

*Full Length Research Paper*

# Prospects of beekeeping in the Northern Ethiopian highlands

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Ethiopia is one of the principal honey and beeswax producers in the world. An assessment was conducted to investigate the scope of beekeeping in Endrta district Northern Ethiopia in 2010. Ninety two beekeepers were randomly selected for semi structured interviews. Data on annual income, number and type of beehive owned, honey yield/hive, year of adoption of modern beehives and beekeeping experience were collected. On average 33 and 16 kg of honey per hive was harvested from modern and traditional hives, representing a potential annual income of \$USD 33,444 and 7,939, respectively. Majority (54, 58.7%) of the respondents had modern beehive to enhance honey production and increase their income. Fifty four beekeepers were applying the new technology to enhance honey production and increase their income, of which only 20 have been using the technology for more than 5 years. During the study period the district had a total of 991 modern and 2,603 traditional beehives, worth a maximum of about \$USD 454,128. The findings indicated that beekeeping could be a great source of employment creation for the rural people to reduce poverty. Beekeeping plays an important role in income generation for beekeepers of the district. The regional government should organize landless youth in the district and should provide initial capital to run beekeeping activities.

**Key words:** Beekeeping, traditional beehives, modern beehives, Endrta.

## INTRODUCTION

Ethiopia is one of the principal honey and beeswax producers in the world (Kerealem et al., 2009). The time is immemorial as to when and where marketing of honey and beeswax started in the country (Beyene and David, 2007). Beekeeping is one of the most important income-generating activities in the rural communities of Ethiopia (Kerealem et al., 2009). The national average honey produced for the year 1997 to 2004 was estimated at 30 thousand metric tones, which accounted over 23% of the total African production and about 2% of world honey production (MoARD, 2005). Production of beeswax was three thousand tons per annum placing the country among the four largest world beeswax producers (MoARD, 2005). Many people are engaged in the production and trading of honey at different levels and

selling of honey wines (local beverage Tej) which create employment opportunities for large number of citizens (Beyene and David, 2007).

Export of honey and bee wax contributes an average of 1.6 million USD to the annual national export earnings (Ethiopian Customs Authority and Export Promotion Agency, 2006). The system of production commonly exercised in Ethiopia is traditional. Honey production is very low, only about an average of 8 to 15kg of honey could be harvested per hive per year but in areas where improved technology has been introduced, an average of 15 to 20 kg/hive/year has been harvested (Beyene and David, 2007).

Tigray, regional state in Northern Ethiopia, is one of the most drought prone areas of Ethiopia facing recurrent drought and food deficit. Substantial food aid remains a major part of the economic scene (Chekol, 2006). It is dominated by small peasant holder producers and high farmland fragmentation resulting in declining

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**Table 1.** Number, type of beehives and annual income in \$USD in a total of 92 households in Didba sub district (Endrta district), northern Ethiopia.

Beehives	Count (%)	Annual income in \$USD
Modern	155 (64)	33,248
Traditional	86 (36)	7,980
Total	241 (100)	41383

agricultural productivity due to climatic changes and environmental degradations (Chekol, 2006). Livelihoods are difficult to maintain in many drought prone areas and industrial development remains in its infancy (Chekol, 2006). Realizing the magnitude and severity of the food insecurity challenge, the Tigray government has taken beekeeping sub sector as one of the strategies to improve food security of rural households. The focus of the study was to investigate the potential of beekeeping for rural development in the Endrta district, northern Ethiopia.

## STUDY AREA

The study was conducted in Endrta district that lies between 12° 13' and 14° 54' North and 56° 27' and 40° 18' East with an area of approximately 10,000 km<sup>2</sup> at an altitude of 2,300 m.a.s.l. 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 mm. The mean maximum temperature ranges between 12° C (November and December) and 27° C (January and March). The rural population is extremely poor and chronically dependent on food aid. The total rural human and livestock population is about 115,000 and 56,000, respectively (Bureau of agricultural and natural resources development (BOANR), 2009). The area is a barren landscape with some Eucalyptus (*Eucalyptus camaldulensis*) and cactus (*Opuntia ficus indica*) vegetation. Forests have been completely converted into farms and grazing lands throughout the region over centuries, except for patchy remnants of old-aged Afromontane forests around old most Ethiopian Orthodox Tewahido Churches (Aerts et al., 2007; Alemayehu, 2007). The study focused on Didba sub-district with a population of 7,115.

