

Full Length Research Paper

Identification and documentation of indigenous knowledge of beekeeping practices in selected districts of Ethiopia

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Accepted 9 April, 2011

The Ethiopian farmers have been engaging in beekeeping as a sideline activity since 3500 to 3000 BC over centuries; it is presumed that beekeepers have developed indigenous knowledge through their accumulated experiences, which is valuable resource for development. The study was undertaken to identify, record and document the indigenous knowledge of the beekeepers and it was conducted in Central Ethiopia by selecting nine districts. Accordingly, some of indigenous technical knowledge of farmer beekeepers are: Type of hives and construction materials used, different honeybee management techniques like traditional honey season identification, traditional swarm catching and attractant methods, swarm control methods, traditional honeybee enemies protection methods, traditional methods of stinging protection and reduction of pain and others were identified and documented. In net shell, the beekeepers have plenty of appreciable indigenous knowledge. Hence, the researchers can verify and integrate the collected beekeepers indigenous knowledge into mainstream knowledge development and management.

Key words: Apiarist, beekeeping practices, honeybee, Ethiopian farmers.

INTRODUCTION

Indigenous knowledge is knowledge that is unique to a given culture or society. It is seen to contrast with the knowledge generated within the international system of universities and research. Indigenous knowledge is used at the local level for decision making pertaining to food security, human and animal health, education, natural resource management, and other vital activities (Gorjestani, 2000).

The valuable knowledge gathered by farmers over generations, so called indigenous knowledge, is often neglected by researchers, although this information can be quite important for location specific recommendations and for developing sustainable farming systems (van den Ban and Hawkins, 1996). Indigenous knowledge is the basis for self-sufficiency and self-determination for at least two reasons (IIRR, 1996): First, people are familiar with indigenous practices and technologies. They can understand, handle, and maintain them better than introduced technology. Second, indigenous knowledge draws on local resources. People are less dependent on outside supplies, which can be costly, scarce and available only irregularly.

Obviously, it is observed that the adoption of the

technology by the farmers is high, when the technology is developed on the experiences that they have. It is generally recognized that indigenous farmers` knowledge is crucially important for developing agriculture because this way of farming should be adjusted to the local situation which the farmer usually knows better than researchers or extension agents (van den Ban and Hawkins, 1996). Hence, indigenous knowledge is more adoptable as it relies on locally available skills and materials and often requires little or no cash outlay.

Workneh et al. (2008) in their study also recommended that the research and development organizations should identify and document the existing indigenous technical knowledge of beekeepers to integrate it optimally into improved beekeeping practices. Hence, identification and documentation of beekeeping indigenous knowledge ensures the accessibility of the knowledge which in turn contributes to the development of beekeeping sub sector.

Objective

The objective of this study was to identify and document

Table 1. Beekeeping experience and gender across district surveyed.

District	Socio-economic indicators of beekeepers		Average beekeepers year of experience
	Sex		
	M	F	
Tikur-inchini	27	-	13
Cheliya	28	-	20
Adabarga	26	-	24
Grara Jarso	25	1	22
Kuyu	16	8	21
Yaya gulalle	25	-	14
Warajarso	9	16	22
Woliso	16	-	20
Amaya	25	-	23
Total	207	25	Std = 3.8

indigenous knowledge of beekeepers in selected districts of Ethiopia.

METHODOLOGY

Study area

The study was undertaken in west, southwest, and North Showa zones of Oromia regional state (Ethiopia) by selecting nine districts. Sampling technique was purposive for identifying districts that have high population of beekeepers. Accordingly, Chalia, Tikur Inchine, Adabarga, districts of West Shewa Zone; Weliso, and Ameya districts of Southwest Shewa zone; and Yaya gulele, Grar jarso, Gerbe guracha and Wara jarso districts of North Showa zone have been included for the study. From each district, 25 beekeepers were selected purposively by selecting potential peasant associations. The field study took place from September 2007 to June 2008.

Methods of data collection and analysis

As noted by Dick et al. (2004), a full understanding of the complexities involved in the survey study can only be achieved by mixing methods such as structured interview schedule, group discussion, key informant interview and observation. For this particularly study, mixing methods of the aforementioned were used. Secondary data were also collected from different sources and analyzed using descriptive statistics, which is explained in frequencies, mean and standard deviation.

