Jimma University

School of graduate studies

Department of Biology

Assessment of honey production system and beekeeping management practices in Gechi District, Buno Bedelle Zone, south west Oromia Regional state, Ethiopia

BY

Melaku Behulu

Advisor: Eba Alemayehu (PhD)

Co-advisor: Gadisa Natea (M.Sc.)

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DECLARATION

This is to certify that the thesis "Assessment of honey production and beekeeping management in Gechi District, Buno Bedelle Zone, southwest Oromia Regional state, Ethiopia" is submitted in partial fulfillment for the requirement of the award of the degree of Msc in General biology from Jimma University, college of natural science, Department of Biology is my own work.

Name of the student Melaku Behulu Signature _____ Date _____

Advisor Dr. Eba Alemayehu Signature _____ Date_____

Co advisor Gadisa Natea (M.Sc.) Signature _____ Date _____

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LIST OF ABBREVIATION (ACRONOMY)

AD	Agricultural Development
AGP	Agricultural Growth Program.
AD	Anno Domini,
AM	*Apismellifera*
CCD	Colony collapse disorder
CE	Common Era
CSA	Central Statistics Authority
EPO	Environmental protection office.
FAO	Food and Agriculture Organization
FGD	Focal Group Discussions.
FTC	Farmer Training Center.
GDADO	Gechi District Agricultural Development Office
GDRLA &EPO	Gechi District Rural Land Administration & Environmental Protection Office
HBRC	Harvested Been Reported Center
KTB	Kenya Top Bar
MAAREC	Mid-Atlantic Apiculture Research and Extension Consortium
MOARD	Ministry of Agriculture and Rural Development
NGO	Non-Governmental Organization
SNNPR	South Nation Nationality and People Republic
UNEP	United Nation Environment Program
USAID	United States Agency for International Development

Abstract

The study was conducted in Gechi district, Bunobedele zone, south west Oromia regional state, Ethiopia1, to- assess beekeeping management and its production 2, to identify factors that influence beekeeping management in the study area. Questionnaires and interviews were used to collect primary data. Different documents were also reviewed for secondary data A-cross sectional study, in which 247 samples were included to assess the current beekeeping management, production potential and production constraints. The result of the study showed that most (99.6%) of beekeepers, in the study area have owned only traditional hives and produce honey for home consumption. Majority of the respondent (86.45%) are illiterate. The bee keeping practice was dominated by male. Despite the production constraints, the area opportunities' like existence of large size natural forest due to coffee plantation and artificial forest attended by government. The main limiting factors in the study area were Ants. To minimize limiting factors the beekeepers used different indigenous knowledge. With government side designing the strategies to support the beekeepers through training, help by giving honey production materials and continuous or sustainable following their participation up to they are profitable and continue to be done as livelihood .It was recommended that the beekeepers should be supported by training, with modern hives, planting bee forage, conservation of plants and by using the available resources effectively.

Key words: assess beekeeping management, honey production, Gechi district, Oromia regional state.

1 INTRODUCTION

1.1Background of the study

Beekeeping (Apiculture) has been practiced since ancient times and honey has been considered by many cultures as a valuable and precious commodity that is used in traditional rituals, healing or as food (Lietare, 2009). Nearly all countries of the world bees and their products are not only well known and have wide consumer preference, but provide sustainable livelihoods to many small scale farmers and other rural and non-rural people (FAO, 2012). Bees offer a large potential with minimal investments. As an agricultural enterprise beekeeping does not require much landownership or rental, it can be started with equipment and tools that can be sourced locally and in many instances, skills, and knowledge required for such an enterprise are found with in local traditions (FAO, 2012).

Beekeeping (apiculture) is management of honey bee colonies for pollination of crops, to exploiting its products (such as honey, pollen, wax, propolis and brood). The domestic honey bee (*Apis mellifera* L.) for the production of honey is an insect, (Hymenoptera, Apoidea*).* At present, honey bees are considered to constitute one of the most complex societies among invertebrates, with a strict caste division and a highly developed communication capacities. Caste and sexual dimorphism are well pronounced, so that within the colony it is possible to distinguish the queen bee, Africa has been fortunate as it contains a large endemic wild population of honey bees (Dietemann *et al*., 2009). Ethiopia has an extended practice of beekeeping than other country in the world during time of king Ezana. Around the 3rd century AD: because of wax and honey needed for religious ceremonies and for making traditional beverages" (Fitchl and Admassu, 1994*).* Likewise Ethiopia is one of the countries in the continent, which own huge honey production potential. Owing to its varied ecological and climatic conditions, Ethiopia is home to some of the most diverse flora and fauna in Africa. Beekeeping in Ethiopia it is an ancient agricultural practice. It the drones and the worker bees (Onwumere *et al*., 2020)

Beekeeping is universal agricultural activities. It has been experienced in the world for a long period of time. It contributes to peoples' livelihoods in almost every country on earth. Honey and other products obtained from beekeeping have been known by every society (Nicola, 2009).

has been exercised as sideline activity by many of the rural farming communities for its honey and beeswax production that contributes to income generation. It also provides job opportunity in the sector (Yadeta, 2014).

Despite its long history and the favorable agro ecology for honey production and the number of bee colonies, the level of honey production and productivity in the country is remain low. One of the prominent factors for this low honey and productivity is practicing of traditional hives (Gebretsadik and Negash, 2016). In addition to that it has been seriously devastated 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: Eddesa, 2002). Limitations effects that affects beekeeping sub sector in Ethiopia are: Lack of beekeeping knowledge, shortage of skilled man power, shortage of bee equipment's, pests and predators, pesticides threat, poor in structure development, shortage of bee forage and lack of research extension (Gebretsadik and Negash,2016).

According to CSA, the major honey and bees wax producing regions in Ethiopia are Oromia (41%), SNNPR (22%), Amhara (21%), and Tigray (5%). However, the country is suffering from the ecological degradation or its natural resources and this means the basis for any honey production is threatened and affected in many regions of the country. Beekeeping is considered as one of the incomes generating activities for resources. However, in south west Ethiopia Gechi district even though there are many beekeepers. Conversely at any time it is necessary or possible time and place it needs an updated study conducted in the area describes and assess beekeeping practices and challenges facing in Gechi District Buno Bedelle Zone. Therefore the objective of this study is to identify the current practices, production potentials and constraints of beekeeping in the study area.

1.2Statement of the problem

Gechi district is rich in natural resources such as natural vegetation, water, suitable climatic conditions that create favorable conditions to undertake management of bees and honey production activities and make the district one of the potential districts for apiculture sub-sector. But there are tremendous factors which limit beekeeping practice and its management activities in the study area. As (Ejigu *et al*., 2009) states that mostly there are different constraints of bees and affect beekeeping in Oromia region. However, in Gechi district there is no available information due to geographical location and other limiting factors in particular. As a consequence the role of beekeeping management and its production activities of the communities are not well studied. Therefore, the current study evaluated honey production and its management trends south western Oromia regional state, Buno Bedelle zone, Gechi district.

1.3 Research questionnaire

- How is it the current beekeeping management and honey production in Gechi district?
- What are the factors that limit beekeeping management and honey production in Gechi district?

What are the similarity and differences of beekeeping management and honey production in different ecological area of Gechi district?

- How beekeepers alleviate some of the constraints they are facing?

1.4 Objectives of the study

1.4.1 General objective

- To assess honey production system and beekeeping management practices in Gechi district

1.4.2 Specific Objectives

- Evaluate honey production and beekeeping management in the study area
- To verify honey production and beekeeping management practice in different ecological areas of Gechi district.
- To identify factors that influences of beekeeping management and its production in Gechi district.
- To compare beekeepers knowledge on honey production system and beekeeping management practices in Gechi district.

1.5 Significance of the study

The study was conducted to evaluate the practice of honey production and management of beekeeping trends in western Oromia regional state of Gechi district. This study focused on beekeeping management and honey production traditions in the study area. In addition assessed the challenges the beekeepers faced and identify current problems of honey production activities in the district. Mainly this study generates information on indigenous knowledge practiced in the study area to control problems and find solutions. That knowledge was applied to augment honey production and beekeeping management activities. The practice of indigenous knowledge plays a great role to increase the role of honey bee production in the livelihood of the community in particular and for the national economy in general. In addition, the information collected during this study would serve as base line information for other researchers interested to carry out further studies in this area.

2. LITERATURE REVIEW

2.1 ORIGIN AND EVOLUTION OF BEES AND BEEKEEPING

Beekeeping has been practiced since ancient times and honey has been considered by many Cultures as a valuable and precious commodity that is used in traditional rituals, healing or as Food (Lietaer, 2009). Nearly all countries of the world bees and their products are not only Well known and have wide consumer preference, but provide sustainable livelihoods to many Small-scale farmers and other rural and non-rural people (FAO, 2012). Bees offer a large Potential with minimal investments. As an agricultural enterprise beekeeping does not require much land ownership or rental, it can be started with equipment and tools that can be sourced locally and, in many instances, skills and knowledge required for such an enterprise are found within local traditions (FAO, 2012). The world total honey production is 1.3 million tons a year. Larger honey producing countries are Russia and others 193,000 tones, China 161,000, USA 75 tones, Mexico 67,000 tons a year. Developing countries produce about 47% of the total world‘s honey production. Ethiopia is the leading honey producer in Africa and 10th in the world. (H. B.R. C, 2007)

2.1.1 Beekeeping in Africa

Beekeeping up to 1500 AD continued in the traditional form using primitive hives. Of all the regions under the consideration, tropical Africa has the oldest tradition of beekeeping and still with primitive hives (FAO, 1986). Between 1650 and 1850 AD many hives with top-bars and frames were invented, but after these two centuries of effort there was still failure in on the fundamental point: what eve bars or frames were used, the bees attached their comb to the walls of the hive as well, and the combs could, therefore, only be removed from the hive by cutting them out. Lorenzo Lorraine Lang troth made the step, which changed this, in 1853 when he discovered practical movable-frame hives with an appropriate ‘bee-space’. The pattern of modern bee keeping was thus established between 1850 and 1900 AD. Different equipment’s were invented in this period, but Longs troth is advance in 1851 remains the basic principle of the box hive, and thus of our beekeeping today (*Crane,* 1976).

Honey bees were kept in Egypt from antiquity. On the wall of the sun temple of Nyuserreini from the fifth Dynasty. Before 2422BCE, workers are depicted blowing smoke in to hives as

they are removing honey combs. Inscriptions detailing the production of honey are found on the tomb of pabasa from the twenty-sixth Dynasty (c.650BCE), depicting pouring honey in jars and cylindrical hives. Sealed pots of honey were found in the grave goods of pharaohs such as Tutankhamen fully fledged. Beekeeping was being practiced in an ancient Egypt and the earliest written records that relate to the keeping of bees in hives are from about 1500 BC. Generally, the earliest known evidence of beekeeping has been found in the Africa continent (*Crane*, 1990).

2.1.2 Beekeeping in Ethiopia

Honey production in Ethiopia has recently attracted the attention of various agencies because of its potential to help revitalize the Ethiopian economy, reduce poverty, and conserve forests. Ethiopia is believed to possess high potential in producing the honey. Ethiopia is currently ranked as the largest honey producer in Africa and the third largest worldwide by producing 45,300 tons of honey in 2010 (FAOSTAT, 2012). She is the country with the longest tradition of honey production in the world; it is presumed that beekeeping in Ethiopia started about 5,000 years ago (Fichtl & Admasu, 1994). Also, she has diverse habitat and flora for honeybees (Mohammed et al., 2006).