## METHODS

Primary and related secondary data were collected from the district. Ninety two beekeepers were randomly selected from the total 106 beekeepers available in sub district, Didba. Data were collected through the use of semi structure interviews on annual income, number and type of beehive owned, honey yield/hive, year of adoption of modern beehives and beekeeping experience.

## RESULTS

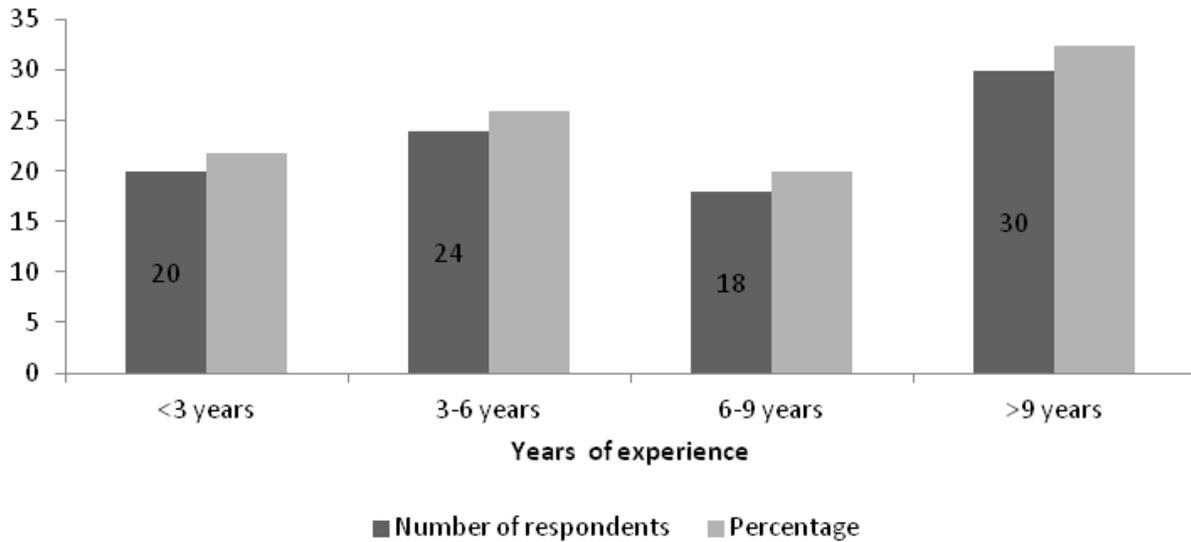
On average 33 and 16 kg of honey per hive was harvested, respectively, from modern and traditional hives in the area representing a potential annual income of \$USD 33,248 and 7,980, respectively (Table 1). The price of one kg pure honey was about 6.5 and 5.8 \$USD from modern and traditional beehive, respectively. It is estimated that about \$USD 454,128 is expected annually from the sale of honey in the Endrta district considering the potential maximum production. Majority (54) of the respondents had modern beehive to enhance honey production and increase their income (Figure 2). Twenty of the respondents who have the modern beehives have been using the technology for more than 5 years (Figure 2). Majority (52%) of the beekeepers had more than 6 years of beekeeping experience (Figure 1). During the study period the district had a total of 991 modern and 2,603 traditional beehives (Table 2).

## DISCUSSION

The economy of Tigray is almost entirely agricultural characterized by subsistence farming mixed with livestock rearing. The average size of land available to a four-person household is about 0.5 hectares, too small to support the family on agricultural production alone (Chekol, 2006).. Beekeepers in Tigray keep their bees in backyard either under separate shelter or around the house wall or even inside the house (Nuru, 2002). They hang their beehives inside their living rooms and provide entrances on the sides of the walls. Some beekeepers keep honeybee colonies inside living rooms and honeybees are sharing the same doors with members of the family (Nuru, 2002).

