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Research Article

ASSESSMENT OF HONEY BEE DISEASE AND ENEMY IN ADET WORDA WEST GOJJAM ZONE, AMHARA REGION, ETHIOPIA

Meseret Atersaw¹ and Abera Anja^{2*}

¹Adet Worda Office of Livestock and Fishery

²Woliata Sodo University, College of Agriculture

**Corresponding Author*

Abstract

The study was conducted in Adet Wordea Woreda, North West Gojam Zone, Amhara region Ethiopia with the objective of assessing honey bee disease, enemies and their traditional control mechanism. For this study 4 kebele were selected using purposive sampling technique based on the potential of beekeeping production. From each kebele 20 respondents were selected by purposively based on the involvement and experience of beekeeping production. The data were collected using semi-structured questioner and analyzed using descriptive statistics. The majority of the respondents about 87.5% were male and the rest 12.5% were female. There are three types of beekeeping system; traditional, traditional and modern, but traditional hive is the most dominant beekeeping system in the study area. The bee floras found in the study area were mainly woody plant like, wanza, Tede, Anfar, Gegerta and Ameja . About 38%, 35.5%, 14.4% and 12.19% of the respondents observed noseema, chalk brood, stone brood and bee paralysis respectively. However, farmers use different control mechanism like cleaning the hive, keeping the colony strong, burning the colony strong, putting of ash on their nest and regular inspection of the hive. Hence, it is recommended that training should be given for beekeeper about the control mechanism of and enemies and there should be sustainable awareness creation activities among farmer with respect to beekeeping activity in general improved beekeepers method in particular.

Keywords: Bee disease, Bee enemy, Beekeeping system, Bee hive

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1. Introduction

Ethiopia is one of the countries which has largest honeybee population and owns big potential of honey production. Moreover, beekeeping is an appropriate and well adapted farming practice to extensive range of ecosystem of country. To data, over 10 million of bee colonies are found in the country, which include both domesticated and bee one (Ayalew, 2001). Ethiopia is the largest honey producer in Africa 10th largest honey producer all over the world. In addition, there is a considerable amount bee wax production (Girma, 1998). The result of the survey conducted by (CSA, 2014) revealed that in Ethiopia a total of about 5.89 million hives is estimated to be found in the rural sedentary areas of the country. From this total hives, the greater part (96.23 percent) is reported to be traditional. However, Ethiopia has diverse and unique flowering plants suitable for beekeeping, the bees knowledge and appreciation o these endowments (Girma, 1008).

The principal resource base for beekeeping has become seriously devastated in the course of time. The potential of the Ethiopia for honey production does now undoubtedly, only for small fraction of its former wealth. Moreover, the destruction of the remaining resource base can be observed going on at steadily accelerating pace (Girma, 1998) since the late 1970's attempts have been made to improve the productivity of beekeeping of the country through introduction of improved beekeeping technologies (Edessa, 2005).

Resent investigation indicated that the number of honeybee colonies in the country has been declining (Gezahegne, 2001) and consequently the honey and bee wax production as export earnings fall down because of honeybee disease and enemies (Tesfaye, 2007). However, different disease and enemies found in Ethiopia have significant influence on honey production capacity of bees. From those disease like Adult bee disease (Nose ma, bees paralysis, Amoeba, varrioa mites) and brood disease (Chalk brood,

stone brood, sac- brood) and from enemies like ants, wax moth, Birds, termites and spiders etc.) are found (Morse and Flutten, 2005).

Farmers use different control mechanism in order to protect their honeybees from disease and enemies from those control mechanism removing of infected comb cleaning of the apiary site, disinfect the hive maintain adequate food supply remove unused and empty comb etc are some of the control mechanism (Amsalu, 2001). Generally, Ethiopia has large number of honeybee colonies but, the production performance is under the expected amount due to disease and enemies. Even though Adet Woreda is known to potential and honey bee has a significant role for farmers in terms of providing of honey, wax and pollen a prevalence of different honey bee disease and enemies was not yet studied and documented in the study area. So insufficient in Ethiopia, therefore this research was aimed to assess the enemies and their traditional control major disease, enemies and their control mechanisms by farmers. Therefore, this research was aimed to assess the existing honey bee disease and enemies and traditional control mechanism of honey bee disease and enemies.