The honey produced in Ethiopia is expected to become a major commodity for acquiring foreign currency to improve the Ethiopian economy. Although Ethiopia does not have sufficient infrastructure for transporting and storing goods, the long shelf life of honey makes it an attractive export for the country. The country already earns an average of 420 million ETB (1) (35 million USD) annually from the sale of honey (Gidey & Kibrom, 2010). This figure is expected to increase in the future (Paulos, 2011). Indeed, in 2011, the European Court of Justice ruled that honey containing pollen from genetically modified plants could not be sold in the European Union (Aravindakshan et al., 2011; Gallmann & Thomas, 2012), which gives Ethiopia an advantage over other major honey-exporting countries since most Ethiopian honey is free of genetically modified plants as well as pesticides and other agrochemicals (Hart mann, 2004).

Despite the favorable agro ecology for honey production and the number of bee colonies the country is endowed with, the level of honey production and productivity in the country is remain low. One of the prominent factors for this low honey and productivity is traditional hives. Ethiopia has the potential to produce 500,000 tons of honey per year and 50,000 tons of beeswax

per annual, but currently production is limited to 43,000 tons of honey and 3,000 tons of beeswax (MOARD, 2008).The quantity and quality of Ethiopian honey in generally poor, as 95% of beekeepers follow traditional method of beekeeping practice with no improved techniques or technology (Oxfam, 2008). Ethiopia has immense natural resources for beekeeping activity. However, like any other livestock sector, this sub Sector has been seriously devastated 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 major constraints that affect beekeeping sub-sector in Ethiopia are: lack of beekeeping knowledge, shortage of skills man power, shortage of bee equipments, pests and predators, pesticide threat, poor infrastructure development, shortage of bee forage and lack of research extension Kerealem *et al*. (2009).

There was long tradition of beekeeping in Ethiopia, having the highest bee density and being the leading honey and beeswax producer in Africa, the share of the sub-sector in the GDP has never been commensurate with the huge potentiality for beekeeping. Productivity per bee colony as well as the product quality has always been low, leading to high domestic utilization, and low export earnings. Hence, the beekeepers in particular and the country in general are not benefiting from the sub sector (Nuru, 2002).

2.1.3 Geographical Distribution of Honeybees in Ethiopia

Morphometric analyses of Ethiopian honeybees are concerned, (*Smith*, 1961) reported *Apis Mellifera monticola* from the Ethiopian plateaus and later, *Ruttner* (1975) reported the presence of *A.m. scutellata* and A.m. *jemenitica. Ayalew* (1990) suggested the existence of five honeybee races: *Apis mellifera jemenitica* (in eastern lowlands), *A.m. monticola* (in the southern mountains), *A.m. litorea* (in the extreme western low lands), *A.m. adansonii* (in the southern mid-altitude areas) and *A.m. abyssinica* (central plateau and southwestern parts of tropical forest). *Radloff and Hepburn* (1997) recorded *A.m. jemenitica, A.m. bandasii and A.m. sudanensis*from Ethiopia. However, these findings are inconsistent except for *A.m monticola and A.m. jemenitica* and none of the results indicated the distribution, behavior and biology of these honeybees for the whole of Ethiopia (Amsalu, 2002).More recently, the northern regions of the country (located between 90 N and 14.530 latitudes north and 340 and 440 longitudes east), most of which were not covered by Ayalew were studied.8by *Nuru* (2002) and revealed the existence of four discrete geographical races. These are *A.m.jemenitica* from eastern, northwestern, and northern arid and semi-arid lowlands, *A.m. scutellata* form the western humid midlands, *A.m. bandasii* from sub-moist central highlands and *A.m. monticola* from northern mountainous parts of the country. Moreover, the southern Ethiopia region (located between 40 49' 54.3" North to 90

7' 98" North latitude and 340 16' 07" East to 420 57' 57" East longitude) were studied by *Amsalu* (2002) and four distinct morph clusters were reported in the study area: the smallest and yellow honeybee, *A.m. woyi-gamballa* in the western and southern lowlands; the small and yellowiest honeybees, *A.m. jemenitica* in the eastern escarpment; relatively large and dark honeybees, *A.m. bandasii* in the central and eastern highlands; and dark honeybees, *A m. scutellata* in the wet tropical forests.

The results of the northern and southern regions were well fitted to each other and multivariate Morphometric analysis of the merged data (northern and southern) revealed the existence of hive. statistically separable morph clusters occupying ecologically different areas: Apis *mellifera jemenitica* in the northwest and eastern arid and semi-arid lowlands; *A.m. scutellata* in the west, south and southwest humid midlands; *A.m. bandasii* in the central moist highlands; A.m. monticola from the northern mountainous highlands; and *A.m. woyi-gambella* in south western semi-arid to sub-humid lowland parts of the country (Amsalu et al., 2004).

2.1.4Economic Importance of Beekeeping in Ethiopia

Beekeeping has been part of the farming system in Ethiopia since time immemorial. It has been a Tradition since long before other farming systems. Beekeeping is a very long-standing and deep-rooted practice in the rural communities of the country and around one million farmers are estimated to keep bees (*Mammo,* 1973). Beekeeping has been and still plays a significant role in the national economy of the country as well as for the subsistence smallholder farmers. The contribution of bees and hive products, though difficult to assess, is probably one of the most important small-scale income generating activities for hundred thousand of farmer beekeepers. Beekeeping has many advantages that help farmer beekeepers to improve their wellbeing. The Socio-economic impact of beekeeping and the main hive products and importance of beekeeping are summarized as follows:

Honey has been used to generate income, as well as for nutritional and medicinal value for local communities (Benjamin & McCallum, 2008). Honey is very important for healing wounds, skin treatment (Brad bear, 2004). In Ethiopia, honey is almost used for local consumption, and to a very large extent for brewing of mead (Tej).Almost no wedding or other cultural, religious and social events cannot be imagined without the honey wine ‘Tej’ in the past (Beyene& David, 2007).

Bees Wax and Propolis: Wax is essential primarily for honeycomb, cosmetic industries, varnishes, polishes and for queen cups preparation to be used for queen rearing to develop and multiply bee colonies. In addition, wax is also used for candle making especially in Orthodox churches has a long history in Ethiopia (Ayalew, 2006). The annual production of wax in Ethiopia is estimated at 5000 t (Holeta Research Center, 2004). Propolis is a substance that is used by the bees to seal up the hive, to strengthen the comb, for wind protection and defense. It comes from the sticky exudates of trees and buds such poplars, and some conifers. Propolis has anti-microbial properties, so it is used to treat various disorders. It is effective in treating hypertension, coronary diseases and arteriosclerosis. Propolis is sold in capsules at health food stores as a health supplement (Crane, 1990). The prospect for helping peasant farmers of third world and raising their living standard through the development of beekeeping activities are bright (Robinson, 1980).

2.2Beekeeping management

Beekeeping management can be expressed in the ways of: - Traditional, Transitional and Modern system ways of keeping.

2.2.1 Traditional Beekeeping

Traditional beekeeping in Ethiopia is the oldest and the richest practice. It has been carried by the people for thousands of years. Several million bee colonies are managed with the Same old traditional beekeeping methods in almost all parts of the country (Mammo, 1973; Fichtl And Admasu, 1994). Traditional beekeeping is of two types: forest beekeeping and backyard Beekeeping. In some places, especially in the western and southern parts of the country, forest Beekeeping by hanging a number of traditional hives on trees is widely practiced. In other most Parts of the country backyard beekeeping with relatively better management are common (*Nuru*, 2002). Mostly it is practiced with different types of traditional hives. The most universal type of traditional hives, known to have been in use is simple cylindrical type. Beekeeping started with traditional or fixed comb hives, so called because the combs are attached to the top and sides of the hive itself and the beekeeper cannot easily remove and replace them.

In its primarily form, only one end of the hive could be open, but in more advanced forms both two side ends of the cylinder will be fitted with a removable closure. The types of hives and the

way of keeping bees vary from area to area. Based on locally available materials used for construction of hives, environmental conditions and positions used to keep bees.

Throughout the country the basic variation of the designs is: hollowed logs, bark hive, bamboo or reed grass hive, mud (clay) hive, animal dung (mixed with ash) hive, woven straw hive, gourd hive, earthen pot hive and so on. The beekeepers that are experienced and skillful in using these hives could do many operations with less facility. *Gezahegne (2001*) stated that under Ethiopian farmers' management condition, the average amount of crude honey produced from traditional hive is estimated to be 5 kg / hive / year. On the other hand, based on the survey conducted in West Showa Zone (*Edessa,* 2005), the amount of honey harvested, from a traditional hive on average was reported to be 6.1 kg/hive/year. Traditional husbandry is practiced with many millions of fixed comb hives particularly in the remote areas of the country. For the period until modern frame-hives are introduced, these fixed comb hives can yield a modest amount of honey, and also about 8-10% of its weight is beeswax. This harvest is achieved with minimal cost and labor, and it is valuable to people living a marginal existence.

2.2.2Transitional System of Beekeeping

From its name indicates it is intermediate methods of beekeeping between Traditional and modern methods of beekeeping. Top-bar hive is a single-story long box with slopping sidewalls inward toward the bottom (forming an angle of 115^0 with the floor) and covered with bars of fixed width, 32 mm for east African honeybees (Segeren, 1995; Nicola, 2002).

For technical and economic reasons, most African countries are not yet in the position to use movable- frame hives, and for them top- bar hive represents a satisfactory compromise. *Adjare (1990) and IBRA (1997) Transitional* beekeeping started in Ethiopia since 1976 and the types of hives used are: Kenya Top-bar hive, Tanzania top-bar hive and Mud- block hives. Among these, KTB is widely known and commonly used in many parts of the country (HBRC, 1997). The advantages of KTB over fixed comb hive and movable frame hive is discussed by *Segeren (1995), Nicola (2002*) and *Sossahel (2002).*

Top-bar hive in an ideal condition can yield about 50 kg of honey per year, but under Ethiopian Condition, the average amount of crude honey produced would be 7-8 kg/hive/year

(Gezahegne,*2001a).* However, at zonal level (North Wello) it has been reported that production of 24-26 Kilograms crude honey per hive per year (SOS, Sahel 1999), and about 8 percent as much beeswax per kilogram of honey is likely to be obtained.

2.2.3Modern System of Beekeeping

Modern beekeeping methods aim to obtain the maximum honey crop, season after season, without harming bees (*Nicola*, 2002). This method (Modern movable- frame hive) consists of precisely made rectangular box hives (hive bodies). Superimposed one above the other in a tier. The number of boxes is varied seasonally according to the population size of bees.

Practical movable- frame hive was invented in 1851 by Lorenzo Lorraine Langstroth in U.S.A. (Crane, 1976; Vivian, 1985). Later on, different countries developed their own movable frame Hives (for instance Zander, Dadant) and Langstroth was the prototype of movable frame hives Used today. In many countries Langstroth hive boxes have proved to be convenient for handling and management. In Ethiopia, about 5 types of movable frame hives were introduced since 1970 (HBRC, 1997) and the most commonly used are: Zander and Langstroth style hives. Based on the national estimate, the average yield of pure honey from movable frame hive is 15-20 kg/year, and the amount of beeswax produced is 1-2% of the honey yield (Gezahegne, 2001). However, in potential areas, up to 50-60 kg harvest has been reported (HBRC, 1997). Movable frame hives allow colony management and use of a higher level of technology, with larger colonies, and can give higher yield and quality honey but are likely require high investment cost and trained man power.

2.2.4 Beekeeping production management

In the later expressions it is expressed three main categories these are previous starting beekeeping management, next its looks like in Africa and also in Ethiopia with its economic importance have been seen, band concerning the qualities of management deeply expressed. Let as see now its production. Production we get from beekeeping managements are primarily honey, bees wax, propels and often others. From these the best we use is honey.