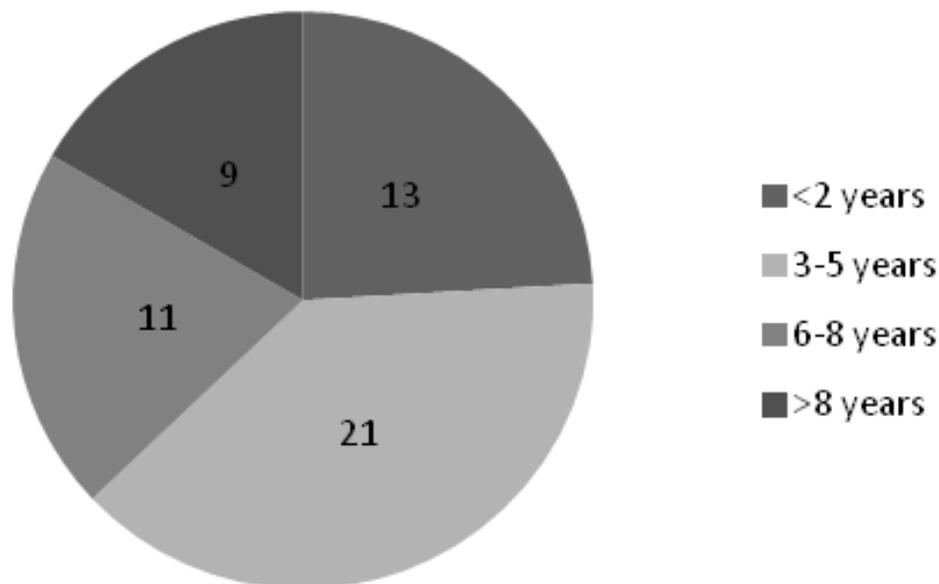
Beekeeping does not require fertile land; uncultivated area is suitable for beekeeping. It is a common practice in every part of Ethiopia (Yirga and Teferi, 2010). Hence, for landless farmers having apiary site is sufficient for engaging in the activity (Workneh, 2007).

Improved box hives have been introduced and promoted in Ethiopia for the last 40 years yet adoption rate is low (Kerealem, 2005). Modern beehives allow honeybee colony management and use of a higher-level technology, with larger colonies, and can give higher yield and quality honey (Crane, 1990). The probability of



**Figure 1.** Years of experience of beekeepers in Didba sub district (n=92) in Endrta district, northern Ethiopia.

### Adoption of modern beehives in time span



**Figure 2.** Adoption of modern beehives in time span in Didba sub district (n=54) in Endrta district, northern Ethiopia.

adoption of a new technology will depend on the difference in profitability between the new and old technologies (Schultz, 1995).

During the study period, the Endrta district had a total of 991 modern and 2603 traditional beehives, respectively worth a maximum of about \$USD 454,128.

Three types of beehives are used for honey production in Ethiopia; traditional, intermediate, and modern hives (Beyene and David, 2007). About 4,601,806 hives exist in the country of which about 95.5% are traditional, 4.3% transitional and 0.20% modern hives (Beyene and David, 2007). More than 95% of the honey and beeswax

**Table 2.** Number of beekeepers and beehives in Endrta district, northern Ethiopia in 2010.

Sub districts	Modern beehives users	Number of modern beehives	Traditional beehives users	Number of traditional beehives	Total hives
Dergi -Ajen	12	18	192	340	358
Meseret	12	12	117	265	277
Lemlem	162	197	289	459	656
May-Genet	88	100	210	355	455
Didba	61	145	45	116	261
May -Tsedo	8	13	7	13	26
Shibta	51	98	176	228	326
Felege-Selem	27	45	115	164	209
Arato	24	50	74	96	146
May-Alem	16	16	57	111	127
May-Anbesa	7	16	101	205	221
Debri	15	18	59	72	90
Mehabere-Genet	1	1	17	29	30
Mesebo	22	36	23	51	87
Felege-Mayat	50	61	38	68	129
Maryam-Liham	45	75	21	15	90
Chelekot	61	90	20	16	106
Total	662	991	1561	2603	3594

Office of agriculture and rural development of Endrta district.

produced in Ethiopia is obtained from traditional beekeeping (Beyene and David, 2007).