2. Materials and Methods

Description of the study area

The study was conducted at Adet worda at western Gojjam, Amhara region in Ethiopia. The study area has a latitude and longitude of 11°16 N 37°29E with an altitude of 2,216 meters above sea level. It is found in the northern east of Addis Ababa at distance of 592km. The area has maximum and minimum temperature of 25.2⁰c and 8.8⁰c respectively. The area receive 1045.5mm of reception (Zelalem *et al.*, 2009). The total livestock population of the Woreda is 98.487 from those 30.8 are cows, 40.82 oxen and 13.76 heifer and 14.15 blue (Adet Agricultural, office, 2007).

Sampling methods

Adet Woreda has a total of 36 kebeles from which 27 and 9 kebeles were *Weina Dega* and *Dega* respectively. For the present study to make the data representative based on agro-ecology 3 and 1 kebeles were selected purposively from *Weina Dega* and *Dega* respectively. Accordingly, based on the potential of beekeeping production *Goshey*, *Anbest*, *Dabal* and *Fatman* kebeles were selected. Then 20 respondents were selected from each kebele purposively based on the experience and involvement of beekeeping farming. Thus, totally the number of households included in the present study was eighty (4 kebeles X 20 households).

Data collection

In this study both primary and secondary data were used. The primary data was collected by preparing semi-structured questionnaire to collect information on honey bee disease, pests and enemies of honeybee. The secondary data was obtained from published research works and governmental office.

Data Analysis

All the collected data was analyzed by using simple descriptive statistics. Finally, the results

was summarized and analyzed in the form of table, percentage, graphs and chart.

3. Results and Discussion

Socio economic status

Sex family size and age group of the respondent

The socio economic status of the interviewed households is presented in table 1. Out of interviewed respondents the about 87.5 and 12.5% were male and female respectively. It was observed that bee keeping management was mainly the business of man similar finding were also noted by Harmnan (2004). This could be mainly due to the fact that bee keeping system to which man are closer. The majority (62.5) of the respondents had family size of lower 1-4 (table 1). The majority (68.75) of the respondents' age was in the range of 21-40 years which is active to undertake bee keeping production effectively.

Table 1 Sex family size and Age group of households (years of the respondents)

Variables		Number of household 80	Percentage (%)
Sex of household	Male		
	Female		
Family size of respondent	1-4	50	62.5
	4-8	20	25
	>8	10	12.5
Age group of household (year)	>20	10	25
	21-40	55	68.75
	41-60	15	18.75

Religion of the respondent

According to table 2, majority of respondent (75%) were Orthodox religion followers were as

only (25%) were Muslim religion followers in the study area.

Table-2 Religion of the respondent

Type of religion	Goshey	Anbest	Dabal	Fatman	Total	Percentage
Orthodox	20	15	10	15	60	75
Muslim	5	4	6	5	20	25

Educational back ground of respondents

The higher proportion (56.25%) of the respondent were illiterate whereas 25% of the respondents completed their elementary school. However, the present study revealed that 12.5% and 6.25% had educational level at high school and Preparatory respectively. It is clear that educational level of the farming households may have significant

importance in determining the type of development and extension service approaches. Similar findings were also noted by (Beyene, 2015) who indicated that the high level of illiteracy in *Kewet* district limits the effectiveness of formal training programs and requires more emphasis to be placed on practical demonstration of essential concepts especially in improved beekeeping.