2.3 Honey production in Ethiopia

Honey production in Ethiopia has a potential to strength the Ethiopian economy, reduce poverty, and conserve forests. Ethiopia has diverse habitat and flora for honeybees (Mohammed et al., 2006). The honey produced in Ethiopia is expected to become a major commodity for acquiring foreign currency to improve the Ethiopian economy. Ethiopia has longer tradition on beekeeping than any other country in the world. Beekeeping is a long-standing practice in the rural communities of Ethiopia and appears as an ancient history of the country (Ayalew, *2004*). Ethiopia has a huge natural resource base for honey production and other hive products.

Since the 4th century, during the time of king Ezana, Christianity with strong emphasis on nomadic culture had greater contribution for intensive growth of apiculture, because of wax and honey needed for religious ceremonies and for making traditional beverages" (Fitchl and Admassu, 1994*).*

Honey production in Ethiopia is expected to become a major commodity for acquiring foreign currency to improve the Ethiopian economy. Honey bees play a significant role for living organisms like pollination service, maintenance of ecological diversity, keeping the environment healthy and those people who do not have land for agriculture, it is possible to rear bee and harvest bee products easily. Beekeeping can also be supplementary to crop production by facilitating pollination (Wilson, 2006*).*

In Ethiopia, there are two honey-collecting seasons: the major one is that carried out from October to November and the second one from April to June. However, in addition to these major harvesting periods, there are many small harvesting periods, which depend on the type of flowering plants and rainfall patterns in different agro ecologies, which experienced beekeepers and local people easily associate the harvesting season with the botanical origin of honey in their locality. There are a number of factors that limit honey production in Ethiopia such as climate change, deforestation, and invasive species that reduce their quality of health and longevity (UNEP, 2010). According to *Pokhrel (2008),* predators, parasites and diseases are some of the other factors that affect beekeeping.

Honey production is mainly practiced in rural areas. These areas have people who are less educated in agricultural practices due to the fact that they are unable to get funds for their education thus limiting the harvested honey yields (Yahaya and Usman, 2008*).* When the colony is not well fed, it will leave the area at the same time affect the yield. Beekeepers therefore, introduce sugar syrup in their feeds at least 6weeks prior to the onset of the first major nectar flow and this may encourage the production of bees that will be at the appropriate age for foraging by the time of the main nectar flow (Gamez et al., 2004*).*There are five distinct races of honeybees in Ethiopia namely *Apis milliferajementica, A. m.scutellata, A. m.bondasii, A. m. monticola and A. m. woyi-gambella* (Amsalu et al., *2004*). Among those, *Apis melliferabondasii* is the famous one in the country.

2.4 Honey Production in Oromia

Oromia is the well-known honey and beeswax producer region in Ethiopia. Regional contribution of honey production in Ethiopia distributed as Oromia (41%) SNNPR (22%), Amhara (21%), Tigray (5%) and other regions together (11%) (CSA (2003). Different species of plants, high bee colonies, good water supply, and suitable agro-ecological and climate condition among others are resources vital for honey production which most regional state in Ethiopia owned. The resource that is important for bee includes dense forest, oil crops, grain crops, different shrubs and herbs. This suitable agro ecology and good climate condition makes high reproduction, well survive of bees and good production of bee product.

Bunobedelle zone is one of the Oromia regional state's zones with high potential of honey and bees wax production. The livelihoods of Gechi district mainly falls under cereal crop production, livestock production and cash crop production (Coffee and Chat) and honey production. The household livelihoods of the population of the district are based predominantly on crop and livestock production.

We will see a difference in rural and urban beekeepers in Gechi district, primarily the ratio of beekeepers in one area (kebele) related to urban area, and the ratio related to ecological area differences. Also, their bee keeping manage mental methods and the production they are earned.

3. RESEARCH METHODS AND DESIGN

3.1 Study Area description

The study was conducted starting from September 20/2018 to October 30/2020 in Gechi district, South West Oromia National Regional State which is found at 475km away to south west from Addis Ababa. Based on agro ecology, the area was classified in to high land (5%), mid land (85%) and low land (10%). Gechi district is located in the range of 8^0 12' 03.48" N to 8^0 34' 38.80" N latitude and $36^0$18', 07.50" E to $36^0$39'03.87" E longitude with an altitudinal range between 1300-2100 meters above sea level. The average annual rain fall is 1500mm. It is bordered by Jimma Arjo district of East Wollega in the North, Borecha district in the East by Bedele district in the West and Didesa District in South (GARDO, 2010).

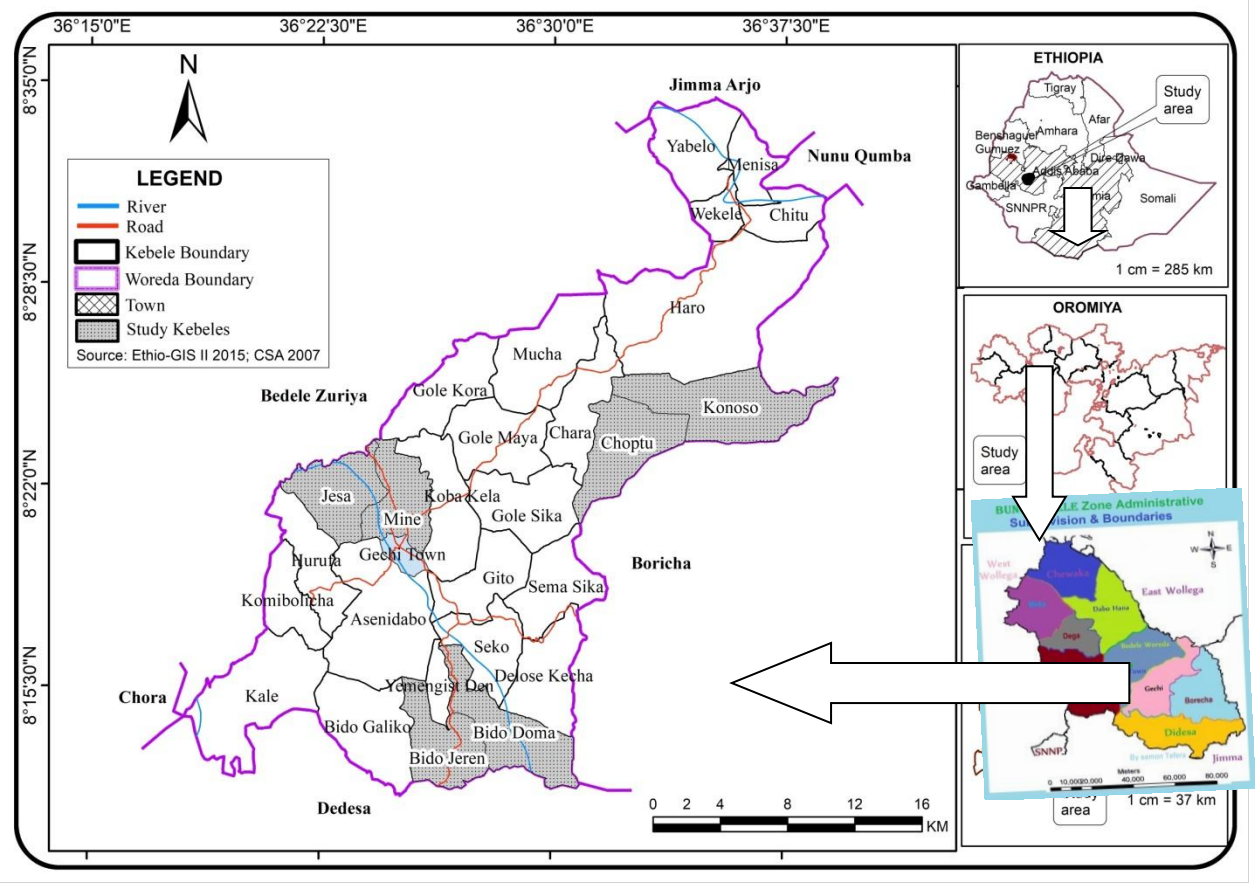


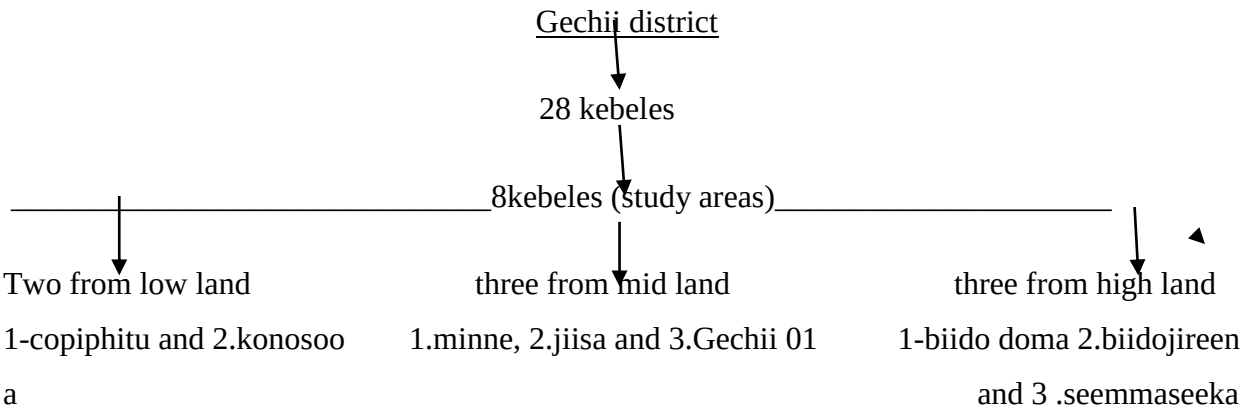
Fig.3.1 Map indicated Gechi district

3.2. Demography of the District

Gech district is divided into 28 Kebeles of which 27 of them are settled by farmer association engaging their livelihood by means of agriculture and one urban center Gechi town of Gechi district serving as capital town and center of administration. Based on a population and housing census of 2007 GC, the total population of this district was about 90,314 with the composition of 49%male and 51% of female population, which is almost equal. The total area of this district is about 48,652.7 hectar sharing 2.7% of the total area of Bunobedelle Zone (Gechi district administration and Agricultural Development Office, 2010). The local people are mainly engaged in growing crops, animal husbandry and beekeeping. Lowland areas of this district are experienced by different types of crops, but mainly used for commercial purpose. Even if it is not well known, tourist attraction sites in this district but it would be playing some role for the economic development and improvement of livelihood of the population of Gechi district.

3.3. Study Design and Sampling Techniques

The study designed community based cross sectional design was used to describe the beekeeper's characteristics and to assess beekeeping management and its production. The information was collected then organized and analyzed accordingly. From all district kebeles eight were selected purposely as a sample depending on variation in agro-ecology and honey production potential (2kebeles from low land, 3kebeles including municipal town from mid land or temperate and 3kebeles from high land). Individual beekeepers from micro enterprises also included in the sample. Structurally design as follows.



3.4 Sample size selection

Sample size was determined purposively to join necessity sample from study area. Micro-enterprise beekeepers and more beekeepers from ecologically selected areas were included. Each individual selected area (farmer association) kebeles of Gechi are divided in to three zones, one manager and one DA workers of FTC. 1 manager, 3 zone leaders and 1DAworker (5 from each individual kebeles). then 35 from farmer association management and 3 of them are district livestock worker expert. Totally 38 leaders were selected for questionnaires and interviews. Beekeepers at least two from each zone, those more honey reproductive 2×3= 6 then six from each kebele, seven sample kebeles then 7×6=42 of them are beekeeper samples and 13 are additionally one up to four from five kebeles, because more production and hives contain bees are present. Especially low land areas harvest high production, midland areas participate with organization so 42+13= 55 from farmer association kebeles others from 38 personal samples, 1 from municipal town. The rest 153 micro enterprises are also from farmer association kebeles. Totally 247 samples were selected.