RESULTS AND DISCUSSION

Source of indigenous knowledge and type of beekeeping practice

The study result showed that the indigenous knowledge of beekeepers differ from farmer to farmer and from area to area, based upon their experiences and exposure in beekeeping activities. Among the beekeepers 70.8, 24.5 and 4.7% have got beekeeping knowledge from family,

neighbors, and training, respectively. In all sampling areas, the beekeepers keep their bee colonies at their back yard. In the study area, 99.1% beekeepers are practicing traditional beekeeping management and the balance is practicing improved beekeeping management. On average, the interviewers have 10, 0.1 and 0.3; traditional, transitional and improved hives, respectively. With regard to gender responsibility, male (87.9%) and female (12.1%) are engaging in beekeeping activities (Table 1). The main reason for less participation of females according to the respondents is that culturally, women cannot climb up the tree for baiting bees. However, the picture in Warajarso is different from other study sites. The average yield obtained from a given traditional hive per annum in the survey area is 6.2 kg (Table 2). The price of one kg crude honey varies from district to district and ranges from 2 to 2.50 US dollar /kg.

Types of beehives and construction materials

In the study areas, traditional beehives used are mostly cylindrical in shape with the dimensions of around one meter in length and a diameter of around 20 cm (Figure 1). It is made up of "soyama" (*Vernonia Vernonia thomsoniana* Oliv. & Hiern), "koso" (*Hagenia abyssinica* Willd.), (*Lippia adoensis* (Hochst. ex Walp.)), eucalyptus (*E.globulus* L.), *Dhokonu* (*Grewia ferruginea* Hochst. ex A. Rich.), *kachama* (*Myrsine africana* L.), clay (hive made using clay soil), log (hive made from wood), *qaqawi* (*Rosa abyssinica* R. Br. ex Lindl.) *urgesa* (*Premna schimperii* Engl.), and other locally available materials. The internal parts of the hives are smoothed with mud and cow dung and the external part of the hives are covered with grass to protect from rain. According to the respondents' perception, bees prefer hives made of climber and bamboo as they give them heat as well as the bees can eat the internal part of the climber and bamboo during the dearth period.

Table 2. Average bulk honey yield per hive from traditional hives/year across districts.

District	Average number of traditional hive holding	Average honey yield /hive (Kg)	Standard deviation of district
Tikur-inchini	7	4.1	2.2
Cheliya	10	10.1	3
Adabarga	15	6.23	2
Grara-jarso	6	5.7	1.3
Kuyu	9	5	2
Yaya-gulalle	4	4.2	2.1
Wara-jarso	18	9.3	3
Woliso	5	4	2
Amaya	7	7.4	3
Mean		6.2	
STD		5.97	

**Figure 1.** Traditional hive mostly used by farmers.

It was also identified that in traditional hive, the construction of combs either straight or round shape depending on the guide provided by the farmer in the internal part of the hive. Hence, beekeepers are protecting bees from construction of straight comb along the hive length by providing round strips in the upper part of the internal hive, other wise, it will difficult to take the honey combs from the hive during harvesting. The honey yield obtained also from such hive is smaller as the bees construct few combs. There are also beekeepers that practices insertion of '*Kamsasa*' Afan Oromo (internal fiber part of "inset") in to the hive during dearth period. The '*Kamsasa*' will be pulled out towards one end, when

the bee colonies get stronger.

Traditional honey season identification

Most traditional beekeepers identify honey season by the experiences they developed in their respective areas. The different indicators used by beekeepers for identifying honey season are: Smelling of honey, accumulation of bees around the entrance of hives, end of "*adey*" (*Bidens prestinaria* (Sch.Bip. ex Sch.Bip.) *Cufod.*) flowering season and weighing of the hive. Some beekeepers identify honey season by inserting stick into

the hive. If there is honey, the stick comes back with the honey strips.

Concerning honey harvest practices, more or less, it is similar with that of improved practices of honey harvesting except they use traditional equipment such as smoker made of clay, traditional brush made of grass, dish made of wood for putting honey, and knife for cutting combs.

Traditional extraction of honey

In the study areas, all the beekeepers do not extract their honey. According to their perception, extraction is identifying honeycombs from brood combs or identifying new honeycombs from old honeycombs. All empty combs are wasted. No beekeeper practiced extraction of empty combs to get pure beeswax. The beekeepers store the honey in jar made from clay, 'kil' made of cucumber (*Cucumis sativus* L.), small 'tasa'(tin), plastic bag (sack of fertilizer), plastic jar and bags made of animal skin.