Table 3. Education background

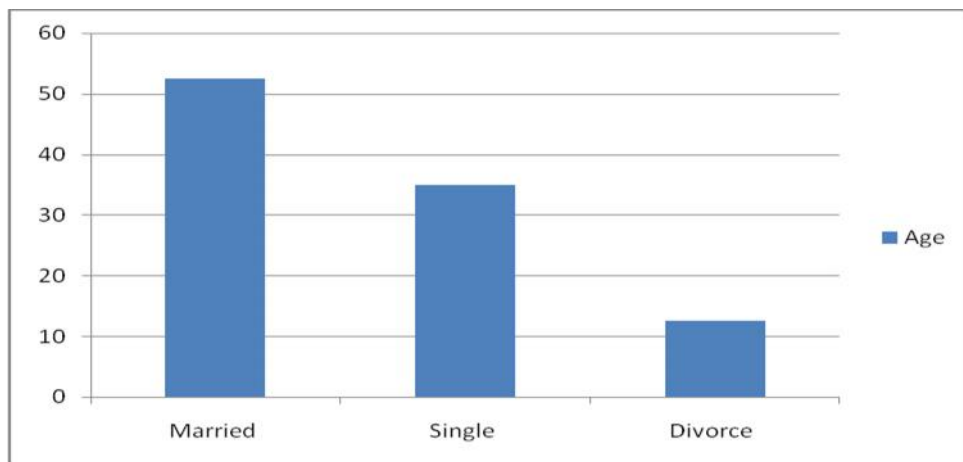
Education status	Total	Percentage
Literate	45	56.25
Elementary school	20	25
High school	10	12.5
Preparatory	15	6.25

The marital respondent

As it is indicated in figure 1, the majority of respondents (52.5%) participated in bee keeping

activities were married. However, from the total numbers of respondent (35%) were single and (12.5%) were divorce in the study area.

Figure 1. Marital status of respondent



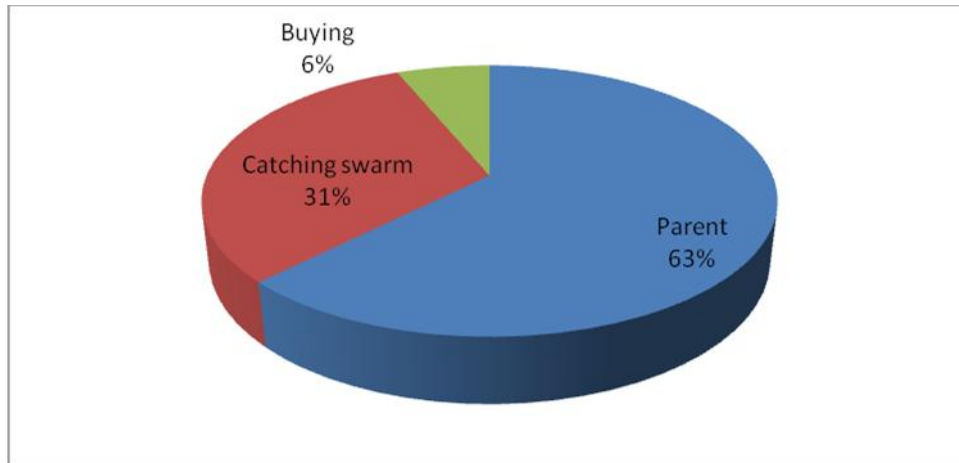
Honey bee colonies and types of beekeeping system

Sources of honey bee colonies

honey bee colony was from their parents. Similarly, about 31% of respondents indicated that they have started bee keeping by catching swarm. However, only 6% of the respondents obtain honeybee colony by purchasing

According to Figure 2, the majority (63%) of the respondents indicated that the main source of

Figure 2 Sources of honey bee colonies



Bee keeping system

Beekeeping is an important agricultural practice in the mixed farming systems of the area. According to table 6, about 82% of the respondents practice traditional beekeeping system using traditional bee hive. However, transitional and modern bee hive had similar

proportion which was 9% each (table 4). This finding is in line with (Krell, 1996) who concluded that the reason for the presence large number of traditional hive in the study areas were due to the accessibility of raw material for contracting the hive, high price of improved bee keeping technology and of lack of skill and experience to keep their colonies in modern hive.

Table 4. Types of bee keeping system

Name of sample kebeles	Traditional (%)	Transitional (%)	Modern (%)	Total (%)
Goshete	86.6	6.7	6.7	100
Anbset	81.8	9.1	9.1	100
Patmen	84.2	7.9	7.9	100
Dabal	75.5	12	12.5	100
Average	82%	9%	9%	

Placement of honey bee colony

With regard to placement of honey bee colony farmers require a place that site their bee colonies; like keeping bee at homed yard (back yard), placing traditional hive on the branch of tree either on the forest or near the home stead (hanging on the tree), under the eve of the house. So from the result of the study, the higher

proportion about 42.1% of traditional hive are kept in back yard. However, 15.8%, 39.4% and 2.6% under the eve of the house, hanging on the tree near home stead and hanging on the tree in the forest respectively. About 100% of the respondents modern hive kept on the back yard because it is difficult to hang on the tree and 75% of transnational hive hanging on the tree near the home stead and 25% under the eve (table 5).