The samples were

Six from each seven kebeles 6 ×7=42

this indicate six samples from one rural kebele so seven kebeles were selected study areas and additional samples which have more hives of beekeepers are =13 these are from low land konooso 4 and chophitu also 4, ,from mid land that is from jiisaa 2and from minnee 2 next from high land seemma seeka 1samples are added.

1 from municipal town =1

Others were parts of management and leader in each seven kebele also they are give information deeply on my study they are

1manager, 3zone leader, 1DA worker from each kebeles so 5× 7=35

The rest were three livestock workers from Gechii district office =3

Micro enterprise beekeepers from sample area = 153 these are no microenterprise in low land but in mid land Jiisaa 59, in minnee 19 from high land in Biddodooma 20 Bidojireen 10and seemmaseeka 45

Total samples are =247 Table 3.1 and table 3.2 express all these samples.

Table 3.1 Total numbers of sample respondents

NO.	Respondents	Methods of data collection	Total number of respondent
1	Beekeepers	Questionnaires	209
2	Gechi district livestock and fishery development experts	Interview and questionnaires	3
3	Kebele manager and other personal workers (DA, FTC workers and kebele zone leaders).	Interview questionnaires and focal group discussion	35
	Total		247

Table 3.2 ecologically distribution of samples, personal worker and livestock experts

Study area		Samples of beekeepers	Microenterprise samples of beekeepers		Personal worker and livestock experts
Ecological area	Kebele	Sex	Kinds of microenterprises	Sex	Sex
Highland	Seemaseeka	Male = 7 Female = __ Total = 7	AGP1	Male = 13	Male = 5
				Female = __	Female = __
				Total = 13	Total = 5
			AGP2	Male 12	Male =
				Female =__	
				Total = 12	
			SLM1	Male = 5	
				Female = 3	
				Total = 8	
			SLM2	Male = 5	
				Female = __	
				Total = 5	
			SLM3	Male = 7	
				Female = __	
				Total = 7	

Study area		Samples of beekeepers	Microenterprise samples of beekeepers		Personal worker and livestock experts
Ecological area	Kebele	Sex	Kinds of microenterprises	Sex	Sex
Highland	Biidodooma	Male = 6	AGP1	Male = 6	Male = 4
		Female = _-		Female = 4	Female = 1
		Total = 6		Total = 10	Total = 5
			SLM1	Male = 7	
				Female = 3	
				Total = 10	
	Bidojireen	Male = 6	AGP1	Male = 7	Male = 4
		Female = __		Female = 3	Female = 1
		Total = 6		Total = 10	Total = 5

AGP=Agricultural growth product. SLM=Sustainable land management

Study area		Samples of beekeepers	Microenterprise samples of beekeepers		Personal worker and livestock experts
Ecological area	Kebele	Sex	Kinds of microenterprises	Sex	Sex
Mid land	Jiisaa	Male= 8	AGP1	Male= 16	Male= 5
		Female= ____		Female= __	Female= __
		Total= 8		Total= 16	Total= 5
			AGP2	Male= __	
				Female= 13	
				Total= 13	
			SLM1	Male= 8	
				Female= 2	
				Total= 10	
			SLM2	Male= 12	
				Female= 8	
				Total= 20	

AGP=Agricultural growth product. SLM=Sustainable land management

Study area		Samples of beekeepers	microenterprise samples of beekeepers		Personal worker and livestock experts
Ecological area	Kebele	Sex	Kinds of microenterprises	Sex	Sex
mid land	Minne e	Male= 8	AGP1	Male= 6	Male= 4
		Female= __		Female= 2	Female= 1
		Total= 8		Total= 8	Total= 5
			SLM1	Male= 11	
				Female= __	
				Total= 11	
	Gechi (01)	Male= 1	There is no microenterprise	There is no microenterprise	Male = 3
		Female= ___			Female = __
		Total = 1			Total = 3

Study area		Individual Samples of beekeepers	Samples of Microenterprise samples		Personal worker and livestock experts
Ecological area	Kebele	Sex	Kinds of micro enterprises	Sex	Sex
Lowland	Coophi xuu	Male= 10 Female= ___ Total= 10	There is no microenterprise		Male= 4 Female= 1 Total= 5
	Konoos oo	Male= 10 Female= ____ Total= 10	There is no microenterprise		Male= 5 Female= __ Total= 5
Total		Male= 56 Female __ Total = 56		Male = 108 Female = 45 Total = 153	Male= 34 Female= 4 Total= 38

3.5 Data collection instruments

Qualitative and quantitative data collection methods were used to collect relevant data. Observations, in-depth interviews, semi structured questionnaires, and focus group discussions (FGDs) were used as data collection together primary data from study participants.

Plate 3.1study participants by district expert

3.6 Data collection methods

Data was collected by using interview to key informants (satellite agricultural developments agents located in each kebele, district agricultural development focal persons) and house to house survey of selected beekeepers. Checklist was prepared in advance consisting of different questions in English language and translated to afaan Oromoo language for each category of the key informants that help to conduct key informant interviews.

A semi structured questionnaire was prepared and included questions about honey production systems, beekeeping management and beekeepers about beekeeping practical activities. To conduct the house hold survey field guide person was selected from the study area. The selected respondents were interviewed through semi structured questionnaire.

3.7 Data analysis

Data was analyzed and interpreted by qualitative (descriptive) method and quantitative (percentage, frequency, tabulation and ratio) methods using Microsoft office excel2010 software. Calculations of the percentages and frequency of counts were used to arrive at a general picture for the generation of conclusion and used as a tool for analysis of quantitative data. The qualitative data collected from interviews, focus group discussions and direct observations were analyzed using descriptive statistics. In general, close ended questions were analyzed through table and express its discussion results. Open-ended questions including interview and observations were analyzed using descriptive methods.

4 Results

4.1. Socio demographic characteristics of the respondents

The age and sex ratio of sampled house hold beekeepers were shown in Fig 4.1A. And educational statuses of sampled house hold beekeepers were shown in graph 4.1B. The age sex ratio of the respondents ranges from 15 to 70years. The majority of the beekeepers (90%) were below 50 years old. While the rest respondents were above 50years old. The sampled house hold beekeepers were gender biased such that about 78.5% were males and 21.5% were females. Implying that in the study area honey production was dominated by male. Female were not encouraged to be involved in honey production business.

Regarding educational status of the beekeepers about 27 (10.93%) did not attended the school and about 81 (32.8%) of respondents took informal adult education, which enabled them to write and read somehow. These households who got a chance to go to school grouped in to primary school; first cycle education (1-4) and second cycle primary education (5-8) learners were 56(22.7%) and 47(19.02%)respectively. 25(10.12%)were reach secondary school(9_12). 7(2.83%) were reach TVT/College level. There is only 4(1.6%) reach university.

Table4.1 Age, Sex ratio of samples of beekeepers and respondent

Study areas		Sample of beekeepers			15_____30yrs			31_____50yrs			Above 50yrs		
Kebele	Ecological area	Male	Female	Total	Male	Female	Total	Male	Female	Total	Male	Female	Total
Bidoojireen	Highland	16	5	21	5	2	7	9	3	12	2	__	2
Seemaseeka		54	3	57	22	__	22	29	3	32	3	__	3
Bidodooma		17	14	31	6	4	10	8	10	18	3	_	3
Jisaa	Midland	49	23	72	16	8	24	29	15	44	4	_	4
Minnee		29	3	32	9	1	10	14	3	17	5	__	5
Town		4	__	4	1	__	1	3	__	3	_	_	_
Konoosoo	Lowland	15	__	15	5	__	5	7	__	7	3	___	3
Coophixuu		14	1	15	4	_	4	6	__	3	5	_	5
Total		199	48	247	68	15	83	103	34	139	25	__	25
Percentage					33.6			56.15			10.25		

Table 4.2 educational socio demographic respondents

Study area		Did not attend	Only read and write	Grade1-4	Grade5-8	Grade9-12	TVT/college	University
Ecological area	kebeles							
Highland	Biidojireen	__	6	4	6	4	1	__
	Seemaseeka	7	21	13	12	3	1	
	Biidodooma	9	10	5	4	2	1	_
Midland	Jisaa	6	29	15	14	7	1	
	Minnee	3	7	8	7	6	_	1
	Town	_	_	_	_	_	1	3
Lowland	Cophixuu	2	3	6	2	1	1	_
	Konoosoo	_	5	5	2	2	1	_
	Total	27	81	56	47	25	7	4
	Percentage	10.93	32.8	22.7	19.02	10.12	2.83	1.6

4.2.1 Response on amenity of Gechi district for honey production and types of hives used by the beekeepers.

Table 4.2 demonstrated that Gechi district was acquiesces for honey production and types of hives the beekeepers of the district were used. All the respondents (100%) disclosed the Gechi district has suitable conditions for honey productions. This is because there are dense forests. From this forest they can get materials easily for hive making, bee's food from forest flowers earned. Also large trees used for placement of hives large bee colonies, availability of food and water for the bees and also convenient environmental conditions.

Types of hives beekeepers used in Gechi district are different in different ratios. Among these 31.17% of them were users of the traditional hives only. There are no beekeepers that were used modern hives alone. But beekeepers which used traditional and transitional hives were 28.34% others which used modern and traditional hives were 31.58%. Few respondents 8.9% used all the three kinds of hives. This indicated

- Most Beekeepers contain at least two types of hives.
- In this district with numbers there are more traditional hives.
- In recent time beekeepers practices translate their methods of honey production .because translate their hives from traditional to transitional hives.

Table4.3 amenity condition indicate in Gechi district

Does Gechi district have amenity condition for honey production	Kind of response	No. of responses' in ecological areas			
		Highland	Midland	Lowland	Total
	Yes	109	108	30	247
	NO.	____	____	___	____

This data shows as we have seen all ecological places are favorable for honey production system and bee keeping management. This means not saying there are not constraints in the district .but it means for making hives they can get necessity materials in all ecological places according to different areas they can get different materials. In all areas they can got places for staying hives of them at least for the two kings of their hives and also they can get nectar flowers and other kinds of food for their colonies $3/4^{th}$ of the year. So beekeepers can harvest two times per year and can get enough honey and earn money for surviving life.