Traditional way of category of honeybees

Beekeepers have their own methods of categorizing their bees, mostly based on the color of the bees. Accordingly, they divide bees in to two groups namely, dark bees 'Tikur' and brown color bees 'Faki'. These bees have their own characteristics in behavior and honey production. The brown color bees 'faki' are aggressive, productive and relatively small in body size. Where as the dark bees 'Tikur' are gentle, relatively less productive and large in body size.

Traditional swarm catching and attractant methods

In all sampling area, all the beekeepers practices catching of the swarms by hanging bait hive on the tree. If they get the swarms around their vicinity, they spray soil or water on the swarm then catching the queen and putting in the traditional queen cage made up of 'shembeko' (*Arundo donax* L.) and put the caged queen into the hive. The queen stayed in the queen cage for 3 to 5 days and after the bees accustomed to the new hive, the queen released. There are also beekeepers that practices catching the queen and tying by thread on the thorax and fixing it on the hive. In the mean time, the worker bees eat the thread and the queen released.

Traditional way of swarm control

The traditional beehives are not suitable for internal inspection. Due to this problem, beekeepers rarely practice controlling of swarms internally. They minimize

swarm by removing queen cell and brood comb. External methods that the beekeepers practice to reduce swarm are: Smoking the hive with the dung of equines, spraying fresh cow milk in the hive, smoking dry comb, de-queen of newly released swarm. According to the beekeepers response, smoking the hive with 'agamsa' (*Carissa edulis* Vahl.) during harvest helps to protect production of new queen so that reproductive swarming is protected.

Traditional bee's sting protection method

Beekeepers have developed their own bee's sting protection method through experiences. Some of the methods that the beekeepers employ to protect themselves from bees are smoking cow dung when they are working with bees, painting their body with butter, painting "adey" flower (*B. prestinaria*) on their body, using veil made of grass 'mur' (*Eleusine floccifolia* (Forssk.) Spreng), painting honey on their body, painting "ulmay" (*Clausena anisata* (Willd.) J.Hk. ex Benth.) by pressing its leave on the body, and spraying water on the bees before harvesting honey.

Traditional sting`s pain reduction method

Beekeepers have their own methods of minimizing the pain from sting of the bees. Some of the methods that they utilize are: Rubbing with soil or ash on which they have been stung, according to their assumption drinking 'areke' (local alcoholic drink) minimizes pain of sting; immersing in cold water the area which is stung, rubbing with garlic on the area which got sting, pressing leave of 'Ebicha' (*Vernonia amygdalina* L.) on the area which got sting, eating honey, and washing with hot water.

If some one is highly attacked by bees, pressing the leave of 'Ebicha' (*V. amygdalina*) and drinking its juice avoids the pain of venom. Its amount should be less than one spoon of coffee.

Traditional honeybee enemies' protection methods

Bee enemies identified in the study areas are ants, "hamgota" (Honey Badger), birds, spiders, snakes, and wax moths. Beekeepers have their own protection methods from enemies.

In all study areas, ant is a serious problem of beekeepers. To overcome the problem, beekeepers have developed their own indigenous knowledge. Some of the methods that they use are: Dusting ash under the hive stand, plastering the hive stand with plastic materials, finding and killing the queen of ants, rolling "Kamsasa" (internal fiber part of "inset") on the hive stand. The beekeepers also use garlic (leave) + water + Eucalyptus (leave) to repel ants. It is prepared by pressing them together and spraying on the ants.

Table 3. Percentage distribution of honey utilization for medicinal purpose by beekeepers.

S/No.	Type of medicine prepared from honey	Type of utilization	Percentage
a	Honey	Cough	76.8
b	Honey + barely + flax (telba)	Backside pain	9
c	Honey + coffee	Stomach ache	1
d	Honey + barley + "Aja"	Broken body part and give birth mother	2
e	Honey + egg + butter + coffee	Cough	6
f	Honey + "chat"(boiling)	Gonorrhoea disease	3.2
f	Honey + garlic + " <i>bishops weed</i> and <i>black cumin</i>	Eye disease	2
Total		-	100

N = 188.