Table 5. Placement of honey bee colony

Placement of hive	Traditional (%)	Transitional (%)	Modern (%)
Back yard	42.1		100
Under the eve of the house	15.8	25	
Hanging on the tree near the home stead	39.4	75	
Hanging on the tree in the tree	2.6		

Honey bee flora in the study area

According to table 10, the respondent indicated that there are different forage types of bee floras,

mainly woody plant like, *Wanza, Tede, Anfar, Gegerta and Ameja*. Accordingly about 22.5% of the respondents indicated that *Wanza* was the dominant bee flora species widely grown in the study area.

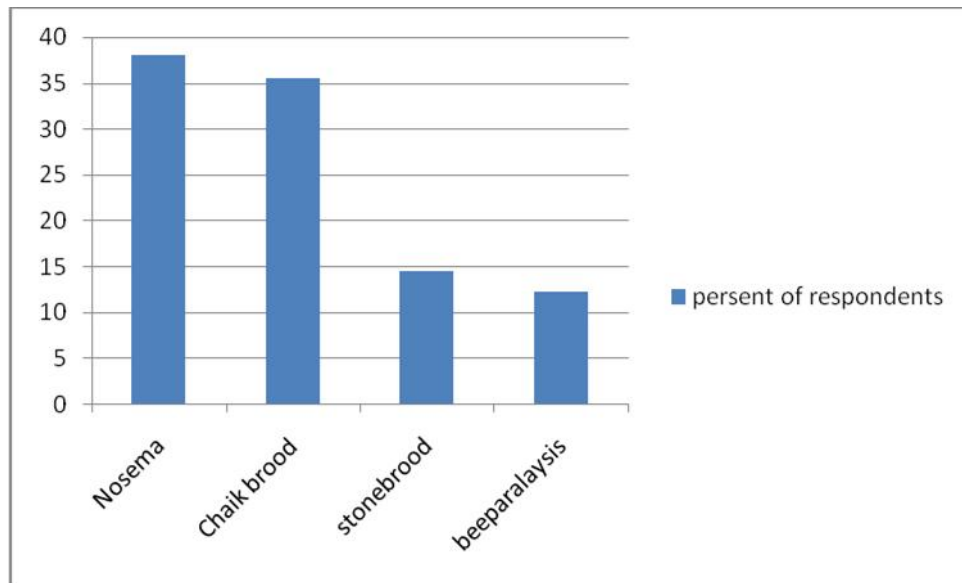
Table 6. Honey bee flora

No	Local name	No of respondent	Percentage
1	Wanza	18	22.5
2	Tide	14	7.5
3	Anfar	17	21.25
4	Gegerta	15	18.75
5	Ameja	16	20

Honey bee disease

Based on figure 3, about 38% of the respondents observed noseema, 35.5% chalk brood, 14.4% stone brood and 12.19% bee paralysis disease that caused by protozoan noseema. The second disease next to noseema which occur in the area was chalk brood disease caused by fungus *ascophrea apis* which attach workers and and drones. Bees that affected by this disease shows the larvae die early and the larvae seems like chalk and the larvae seems like chalk so that farmers clean the brood nest, burning infected brood comb to control the disease. The third disease is stone brood disease which is caused by *aspengillus flavis* which result the brood become stone and die early before the

pupal stage so farmers clean the aoiary and remove infected brood to honeybee is bee paralysis disease. The last disease which have less significance influence to honeybee is bee paraysis virus and show bees fail to fly, trembling of wing and bodies, crowing on the ground and dislocating wing but these disease happen rarely when there is scarcity of flor but farmers removing the inflected bees and cleaning the hive. Generally, those disease were mainly occur in traditional bee hive because it is difficult to inspect the hive regularly and it is ease for transmission of disease from infected hive to healthy hive due to the presence of hole and crack.