Table4.4Types of hives used by the bee keepers in Gechi district

Types of hives	Study area		No. of respondents			Percentage
Traditional hives only	Ecological	Kebele	Male	Female	Total	
	Highland	Seema	12	__	12	4.9
		Bidodoo ma	10	_-	10	4
		Bidojiree n	10	__	10	4
	Midland	Jiisa	12	__	12	4.9
		Minnee	8	__	8	3.2
		Gechi 01	__	___	__	
	Low area	Coophixu u	10	__	10	4
		Konooso o	15	__	15	6.1

Types of hives	Study area		No. of respondents			Percentage
Transitional and Traditional hives	Ecological	Kebele	Male	Female	Total	
	Highland	Seema	12	__	12	4.9
		Bidodoo ma	8	__	8	3.2
		Bidojiree n	6	__	6	2.4
	Mid land	Jiisa	31	__	31	12.6
		Minnee	8	__	8	3.2
		Gechi 01	__	__	__	
	Low area	Coophixu u	5	__	5	2
		Konooso o	__	__	__	

Types of hives	Study area		No. of respondents			Percentage
Modern and Traditional hives	Ecological	Kebele	Male	Female	Total	
	Highland	Seema	20	3	23	9.3
		Bidodoo ma	8	__	8	3.2
		Bidojiree n	3	__	3	1.2
	Midland	Jiisa	3	23	26	1o.5
		Minnee	11	13	24	9.7
		Gechi 01	4	__	4	1.6
	Low area	Coophixu u	___	__	__	
		Konooso o	__	__	__	

Types of hives	Study area		No. of respondents			Percentage
All three kinds of hives	Ecological	Kebele	Male	Female	Total	
	Highland	Seema	10	__	10	4
		Bidodoo ma	5	__	5	2
		Bidojiree n	2	__	2	0.8
	Midland	Jiisa	3	__	3	1.2
		Minnee	2	__	2	0.8
		Gechi 01	__	___	__	
	Low area	Coophixu u	__	__	__	
		Konooso o	__	__	__	

Plate4.1. Traditional hives

Plate 4.2. Modern and transitional hives with bee colonies.

Modern hive

Transitional hives

Plate 4.3 Transitional hive made from Soyyama (*vernoniahymenolepis*) and forests they used

Plate4.4 Female participant in honey production has traditional and transitional hives. Traditional hive ⇦

Transitional hive ◇

Plate 4.5 Traditional, Transitional and Modern hives.

Traditional hives Transitional hives Modern hive

4.2.2 Responses on placement of hives in Gechi district

Regarding placement of hives, the majority of the respondents (54.66 %) placed their hives under backyard settled for hives, while (7.7%),(2.02%), and (20.24%) of the respondents placed their hives in open space on long tree near to their home, backyard in open space, and backyard under their eaves of home respectively. The rest 15.38% are placed backyard under shelter made for this purpose and backyard under their eaves of home (Table4.2.2)

Table 4.5 placement of hives in Gechi district.

Placement of hives	Types of hives	Low land	Mid land	High land	Total of individual	Total of all kinds.	%
Back yard I n open space on long trees near to home	Traditional	4	10	5	19	19	7.7
	Transitional	___	___	___	___		
	Modern	____	____	____	___		
Backyard in open space	Traditional	____	____	____	____	5	2.02
	Transitional	2	____	___	2		
	Modern	___	3	___	3		
Backyard under shelter made for this purpose	Traditional	10-	10	15	35	135	54.66
	Transitional	30	20	__	50		
	Modern	20	30	__	50		
Backyard under their eaves of home	Traditional	7	5	5	17	50	20.24
	Transitional	12	10	____	22		
	Modern	6	5	___	11		
Backyard under shelter and under their eaves of home	Traditional	9	6	5	20	38	15.38
	Transitional	5	4	__	9		
	Modern	4	5	___	9		

The next Figure indicates placement of hives of beekeepers in Gechi district seen during survey.

Plate 4.6 Traditional hives under backyard settled for beekeeping purpose

Plate 4.7Traditional hives under prepared backyards and an awarded beekeeper**.**

Plate.4.8 placement of hives on long trees near to home

Plate 4.9 Traditional hives under eaves of their home.

Plate.4.10 Modern and transitional hives on open place

Modern hive Transitional hives

Plate4.11Traditional and transitional hives on open place

Plate.4.12Both Modern and traditional hives under eaves of home

4.2.3 Response on materials they used for making hives.

Beekeepers material they used for making hives are almost similar but some differences in ecological place and their economic levels. All modern hives in all places are made from plank. Traditional hives are made from according to material they earned; in high land areas 65.2%they are used bamboo, 34.8% are used Grawa (*vernoniamygdalina*) and other related plants. In temperate or mid land areas 30% they are made from bamboo, 40% made from *verononiа hymenolepis* 30% *are* made from other plants. In low land 60% they are used *vernoniahymenolepis,* 40% are used other plants like stems of maize, Thatcher and others.

In study area generally materials they used for making hives 50 respondents (20.24%) plank, 70(28.34%) bamboo, 23(9.31%) *vernoniamygdalina,* 80(32.39%) vernoniahymenolipes and24(9.72%) are used Thatcher and others. It indicated with Graph4.4

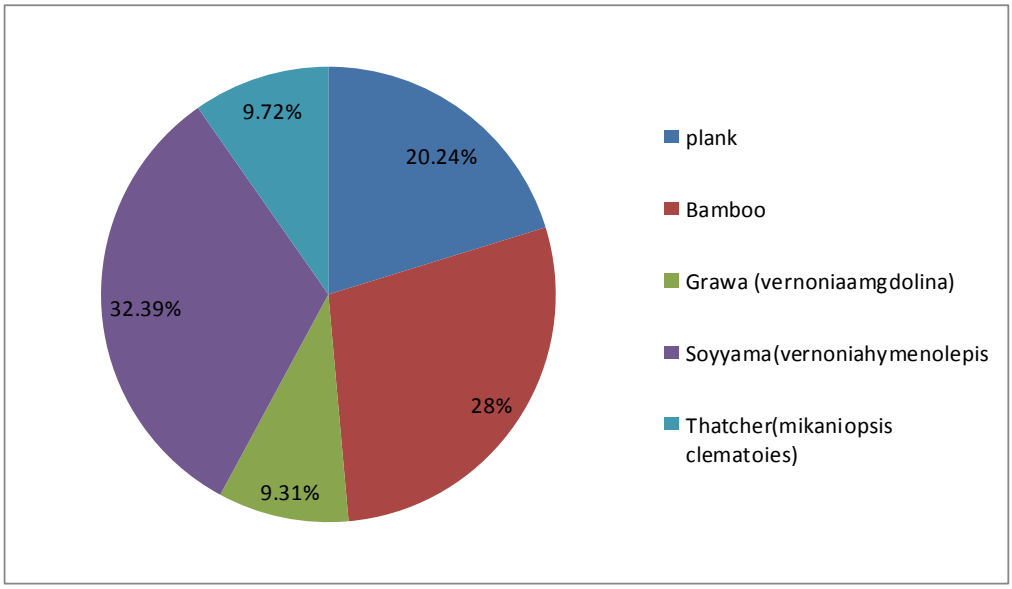


Fig.4.1 material they used for making hive in study area.

Plate.4.13 Bamboo plant (*Arundinaria alpinal*) used for making traditional and transitional hives).

Plate.4.14 Soyyama (vernoniahymenolepis) material used for making traditional and Transitional hives.

Plate4.15Traditional and transitional hives prepare from thatcher and different material

4.3 Response on training given for the bee keepers and problem faced by the beekeepers.

Table 4.5 demonstrates that about 73% of the respondent did not take any kind of training. It is only about 27 % of the respondent got training by AGP. All the respondents' problems are faced similar in all ecological area is inhibition of ants on bees by feeding colonies and honey comb, and there are other different problems are faced in different ecological areas.

Table 4.6Responce on training given for the beekeepers and problem faced the beekeepers in honey production.

			Ecological area			
Have you got training on honey production	Responses	High land	Mid land	Low land	Total	%
	Yes	29	33	5	67	27,00
	No	80	75	25	183	73.00
Have you ever faced problem in honey production	Yes	107	106	30	243	98.4
	No	2	2	__	4	1.6

4.4 Response on limiting factors that affect honey production in Gechi district.

All respondents were asked to list main limiting factors that affect honey production in the study area. (Table 4.4). Among all the limiting factors, the following were the major ones. About 36.44% of the honey was lost by ants, spiders, wax moth, and birds while 16.19%, 7.69%, 16.19%, and 2.83% of the honey was lost by impact of traditional hives, lack of proper management for bees and hives, agrochemicals, (herbicides and other pesticides) and deforestation, respectively. About 5.26%, 4.82%, 6.07%, and 4.45% of the honey was wasted due to decline of bee colonies, feed by monkey, hamma or budger and improper harvesting time respectively. From these pests, the impacts of ants were the very serious problems in the study area. Farmers were commented on the mitigation methods of the limiting factors in honey production such as cleaning apiary site, placing the white ash around hive strand, covering the hive strand, by plastic materials, avoiding bird nest around apiary site, making a hole around apiary site among others.

Table 4.4 Challenges that affect honey production and its mitigation methods.

Reasons for declines of honey production.	Respondents		Management method to overcome the problem by the beekeepers.
	Number	(%)	
Pests	90	36.44%	Cleaning apiary site, placing white ash around hive stand, covering the hive stand by tin or plastic materials, avoiding bird nest around apiary site, making a hall around apiary site.
Traditional method of beekeeping	40	16.19%	By converting traditional hives to modern hives.
Diminish of bee colonies.	13	5.26%	Leaving the larvae in hives during harvesting, By leaving honey comb in hives.
Lack of proper management for bees and hives.	19	7.69%	Continuous monitoring of bees and hives/supervision.
Predators	27	10.93%	Keeping the hives. Mostly afternoon and deam lights.
Medical applications	40	16.19%	Moving honey bee colonies from the spraying area, removing the weed by hand, using this chemical before the plant flowering, cleaning surround hives.
Deforestation/habitat degradation	7	2.83%	Planting tree for bee forage. Conservation of plants.
Improper harvesting time.	11	4.45%	Harvesting the honey on time.

Plate.4.4 plant grown for bee forage

4.5 Respondents response on amount of honey they harvested per year and per hives.

Majority of the respondents 209 (84.62%) harvested below 100Kg.of honey per year, while 30 respondents (12.15%) harvested 101- 200kg. 5 (2.02%) of the respondents harvested 201- 300kg of honey per year. The rest only 3 (1.21%) of respondent harvest301- 400kg of honey per year. (Figure4.7)

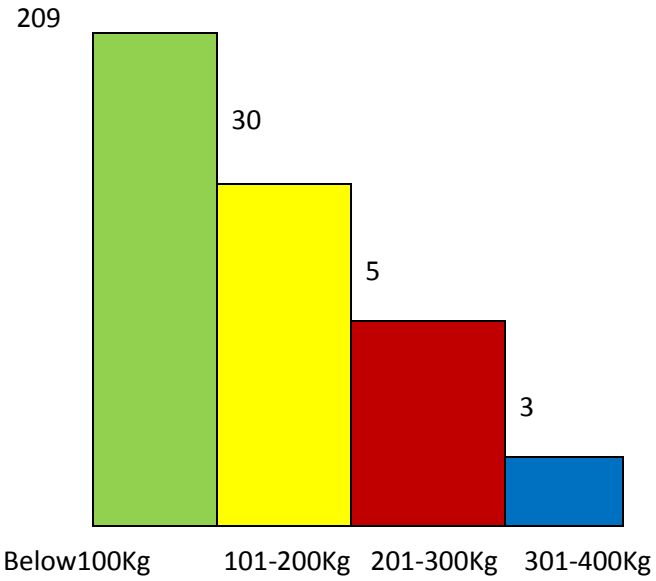


Fig.4,2 Response on amount of honey the beekeepers harvested per year

Table4.5 Response on amount of honey the beekeepers harvested per year from each kind of hives.

Kind of hives	How many kg harvested/year	Number of respondents			Percentage
		Male	Female	Total	
Traditional	3- 5kg	62	18	80	32.39
	4- 6kg	75	18	93	37.65
	5- 8tkg	62	12	74	29.96
Transitional	6- 10kg	1o4	20	124	50.2
	8- 15kg	95	28	123	49.8
Modern	10- 15kg	63	12	75	30.36
	15- 20kg	78	26	104	42.11
	20- 25kg	58	10	68	27.53

Plate.4.5 an Awarded beekeepers in Oromia regional level and FTC workers from Gechi district.