Honey Badger is also another enemy of honeybees. Beekeepers protect it from their apiary by fencing the apiary, fixing the hive to the hive stand, catching honey badger by "wotmed", and protecting by dog. Beekeepers protect their bees by putting similar objects to the bird eaters in their apiary, removing branches of tree near apiary, expelling birds from the surrounding, and animal tallow ("*mora*") on the hive and when the bird eats animal tallow ("*mora*") their mouth tied together as the result they can not eat bees. Beekeepers protect spiders by cleaning their hive. Smoking "*qarabicho*" (*Echinops kebericho* Mesfin) also protects snakes from the apiary. According to the beekeepers response, fumigation of hive with '*Ejersa*' (*Olea africana* Mill.) is important for protecting wax moth particularly when the bee colony gets weak.

Traditional fumigating method of new traditional hives

The beekeepers attract swarms in to the new hive by fumigating with '*Ejersa*' (*O. africana*), sombo's bark (*Ekebergia capensis* Sparrm.), Tungit (*Otostegia intergrifolia*), kussayee (*L. adoensis*), "teji sar", beeswax, "dokima" (*Syzygium guinneense*), "bessobila" (*Ocimum sanctum* LINN (TULSI)), "Tid" (*Juniperus procera* Hochst. Ex Endlicher), perfume, "ltan" (*Boswellia papifera* (del.) Hochst.), "wanza" (*C.africana* Lam.). If two or more materials are found in their area, they fumigate by mixing together and they believe the mix is powerful in attracting the bees. Method of fumigating the new hive is, digging the hole and preparing the smoke and digging another hole adjacent to the first hole then connecting the two holes internally by producing small hole which helps to pass smoke and putting the new hive up side down on the hole which has no fire. The new hive may be fumigated up to the internal color of the hive gets brown.

Traditional use of honey as medicine

The type of medicine prepared from honey, its utilization

is depicted in Table 3. Some beekeepers believe that the honey that is harvested on "Onkoloolessa" 17 (27, October) is useful for medical purpose to treat any human disease. According to the beekeepers practical observation, honey only (76.8%) or honey + egg + butter + coffee (6%) are recommended by beekeepers for cough problem. Honey + barley + flax (9%) is a medicine for backside pain. The beekeepers also suggested that boiling honey with chat (3.2%) helps for (Gonorrhoea) disease. According to the beekeepers response, mixture of honey, garlic, *bishops weed*, and *black cumin* (2%) is used for eye disease. Honey with coffee (1%) also uses for stomach ache.

Some beekeepers believe that the honey that is harvested on "Onkoloolessa" 17 (27, October) is useful for medical purpose to treat any human disease. According to the beekeepers practical observation, honey + Barley + flax (telba) is a medicine for backside pain. Honey + egg + butter + coffee is recommended by beekeepers for cough problem. The beekeepers also suggested that honey + chat (by boiling) helps for gonorrhoea disease. According to the beekeepers response, mixture of honey, garlic, *bishops weed*, and *black cumin* is used for eye disease. Honey with coffee is also useful for stomach ach.

Traditional beliefs that leads bees to absconding

1. When the woman gets in the apiary site during the ministration period;
2. Undertaking beekeeping activities as soon as returning from funeral;
3. Undertaking beekeeping activities immediately after sexual intercourse;
4. If dog urines in the apiary

Beekeepers from the study areas have rich indigenous knowledge nearly in all areas of beekeeping. Identification and documentation of such knowledge can open new doors for researchers to verify and integrate the indigenous knowledge with main stream science and introduce new practices in the area where by farmers

knowledge is not productive and guarantees sustainability.

CONCLUSION AND RECOMMENDATION

In the study area, beekeeping practice has a long history, as a fact, the beekeepers have developed indigenous knowledge which was passing from generation to generation orally. The main areas of ITK identification and documentation are hive construction from locally available materials, swarm catching, hive fumigation materials, honey and swarming season identification, different medicinal values of honey, pain reduction methods during working with honeybees, honeybee enemy protection methods and bee's sting protection method.

With this particular research, the researchers have got different areas of research problems to deal with. Hence, the researchers can verify and integrate the collected beekeepers indigenous knowledge into mainstream knowledge development and management.

ACKNOWLEDGMENT

The author wish to express my heartfelt thank to Holota Bee Research Center (HBRC) for financial and logistic support to conduct the study.

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