Figure 3. Honeybee disease in the study area

Enemies of Honey Bee

Based on the result obtained from respondents, enemies are the major challenge in addition to disease in the study area. Similar result was also reported by Workneh (2007), who indicated that one of the most constraints for honey bee and beekeepers are the presence of enemies. According to table 8, 36% of the respondent observe ant in their hive which result in death of adult honey bee in the hive and absconding of bee colonies. In this case the beekeepers use; putting ash around the hive stand, pour hot water in to the ants nest, dipping the nest of the hive with stone and mud, smoking like sheep and men hair, putting protective plastic under the hive stand, close the cracks and holes by mud, spray soap solution, brushing the hive with local plants like “tenadam” and onion and putting tree leaves near the hive stand to control the effect of ant on bee and to restrict the movement of ant from its nest to the honey bee hive. Similar result is reported by (Desalegn 2001).

About 26% of the respondents argued that wax moth is the next enemy in the area. It results in the destruction of honey comb in the hive, the comb is eaten and the comb is covered by spider

web. This pest mainly occurs in weak colony and during the prolonged dry period. So that the farmers control this pest immediately after they observe like reducing empty and dark comb, removing the spider web, melting invaded comb and inspect their hive regularly during the dry season.

Birds are (16%). the other predator which attach mainly the worker bee during transport water, orientation flight, nectar and water gathering and during guard duty. So farmers use rob local name “wonchif” to produce noise for brides, killing one hunter and hanging it near the hive and destroy their nest. The fourth predator is spider (13%), which result in killing and eating of bee by building their web near the hive or near the forage source so they have to be identified and destroyed by cleaning the trapping net.

The fifth predator in the study area was termite (6 %) which seems like ant cause the bees to abscond from thy hive and eat honey and bees. Therefore, farmer regularly clean the hive either inside or inside or outside, putting ash and sometimes use motor oil if they get. As it is indicated in table 7, the last predator which was

observed by farmers' was wild cat or the local name "Mengoza" (3%). It cause in the destruction of the hive, eat bees and honey. So that, the

farmers keep their bee standing dangerous dog and use different material like "shigut".

Table 7. Major enemies of bee

Major enemies	Percent (%)	rank
Ant	36	1
Wax mouth	26	2
Birds	16	3
Spiders	13	4
Termites	6	5
Wiled cat (Mengoza)	3	6

4. Conclusion and Recommendations

The study was conducted in Adet Woreda Amhara region Ethiopia with the objective of assessing honeybee disease and enemies. Based on the result of study, farmers in the adult age (21-40) are actively engaged in beekeeping activities. The majority (63%) of the respondents indicated that the main source of honey bee colony was from their parents. The main source of honeybee colonies was from caching swarm (70%) this shows there availability of bee colony in the study area. However, 16.7% and 13.3% obtain honey colony from parent and buying (under respectively. About 50% of respondents use traditional hive due to its easy accessibility of material by farmers, and 25% of respondents use transitional and 25% respondent modern hive.

There are number of challenges for honey bee in the study area. Among these, nosema (38%). Chalk brood (35.5%) which making the brood seems like chalk. Stone brood (14.34%) causing the brood stone and die before the pupal stage, but farmers controlled by cleaning the hive. In addition of disease, there are enemies like:

predator (ant bride, spider, termite and wiled cat) and pest (wax moth). From those predator the respondents rank first for ant (36%) which result in death bee and absconding of the colony and it controlled by putting ash on the hive stand. The second is wax moth (26%). Birds (16%) which, attach worker bee and controlled by destroying their nest. Spider (13%) which, kill and eat bee and can controlled by cleaning the trapping net. Termite (6%) which, cause the abscond and controlled by putting ash. The last predator is wild cat (3%) which, cause destruction of hive and can be controlled by standing dangerous bee. Generally, those disease and enemies are happen due to improper management of hive, high price of modern hive, lack of technical skill and experience of farmer and insufficient inspection of extension service.

- Training should be given for beekeeper about the control mechanism of and enemies.

There should be sustainable awareness creation activities among farmer with respect to beekeeping activity in general improved beekeepers method in particular.

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