Plate.4.5 Microenterprise beekeepers and DA worker with honey production materials given from AGP.

4.6 Respondent response how many times harvested per year and in which month have got more product (honey),

Duration of harvesting time per year is two times in all areas but the difference is according to ecological area and flowering plants during different flowering period are also different. (table4.6).

Table4.9 Duration of honey harvesting time in different ecological study area.

Different ecological areas and kebeles		Harvesting time(months)	In which month got more production (honey)
Kebele	Ecological area		
Konooso	Lowland	December and February	December
Coophitu		December and February	December
Jiisa	Midland	March and June	March
Municipal town(01)		March and June	March
Minne		March and June	March
Seemaseeka	Highland	March and June	June
Bidodooma		March and June	June
Bidojireen		March and June	June

Table4.10 Flowering plant species used as nectar source by honey bees in study area.

Local name	Scientific name	Flowering period
Girawa	*Vernonia amgdalina*	January to March
Girar	*Acasia seyal*	April to June
Besana	*Croton macrostachyus*	April to June
Wanza	*Cordia Africana*	October to December
Bakela	*Vicia faba*	September to October
Ater	*Pisum sativam*	September to October
Mashla	*Sorghum btcotor*	October to December
Suf	*Carthamus tinctorius*	November to January
Adey abeba	*Bidens pachyloma*	September to November
Nug	*Guizotia abyssinica*	October to December

Plate.4.6 Adeyabeba (*Bidens pachyloma*) Natural flowering species in study area.

Plate.4.6B Nug (*Guizotia abyssinica*) known flowering plant in low land and temperate of study areas.

4.7. Discussion

Honey has high social, cultural and economic value in Ethiopia**.** It has different functions in many traditions such as during marriage, birth and funeral ceremonies. According to Giday and mekonin (2010), honey and bees wax also play a big role in the cultural and religious life of the people of Ethiopia. Honey has been used to generate income, as well as for nutritional and medicinal value for local communities (Benjamin and McCallum, 2008).

The current study has used 247samples of house hold beekeepers and inclusive related person were selected purposively for collecting of data on beekeeping management and its production. About 209 of the beekeepers were selected from total house hold beekeepers of eight selected kebeles, about 28 management worker members, 7 DA workers of FTC selected purposively from kebeles study areas and 3from Gechi district rural and agricultural development (GDRAD) office livestock workers.

The age of the beekeepers is very essential to determine the type of agricultural activities engaged by the beekeepers. The range was 15 to 70years. The report showed that majority of the beekeepers in the study area were productive and active age group and more like energetic in holding their honey production than the old age groups.

Out of the total respondents' 89.75% of the respondents were below 50 years old and 10.25% above 50 years old. This result agreed with the findings of Melaku (2005) who reported that the age groups. Between 15- 60 years were considered as economically active age group. Similarly, Chala (2010) reported that the most productive ages are actively involved being supported by experienced from elders and finally become independent beekeepers. The current findings also demonstrated that sampled house hold beekeepers were male biased such that about 80.57% were males and 19.43% were females. Implying that in the study area honey production was dominated by male and women were not encouraged to be involved in honey production business, since the district was relayed on the traditional methods requires climbing of long trees to hang the hives. It was cultural taboo for female to climb tree in some kebeles in the study area. This result agreed with Hartman (2004) who reported that in Ethiopia traditionally honey production is men's job. Such gender biased practice kept the productivity low.

Education is important to utilize improved honey production technology.For first transfer of knowledge and to increase production and productivity. Regarding educational status of the beekeepers about 11.96% did not attended the school and about 32.8% of the respondents took informal adult education, which enabled them to write and read somehow. Those households who got a chance to go to school grouped in to primary school, first cycle education and secondary cycle education with the proportion of 24.8%, 20.32% and 10.12%respectively. Therefore, most of the beekeepers were an able to read and write. Education encourages beekeeper's ability to access and use information relevant to honey production such as modern beekeeping; while un educated individuals do not access such information. Education barrier brought about sticking to tradition practices by neglecting the modern practice, which ultimately leads to low production and productivity (Ajiao and oladimeji.2013).Similarly, Workineh (2011).Reported that education increases the access to information and thereby raising knowledge of beekeepers regarding improved hive. The Dabessa and Belay (2015) reported similar literacy problem from Walmara district such that about 42.9% of the beekeepers cannot read and write which is in agreement with the current findings. Tessega (2009) reported different scenario from Burie district such that most beekeepers in Burie district can read and write.

Regarding suitableness of the district, all the respondents disclosed that Gechi district has suitable conditions for honey production because presence of forests are sources for large bee colonies staying , availability of food & water for the bees and suitable environmental conditions. Among others Presence of forest increases availability of nectar and pollen for honeybee. Water is essential for honeybee consumption as well as for brood rearing and hive ventilation. In addition to this, bee colonies and suitable environments are the base for honey production. This study agreed with Nuru (2002) who reported that the availability of more honeybee forage results in high honey yield provided that other factors are also suitable for honey production.

Based on kind of hives**,** three types of beehives were used by the sampled beekeeper farmers in the district. These were traditional, transitional and improved (modern) beehives. The study showed that traditional hive was the leading with numbers because almost all beekeepers were used. But regarding materials they used for hives making types of material they use differentiate according to ecological area and economic levels. All modern hives in all places are made from

plank. Traditional hives are made from according to material they earned; in high land areas 65.2%they are used bamboo, 34.8% are used Grawa (*vernoniaanygdalina*) and other related plants. In temperate or mid land areas 30% they are made from bamboo, 40%made from *verononia hymenolepis* 30% *are* made from other plants. In low land 60% they are used *vernoniahymenolepis*, 40% are used other plants like stems of maize and others. In study areas generally materials they used 20.24% plank, 28.34% bamboo, (9.31% *vernoniamygdalina*, 32.39% vernoniahymenolipesand 9.72% are thatcher.

The result showed that all of the beekeepers were used traditional hives, because it's easy to construct, its cost effectiveness and less dependency on external input and also because of expensiveness and unavailability of modern beehives & accessories. This finding agrees with Nuru (2007) who reported that in Ethiopia, the type of beekeeping practiced is largely traditional which is being carried out in traditional hives of different types. Similarly, Gichora (2003) reported that in traditional honey production the hive condition; affect the honey, wax and bee colonies. However, these findings disagreed with Haftu *et al.*, (2015) who reported that about 41% of the beekeepers of the central zone of Tigray used both traditional and modern beehives and the rest 27.7%,

Regarding placement of hives the majority of the respondents (64.6%) placed their hives under backyard settled for beekeeping purpose,. while 9.1%, 23.9% and 2.4% of the respondents placed their hives on long trees near to home, under the eaves of home, and on free open space respectively. The result of the study showed that the majority of the respondents' managements of their hives were not bad but also not very well. For example, they placed their hives on long tree, backyard and under simple shelter is almost similar. Even cleaning of apiary site and arranging of hives under shelter is still very poor. The report showed that the beekeeper of the district did not care for the bee's health and the product harvested from the bee due to lack of management practices & carelessness. This result agreed with Nuru (2007) who reported that, lack of management practices and poor placement of the hives the annual average honey yield per colony is relatively low. Similarly, Tessega (2009) who reported that most of the beekeepers placed their honeybee colonies at back yard and inside the house.

Training can bridge technical gaps and equip the beekeepers with basic knowledge on how to operate improved hives and bee equipment, basic bee biology and honeybee colonies. Regarding training given for the beekeepers, majority of the respondents (73%) did not take any kind of training. It is only about 27% of the respondents got training on honey production and management. The trainers are not continuously applied for more than one or two years. This means that the district Livestock and Fishery Development office has not given an attention for continuous expansion of modern honey production method.

Different factors endanger the life and products of honeybee in the study area, from this the existence of pests and agrochemicals are the major challenge to honey bees and their products. With respect to problem faced the beekeepers, almost all beekeepers faced honey production problems. They listed out pests like ants, beetles, spiders, honey badgers, birds, lizard and monkeys. This result agreed with Dasalegn (2001) who reported that Ethiopia is as one of the sub-tropical countries where the land is not only favorable for bees but also for different kind of honeybee pest and predators that are interacting with the life of honeybees.

The result of the study indicated that, there were a number of limiting factors that reduce amount of honey produced in the study area. From these, the major limiting factors were; impact of ants, spider, wax moth and birds, traditional method, lack of proper management for bees and hives, Herbicides /other insecticide and deforestation with the proportion of 36.44%, 16.19%, 7.69%, 16.19% and 2.83%, respectively. About 5.26%, 6.07, 4.45% and 4.86% of the honey was wasted due to decline of bee colonies, Hamma (budger), improper harvesting time and monkeys, respectively. From these pests, the impacts of ants were a very serious problem in the study area. Insect pests were the primary factors that limit honey production because they may cause total migration of bees from the hives. This finding agreed with kerealem (2005), who reported that ants, honey badger, Bee-eater birds, wax moth, spider and beetles were the most harmful pest and predators for bees and their product. Similarly, Workneh (2011) reported the existence of these pests inAtsbiWomberta district which is in agreement with current findings. Similar result was reported by Desalegn (2001), in which ants were found to be the first ranked pest in his study area. As information was gathered from the respondent's deforestation was carried out for different purpose in study area like; for farmland, construction, charcoal and timber making. This causes shortage of bee food and decline of the number of bee colonies. This implies shortage of

bee food was directly related with deforestation. This finding agreed with, Tessega (2009); Haftu and Gezu (2014) who reported that the shortage of bee forages, drought, pesticides and other herbicides application, lack of water, decreasing in number of bee colony, lack of improved beehives and poor management as reasons for the products and honeybee population decline.

The district farmers are producing mainly teff, wheat, barley, chickpea and different horticultural crops. They use of chemical spray such as pesticide and other herbicide for pests and weed controlling. This has two disadvantages. Herbicide chemical destroys bee forage like herbs and shrubs, which is used as sources of pollen and nectar. The use of pesticides for protection of tsetse fly &mosquito directly kill honey bees and herbicides are not toxic to bee colonies but destroy many plants that are valuable to bees as sources of pollen and nectar. Examples of these chemicals are; Sevin, malathion, DDT, 2-4D and Acetone. Some of the beekeepers totally lost their bee colonies due to these agrochemicals (Kerealem et al., 2009). The beekeepers said that a number of bee colonies either die or absconded from their hive due to extensive use of agro-chemical in the district. This result agreed with Nuru (2007) who reported that agro-chemicals and deforestation reduce the number of honey bee colonies, which result low honey production. To overcome these problems the beekeepers used these chemicals far from apiary site. There is also different varieties of pests were found in the study area, which challenges honeybee and reduce their product. Among those; ants (*Formicidae*) 54.2%, beetle (*Aethina tumida*)6%, waxmoth *(Galleria mellonella*)7%, honeybadger (*Mellivo ra capensis),*8%, spider *(Araneae)*3%,lizard (*Lacertilia*)6%, termite (*Isoptera*)5%, bird *(Merops ornatus)4%* , monkey 8% and snake (*serpents*) 0.8%, respectively.

Ants, honey badger, monkey and wax moth significantly effect on honey yield since they highly limit the activity of bees or cause absconding. Honey badger –this nocturnal animal break hives at night and consume honey, bee-eater bird-this bird stay around apiary site and catch and eat the bees, termite-destroy the hive and hive stand. To mitigate the problems, the beekeepers had different **methods of controlling** the pests that limit honey production in the study area. These were cleaning around apiary site, cleaning the hives, using white ashes as repellents of ants and moving honeybee colonies from spraying area. This finding agreed with Gidey and Mekonen (2010) reported that traditionally, farmers have their own control means of pests including the

application of ash, rope around entrance of hives (hanging the predator's neck) and using insect repellents.

