoARD (2007). Livestock Development Master Plan Study. Phase I Report - Data Collection and Analysis, Volume N - Apiculture. Addis Ababa, Ethiopia, Ministry of Agriculture and Rural Development.
- Nebiyu Y, Messele T (2013). Honeybee Production in the three Agro-ecological districts of Gamo Gofa zone of Southern Ethiopia with Emphasis on Constraints and Opportunities . *Agric. Biol. J. N. Am.* pp. 2151-7525.
- Tessega B (2009). Honeybee Production and Marketing Systems, Constraints and Opportunities in Burie district of Amhara Region, Ethiopia. MSc Thesis. Department of Animal Science and Technology Bahir Dar University, Ethiopia.
- Workneh A, Puskur R, Karippai RS (2008). Adopting Improved Box Hive in Atsbi Wemberta District of Eastern Zone, Tigray Region: Determinants and Financial Fenefits. IPMS (Improving Productivity and Market Success) of Ethiopian Farmers Project Working Paper 10. ILRI (International Livestock Research Institute), Nairobi, Kenya 30 p.