On a world level, Ethiopia is fourth in beeswax and tenth in honey production (Ayalew and Gezehegn, 1991). There are an estimated 10 million bee colonies representing the highest bee density in Africa but farmers keep about seven million in traditional and modern hives that the remaining exists in forests and cervices (EMA, 1981). Beekeeping is a long lasting practice in Ethiopia which produces about 28,500 tons of honey and 5000 tons of beeswax annually (HBRC, 2004).

Apiculture is a powerful way of tackling poverty at the grassroots level. Beekeeping could be a useful avenue for improving rural economy (Baptist and Punchihewa, 1983). Beekeeping should be considered as a great source of employment creation for the rural people to reduce poverty. The honey sub sector should be among the top priority for food security and poverty reduction programs in the region. The regional government should organize landless youth in the district and should provide initial capital to run beekeeping activities.

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## REFERENCES

- Aerts R, Negussie A, Maes W, November E, Hermy M, Muys B (2007). Restoration of dry Afromontane forest using pioneer shrubs as nurse plants for *Olea europaea* ssp. *Euspidata*. *Restor. Ecol.*, 15: 129-138.
- Alemayehu WE (2007). Ethiopian Church Forests: opportunities and challenges for restoration. PhD thesis, Wageningen University, Wageningen, The Netherlands. ISBN: 978-90-8504-768-1.
- Ayalew K, Gezahegn T (1991). Suitability Classification in Agricultural Development, Ministry of Agriculture, Addis Ababa, Ethiopia.
- Baptist BA, Punchihewa RKW (1983). A preliminary analysis of the principal factors which will affect apiculture honey production in Sri Lanka. In: K. N. Mehrotra, M. G. Jotwani, T. P. Sriharan, B. Subrahmanyam, P. J. Rao, D. S. Bisht and M. Naim (eds.) Second international Conference on Apiculture in Tropical Climate. Indian Agricultural Research Institute, New Delhi, India, pp. 87-99.
- Beyene T, Davide 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).
- Beyene T, Davide 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)
- Cheko K (2006). Responding to food security challenges through an integrated watershed approach: The Tigray Experiences Web page. Available at: <http://www.ucc.ie/famine/conference/papers/kidane.pdf>.
- Crane E (1990). Bees and beekeeping: Science, practice and world resources. Comstock publishing associates (cornell university press), Ithaca, New York.
- EEA (Ethiopian Economic Association) (2005). Study of the Ethiopian agricultural extension program. Ethiopian Economic Policy Research Institute, Addis Ababa, Ethiopia.
- EMA (1981). National atlas of Ethiopia. Ethiopian mapping Agency. Addis Ababa.
- Ethiopian Customs Authority and Export Promotion Agency (2006). Annual report for the year 2005. MoARD, 2005).
- Holeta Bee Research Center (2004). Beekeeping training manual.

Holeta, Ethiopia.

Kerealem E (2005). Honeybee production system, opportunities and challenges in Enebesar midir woreda (Amahara region) and Amaro special woreda(SNNPR),Ethiopia. Unpublished M.Sc. Thesis, Alemaya University, Alemaya.

Kerealem E, Tilahun G, Preston TR (2009). Constraints and prospects for apiculture research and development in Amhara region, Ethiopia.Livestock Research for Rural Development 21(10) available at <http://www.lrrd.org/lrrd21/10/ejig21172.htm>

Nuru A (2002). Geographical races of the honeybees (*Apis mellifera* L) of the northern regions of Ethiopia. PhD dissertation, Rhodes University, South Africa.

Schultz TW (1995). The value of the ability to deal with disequilibrium. *J.Econ.Liter.*13: 827-846.

Workneh A (2007). Determinants of adoption of improved box hive in Atsbi Wenberts District of eastern zone, Tigray region. M.Sc. Thesis, Haramaya University, Ethiopia.

Yirga G, Mekonen T (2010). Participatory Technology and Constraints Assessment to Improve the Livelihood of Beekeepers in Tigray Region, northern Ethiopia, *Momona Ethiop. J. Sci.*, 2: 76-92.