As the beekeepers said that, they did not properly know the **time of harvesting** of honey and they detected harvesting period by smelling and by observing the concentration of honeybee colonies around beehive entrance and the defensiveness of honeybee, which decline the economy of beekeepers.

Poor access to material and technical support is the factors that cause great challenge to the beekeepers who adopted improved honey production practices. Regarding support given for the beekeepers, majority of the respondents 97.6% did not obtain any support from the government to overcome some of the limiting factors in honey production, but about 2.4% of the beekeepers had support from government and also get by award. Lack of beekeeping material and financial support from government for the beekeepers had its own impact on quantity and quality of honey produced. This result agrees with Haftu and Gezu (2014) who reported that farmers did not have any type of improved beekeeping equipment in Hadya Zone.

Majority of the respondents 84.62% harvested below 100kg of honey per year, while 12.15% and 2.02% of the respondents harvested 101-200kg and 2001-300kg of honey per year, respectively. Only three beekeepers produce above 3ookg per year done as family group work. This implies majority of the beekeepers did not harvest enough honey in the study area because they used traditional technology and due to impact of pests. This result agreed with Nuru (1999) who reported that low product and low quality of honey were the major economic impediments for the beekeepers. The respondents also said that, 5-10kg, 10-15kg and 18-25kg of honey were harvested from traditional, transitional and modern beehives, respectively based on availability of bee forage. However, they relayed on traditional hives, which lead to low quantity and quality of honey. Similar finding was reported by Beyene and Verschuur, (2014) in which 5kg, 10kg and 16kg of honey was harvested from traditional, transitional and modern hive, respectively in Wonchi district Shewa zone.

5. Conclusion and recommendation

5.1 Conclusion

Gechi district has adequate natural resources, long tradition culture of honey production. However, the district and the rural beekeepers in general did not fully benefit from this apiculture sub sector. Because they use traditional methods, lack of training, lack of material and technical support from concerned bodies. The finding revealed assesses beekeeping management practice and honey production system in the study area.

Concerning improvement product of honey production, education is necessary for development of everything. In other side participation of females are necessary. So on beekeeping management practice and honey production system is individually 100%it is not known. Because all of them start from traditional hives and traditional beekeeping system. The presence samples of the study is government make them start female participation organizing them with micro enterprises under AGP and SLM programs.

Government pursuit apiculture in this district is well planed program previously and also up to resent time. Gechi district is first from the rest district from buno bedelle zone of south west Oromia regional state. There is an award beekeepers' present in this study area. But participating of beekeepers get focuses in a few ecological area. So to change from traditional to modern production organization is necessary. This improvement method should be applicable in all areas and following them by Gechi district (GDAGDP).

The result showed that majority of the rural beekeepers engaged in traditional method, this study also shows that pests like ants, beetles, wax moth, spider, honey badger and lizards were limit honey production activities. In addition to this, improper placement of hives, lack of training &support, were also the factors that limit honey production in the study area. To mitigate the challenges, the beekeepers used their own indigenous knowledge to minimize some of the limiting factors. The study revealed that traditional, transitional and modern beehives were used by the beekeepers for honey production. The current study also showed that modern and transitional beehives give more honey production than traditional beehives. Despite all the limiting factors and challenges currently facing the beekeepers, there are still many opportunities and potential to improve the production system and quality of hive products.

5.2 Recommendations

Based on the result of this study, it is recommended, therefore, to increase beekeeping management, to increase productivity and to improve the economy of the beekeeping recommendations can be given:

1 Gechi district livestock and fishery, development office should give enough attention by giving sufficient training and continuous assistance for the beekeepers.
2 Adequate supply of modern beehives, encouraging participation of households in honey production and increasing their bee product through practicing and regular training on ways of mitigate the limiting factors.
3 The district livestock office should encourage women participation in honey production through provision of training and modern beehives.
4 The beekeepers should give attention for honey production activities in transferring traditional hives to modern bee hives.
5 Increasing production and quality of honey by improving management practices, placement of beehives and environmental conservation.
6 Emphasis should be given to continuous training and support for farmer beekeepers on how to use modern honey production technology to enhance quantity and quality of honey.
7 The beekeepers should participate this field as livelihood outlook from seen as pensioner instead of more adulthood; more adolescence should be participating on them.
8 The beekeepers would use the biological method instead of chemical that affect the bee around apiary site, cleaning hives area and planting bee forage.
9 Developing indigenous knowledge in supporting by scientific method to control the limiting factors.
10 Other researcher may continue the research for further investigation on beekeeping management in the district.

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7. Appendix

Gafille sasabii raga Gaguurtudhaaf. (Questionnaires' for beekeepers).

Kaayyoon sassaabbii raga kana kunuunisa bulchinsa kaniisa fi bu'aawwan omiisha isa Aanaa Gachii Ganda _____ti argamu taasiisudhaaf.

Gaffiwaan kun kan deebisamanu namoota gaguurtu filatamaan Ganda _____keessatiin.

Sababiin isaas qulqullina galma ga'uun qorannoo kana odeeffannoo nu kennitanu irrati waan hunda'uuf. Ragaafi deebiin keessan kayyoon isa qoranno kana qoofaafi akka ta'e waada kanaan isiini galu yommu ta'u ,yaado tokko malle of amanamuumadhan deebii keessan akka naaf lataanu isiin hubachiisa.Gafiiwwan deebii murta'a qabanuuf mallato**X** fayyadamuun sanduuqa keessa akka guutanu ta'e ,kan ibisa barbadaanuuf bakka isaani keenameeti akka deebistannu hata'uu.

Maqaa keessan barreessun barbaachisa miti.

Malaaku Bahullu Lakk.Bil. 0917781267

I. Oddeffannoo nama deebi kennu

1 Ganda keessa jiratu _____

2 Umurii 15---30 ☐ 31---50 ☐ 50 OLI ☐

3 Saala Dhiira ☐ dhala ☐

4 Sadaarka barnoota :-

A Mana barumisa hinseenne. ☐ D 5___8 ☐

B Dubbisuufi barressu qoofa ☐ E 9___12 ☐

C 1_____4 ☐ F TVET |college ☐

G University ☐

II. Gaffille raga kunuunsaafi bulchinsa kaniisa.

1 Gandi_____ kunuunsaafi bulchinsa kaniisatiif mija'adha?

Eeyee_____ Lakkii_____

2. Deebbiin kee gafii 1ffaa Eeyeeni yoo ta'ee maal maaltu mija'adha?Lakkii yoo ta'ee maaliif ?

A_____

B_____

C_____

3 Gosa gaagura kamiin fayyadamita?

A) Bartee| Aadaa B) Ammaya'aa C)Lammaniyuu

4 Gosa gosa gaguuratiin meeqa qabdaa? A. kan Aada_____ B. kan ammayaa'a _____ C. kan biroo____

5 Gaguura atii fayyadamitu kuni maali irra tolfaama? Kaan Aadaa _____, _____,_____, _____ irrat. Kaan Ammayya _____,_____,irrati Kaan biroo yoo jiiratee ibiisa._____

6 Gaguurawwan kee essati kunuunisita?deebiin kee tokko oli ta'u nidandaa'a.

A Golgee baka banatii _____

B Golgee haguugama gaguurafi kan qopha'eeti._____

C Mukaa irratti mana Jireenya irra fageesame _____

D Bakka biro yoo jiratee ibisii _____

7 Leenji gaguura gaguruu irrati leenjiteeta? A eeyyee_____ B lakii _____

8 Gafii 7^{ffa} irrati deebiin kee Eeyeen yoo ta'e bu'a irra argate maal maali?

A_____

B_____

C_____

9 Rakkoon hanga yoowanna omishaa dammafi kaanisaa kunuunissuf si qonname jira ?

A eyyee _____ B lakkii_____

10 Gaaffii 9^{ffaa} dhaaf deebiin kee Eeyeeni yoo ta'e rakoollen kun maal maal?

A_____

B_____

C_____

D _____

11 Kaneen armaan gadii keesa Rakoowaan kunuunisa kaniisaa fi omishaa damma irrati dhiiba isiin irratti fidaanifi hinfinee kamii? Warra dhiiba sitti fidaan akaamiin akka danddamatee , ittisuuf furmata fudhatee guuti.

NO.	Wantoota omisha damma irrati dhiiba fidaan	Dhiibaqabuykn hinqabaan	Yoo dhiiba qabate Akkamiin To'atee?
11.1	Haala bartee ykn adaatiin kaniisa kunuunisu		
11.2	Goonda, Baraariifi Alatiidhaan kaniisin nimiidhamu(nigodaanu)		
11.3	Gurmuun kaniisa dhumu(simanna dhiisu)		
11.4	Jijiirama qilleensaatiin		
11.5	Dalijeessan		
11.6	Summi farra ilbiisootaafi Aramaatiin		
11.7	Hir'ina nyaata kannisatiin		
11.8	Qisaasa'inaa bosoona mancaasuu.		
11.9	Yeero malee damma muruu		
11.10	Kan biiroo yoo jiratee		

12 Jereen armaan olii keesa kamitu caala omisha damma irrati miidha qaba?

_____

13 Mootumaan furmata rakko kanaaf deegarsa isiinif nitasiisa?

A Eeyee ____ B Lakki_____

14 Yoo deebiin kee gafii 13ffaa Eeyee ta'ee wantoota sideegaraan tarreesi.

A_____

B _____

C_____

15 Waggati damma k.g hagaam omiishita? A 10____100 _____ B 1o1__200 ____

C 201__300 ____ D 301___400 _____ E 401___500_____ F 501 fi isa olii ____

16 Waggati si'a meeqa omiishituu _____

17 Ji'a kamiin kamiin keessati omiishitu? _____ _____ _____

18 JI'a isa yeeroo kamiitu omiisha baay'ee argamsiisa?_____

19 Gaguura kamiitu omiisha baay'ee Argamsiisa? _____

20 Omiisha isa xiiqa keennuni hagaamiin waal busuu(waal caalu)? _____

21 Maliif isa omiisha xiiqaa keennu fayyadamita?

I. GAFFII DHUNFA(PERSONAL QUESTIONNARES)

Gaffille hoojeta miisomaatiin,Durata'aGandaatiifi Durata'oota Zoonii Ganda tiin deebisamu (questionnaires for workers of FTC,Kebele managerand leader of each zon in kebele's)

Kayyon gafille kana kunuunisa bulchinsa kaniisa fi bu'aawwan omiisha isa Aanaa Gachii Ganda _____ti argamu ragalle sasaabuudhaaf.

Sabaabni isaas qulquliniifi galma ga'uun qooranno kana odeefanno nu keenitanu irrati waan hunda'uuf. Ragaafi deebiin keessan kayyoon isa qoraanno kana qoofaafi akka ta'e wada kanaan isiini galu yommu ta'u ,yaado tokko malle of amanamuudhan deebii keessan akka naaf lataanu isiin hubachiisa.Gafiiwwan deebii murta'a qabanuuf mallato**X** fayyadamuun sanduuqa keessa akka guutanu ta'e ,kan ibisa barbadaanuuf bakka isaani keenameeti akka deebistannu hata'uu.

Maqaa keessan barreessun barbaachisa miti.

Mallaku Bahullu Lakk.Bil. 0917781267

I. Odeefanno nama deebi keennu

1 Ganda keessa jiratu _____

2 Umurii:- 15---3 0 ☐ 31---50 ☐ 50 OLI ☐

3 Saala Dhiira ☐ dhalaa ☐

4 Sadaarka barnoota :-

A 1____4 ☐ C 5___8 ☐

B 9___1 ☐ D TVET |college ☐ E. University ☐

II. Gaffille raga kunuunsaafi bulchinsa kaniisa.

1 Gandi_____kunuunsaafi bulchinsa kaniisatiif mija'adha? A Eeyee ___ B.Lakkii_____

2. Deebbiin kee gafii 1ffaa Eeyeeni ykn Lakkii yoo ta'ee maal maaltu mija'e? ykn maaltu hinmijofinne?

A_____

B_____

C_____

3 Ganda_____Zonii_____keessa manneen abba warra meeqatu jiiru?_____ A) Abba warra kana keessa Gaguurtooni meeqaatu jiiru?_____

B)Gaguurtoota kana keessa gaguura shaaniifi isaa oli kan qabaanu meeqaa?_____

4 Gaguurtoni Gosa gaagura kamiin fayyadamu?

A) Bartee| Aadaa _____ B) Ammaya'aa _____ C)Lammaniyuu _____

D)Gaguura ammaya qoofa kan faayadamanu meeqa?_____

E) Gaguura bartee ykn adaa qoofa kan faayadamanu meeqa?_____

F) Gaguura ammayafi adaa (lammannu)kan faayadamanu meeqa?_____

G)Gosa biroo kan faayadaman yoo jirate gasa isa ibisi _____

5 Gaguura jeera maali irra hojeetu?

A_____B_____

C_____ D_____

6 Gaguurawwan jeera essati kunuunisatu?deebiin kee tokko oli ta'u nidandaa'a.

A Golgee mana jalati _____

B Muka irrati manati dhihooti _____

C Golgee haguugama gaguurafi kan qopha'eeti._____

D Mukaa irratti mana Jireenya irra fageesame _____

E Bakka biro yoo jiratee ibisii _____

7 Rakkoon hanga yoowanna omishaa dammafi kaniisa kunuunissuf ganda kanaati qonname jira?

A Eeyee _____ B Lakii_____

8 Gafii 7ffaa dhaaf deebiin kee Eeyeeni yoo ta'e rakoollen kun maal maal?

A_____

B_____

C_____

D _____

9 Wantooni kunuunisa kaniisafi omisha damma irrati dhiiba fidaan maal maalidha

---

_____

10 Jerren caqaasite keesa kamiitu caala miidha geesiisa?

_____

_____

11 Kara mootumaa ykn ogeesatiin furmata rakko kanaaf deegarsa tasiistaniif jiira?

A Eeyee ____ B Lakki_____

12 Yoo deebiin kee gafii 9ffaa Eeyee ta'ee wantooni isin deegartaan maal fa'i ?

A_____

B _____

C_____

13 Waggati si'a meeqa omiishu? _____

14 Ji'a kamiin kamiin keessati omiishu? _____ _____

_____

15 JI'a isa yeeroo kamiitu omiisha baay'ee argamsiisa?_____

16 Gaguura tokko keessa wagaati Damma hagam omishuu?

A)Kan Adaa keessa _____Kg hanga _____Kg

B) Kan amaayya keessa_____Kg hanga_____Kg

17.Maliifgaaguraisaomiishaxiiqaakeennu fayyadamu? _____

_____

18 kunuunisafi omiisha damma irrati ganda kana waggadhaan ammam dabala(jijjiirama)qaba?

_____

19 Kan biroo kunuunisa kaniisatiif omiisha isaanii ilaalchisee yaada dabalata yoo qabatee na tareesi.

Lakk.

Guyyaa.

Hojetoota misoomaafi durata'a Gandaa_____tiiif.

_____

Dhimmiisa Atooma barbaachiisa akka tasiistannuuf isiinit beeksiisu ta'a.

Akkuma armaan oliiti ibisuuf yaleeti barsiisa Malaaku Bahulluu barsiisa mana barumisa Gachiisad.2ffaa

Yommu ta'an qorannoofi qu'anno wa'ee kunuunsa kaniisafi omiisha isaaniraati qu'annoo gageessa waan jiiranuf yommu gara gandaa keessani dhufaannu waan isaan barbaachiisu irraati atooma akka tasiistannuuf isiin beeksiifina.

Naaga wajjiin

II. ግለሰብተኮርየሆኑጥያቀዎች

በገቺወረዳግብርናጽ/ቤትየእንስሳትዓሣሀብትልማትቢሮሠራተኞችየሚቅርብጥያቄ

የዝህጥያቄዓላማበገቺወረዳየንብማክብአያያዝናወጤታቸውከግብየሚፎርሰወለጥናታዊፅሁፍበምትሰጠዉሚጃላይየ
ተመረኮዘስለሆነነዉ

1 በገቺወረዳየንብማክብናማርማምረትበሁሉምቀበሌይገኛል;-አዎን ----------አይደለም ----------

2 ለ1ኛጥያቀመልስህአዎንከሆነየመጎብኘትምክንያቶችምንድናቸዉ

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3 ሌላሥራንሳይጨምሩበንብማክብብቻየሚሠዳደሩበወረዳወአሉ;----------

ካሉምንያህልናቸወወንድ,---------- ሴት---------- ድ----------

4 ንብአናቢዎችየሚጠቀመትየቀፎዓይነትዬትኛዉን ዉ

ሀ)ተለምዶአዊለ)ዘመናዊሐ)ሁለቱምመ) ተሸጋጋሪሠ)ሁሉምለላምካለይግለጠት

5) የቀፎዎቹዓይነቶችየአገልግሎቁይታቸወለምንያህልጊዜነዉ

ዓመትየሚይሞኩከሆነ ለ----------ወራትነዉ

ዓመትናከዚያበላይከሆነ ለ----------ዓመታትነዉ

6) የምርትመጠፍቸወበአማክይበዓመትምንያህልኪሎግራምይሆናል;

ከባህላዊቀፎ----------ኪግከዘመናዊቀፎ----------ኪግከለሎችቀፎዎች----------ኪግ

7 ከእነኝህወስጥበአብዛኛወየሚጠቀመትዬትኛዉንነዉ ----------
8,አነስተኛምርትየሚጠዉንአነስተኛመሆኑንእያወቁለምንበአነስተኛምርትሰጪወቀፎለምንይጠቀማሉ;----------
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9 በገቺወረዳየሚየመርቱትየማር ምርትአንድዓይነትነወወይንስየተለያየነዉ

ሀ) አንድዓይነትነወለ)የተለያነዉ

10 አንድዓይነትከሆነምንዓይነትነዉ----------

11 የተለያዩከሆኑምንዓይነትናቸዉ----------፣ ----------፣ ----------

12 ሚር በ ወረዳ ወደ ሚመረ ትበ ትጊዜ (ወራት)የ ትኖቹና ቸዉ፡----------፣ ----------፣ -----

13 የ በለ ጠምር ትበ ዬትኖ ወወር ያ ገ ኙሉ፦----------

14 አ ን ድን ብአ ና ቢበ ዓ መትስ ን ትጊዜ ሜር ያ መር ታል፦----------

15 በ አ ማካ ይአ ን ድን ብአ ና ቢበ ዓ መትስ ን ትኪ ግ ሜር ያ መር ታል;----------

16 በ ን ብ ማ ብና ሚር ማ ም ረ ትለ ተሰ ሙ ገ በ ረ ዎች (ሰ ዎች) በ ገ ቺ ወረ ዳ ያ ለ ባ ቸዉ (የ ሚ ጥ ማ ቸዉ) ችግሮች አ ሉ; ሀ)አ ሉ_____ ለ)የ ሉ ም_____

17 ለ 16ኛዉ ጥ ያ ቀ ቄ መ ል ስ ሀ አ ሉ ከ ሆነ ችግሮ ቹ ም ን ም ድ ና ቸዉ፡

ሀ)ተ ፈ ጥ ሮ አ ዊ የ ሆኑ ---------- ----------

ለ) ሰ ወ ሰ ራ ሽ የ ሆኑ ---------- ----------

18 ለ ገ ጦ ም አ ቸዉ ችግሮች መ ፍ ትኄ ከ እ ና ን ተ የ ተ ሰ ጣ ቸዉ ካ ሉ ቢ ገ ልጠ ልን ----------

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19 ለ ን ብአ ና ቢ ዎች በ ገ ቺ ወረ ዳ የ ተ ሰ ጠ ል ጠ ና ዎች አ ሉ ሀ)አ ዎ ለ)የ ለ ም

20 ለ 19ኛ ጥ ያ ቀ መ ል ስ ዎ አ ዎ ን ከ ሆነ የ ሰ ለ ጡ ሰ ዎች በ ቁ ጥ ር ስ ን ት ና ቸዉ

ወን ድ--------ሴት-------ድ ም ር -------

21 ለ ስ ን ት ጊ ዜ ሰ ል ጥ ነ ዋ ል;

22 የ ስ ል ጠ ና ወር ዕ ሶ ች ም ን ም ን ድ ና ቸዉ ----------

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23 በ ስ ል ጠ ና ወደ ተ ገ ኙ ለ ወ ጦ ች ም ን ም ን ድ ና ቸዉ ----------

24.ሌ ሎ ች የ ን ብ ማ ብና ወ ጤ ታ ቸ ወደ ተ ማ ላ ከ ተ ጠ ቃ ሚ ል ስ ተ ያ የ ት ና ት ም ህ ር ት ሰ ጪ ደ ሆኑ ነ ገ ሮ ች ተ ረ ስ ተ ዋ ል የ ሚ ሉ ት ካ ለ በ ተ ጨ ማ ሪ ቢ ገ ልጠ ል ን

Focal person Questionnaires

Questionnaires for gechi district ministry of agriculture workers on wealthy of fishes and animal breeding office.

The purpose of

1 In Gechi district is there bee keeping management and its production in all kebele(area)?

Yes_____ No_____

2 For question no.1if your answer is yes what is important for favorable of availability?

_____

_____

3without any other additional job, is there persons who lives with only beekeeping and its production? Yes No

4 If your answer for question no.3 is yes how many of them are there? M_____ F____ T____

5 Beekeepers are what kind of hive they used? A) Traditional B) Modern C Both of them D) Transitional E) All

6 The hive they used serves for how many durations of time?

A) If not full one year for how many months? _____

B) If full a year for how many years serves? _____

7 Their production averagely how many K.Gs got from each hives?

Traditional hive_____ Modern hive_____ If others _____

8 From these hives which one they used mostly? _____

9 They know which hive gives more and low production. Why they used a hive which gives lowest production? _____

_____

10 In Gechi district the kind of honey produced is single or different kinds?

Single different

11 If your answer for question no.10 is single what kind of is it?_____

If it is different what kind of are there?_____ _____ _____

12 In Gechi district in which months honey produced ?A _____ B_____ C_____

13 From the above months in which one most honey produced? _____

14 One beekeepers how many times harvest honey within a year?_____

15 Within a year averagely how many K.GS harvested?_____

16 Is there problems On beekeepers and honey producers? Yes_____ No_____

17 For question no.16 if your answer is Yes what is their problems?

A)Natural problems e.g _____
_____

B) Man made problems e.g _____

_____

18 For the enumerated problem what solution given from you?_____

_____

19 Training is given from for beekeepers? Yes No.

20 If your answer is Yes for question no.19 how many of them are trained? M____F____T_____

21 For how many round they are trained? _____

22 On what kind of topic they are trained? A _____

B _____ C_____

23 What kind of change earned(seen)on these trainers? _____

_____

24 If there is additional explanation on beekeeping management and production what I am left and also what you are experienced give me brief explanations of you.