



Oromia Agricultural Research Institute Holeta Bee Research Center



Annual activities report
For 2022/23, Ethiopian fiscal year

July, 2023, Holeta, Oromia

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1. Introduction (overview about the center)

Holeta Bee Research Center (HBRC) is the pioneer institution in the research and development of Apiculture sector in Ethiopia. It was founded as Beekeeping Demonstration Station in 1965 by the former office Livestock and Meat Board with the objective of demonstrating improved beekeeping practices in the country. Currently, HBRC is operating under Oromia Agricultural Research Institute (OARI) as a full-flaged research center with the objective of generating improved technologies and information on management practices of beekeeping, bee product handling and processing, bee, bahavior and biology of local honeybees, bee health, socio-economics and extension-research. The center also coordinates the national apiculture research to support development of Apiculture sub sector in the country. Moreover, the center has been producing skilled manpower in the field of beekeeping through training beekeeping experts, bee technicians and beekeepers of the country. In this plan year, HBRC conducted various research and routine activities with budget sources from the Government and different Donors. These activities are carriedout by the center under the auspices of two research processes, which are divided into eight research teams, one supporting work process, and three supporting teams. In total, the Center planned 51 research activities and excuted all of them at different research stations and on the beekeepers backyards. When excuted activities are considered by budget source, 39 research trials are funded by the Government and 12 research trials are funded by donors (partnership activities). In an effort to encourage the usage of beekeeping technology, HBRC has planned to multiply 22 technologies with promising outcomes but due to the increased demand from stakeholders, 24 most promising technologies were multiplied and most of them distributed to technology users. In demonstration and scale ups of technologies and experience sharing, activities have been conducted in farmers' back yards and Farmers Training Center in Iluabba Bora, Jimma, South West Shoa, and west Shoa Zones. The center had planned to release 11 technologies (9 from the Governmet funding and 2 from Partnership activities), but due to various reasons only 10 of them (9 from Government funding and 1 from Partnership activities) were realized, while 2 were delayed to be reased next year. To implement the planned activities, 113 permanent employees (30 women and 83 men) with various levels of education and professions were involved during this year.

This report includes data on the success of research trials, technology multiplication and center development activities, various trainings, human resource development and ethical prompton aactivities. The report also covers work on cross-cutting issues, strengthening implementation and research capacity, national research coordination works, budget utilization, and other aspects. Overall, the report covers the performance from July 2022 to June 2023 and includes the activities planned and carried out on average during this fiscal year.

1.1. Vision of the Center

Holeta bee Research Center aspires to see improved livelihood, marker-oriented beekeepers in Oromia and be center of excellence in East Africa.

1.2. Mission

To adapt and generate a technological option that contributes to increase production and productivity of beekeeping, and conserve natural resources on sustainable bases through interdisciplinary and participatory research approach, need based training and advisory services there by improve the livelihood of beekeepers.

1.3. Values

- ✓ Innovativeness
- ✓ Accountability
- ✓ Team spirit
- ✓ Transparency
- ✓ Participatory
- ✓ Readiness for change and
- ✓ Commitment

1.4. Services we provide

- ❖ Generating, adapting and demonstrating improved apicultural technologies
- ❖ Provide need-based training and advisory services
- ❖ Coordinate regional and national apiculture research
- ❖ Develop apiculture research strategy and policy guideline and
- ❖ Assist other research centers launch apiculture research

2. Annual performance of the Center

2.1. Leadership activities and roles

The center planned to convene 12 management committee meetings throughout the course of the plan year to evaluate how planned activities were carried out, offer support, and guide the different teams toward the center's and Institute's goals. Nine of the 11 management meetings that were scheduled to take place were actually held, and they were successful in carrying out their objectives because they made decisions to address any shortcomings and encouraged best practices to be followed by all members of the center. For instance, the slow service delivery was fixed, and diligent work has been done to ensure that the service operation meets the basic criteria by some support processes. The leadership also had a significant role in strengthening the Anti-Corruption Prevention Council, which met every three months with the aim of supporting the administration of property in various areas where weaknesses are seen and to carry out rigorous monitoring. The problems with property use and protection processes have at its better position in the center compared what it was in the preceeding years. Instructions were given to concentrate on upcoming events in front of members of the management committee and members of various teams. Additionally, the staff received awareness training on professionalism and work ethics twice, as well as three times on service delivery standards. Although group discussions among the various team members should be held once a week, the center management assessed the situation and decided to hold discussions once a month due to the nature of our work, which prevents us from evaluating results on a weekly basis. As a result, every employee is now familiar with the responsibilities of their jobs and has developed their own monthly, quarterly and annual work plans in compliance with the minimal service delivery standard. The employees' performance this year was assessed twice every six months in addition to making preparations for the evaluation procedure for the next year.

The smooth operation of all research and other operations is a result of discussions with team leaders and the entire staff to prevent work interruptions caused by the shortage of budget and in some case by the current insecurity in our region.

2.2. Center develop activities perfomed in this plan year

Our center's four-story (G+3) office building, whose construction started last year, is closely being monitored by center management, and the necessary help was provided to ensure that the work continues and progresses fast. Currently, the construction of the building is completed 75% overall and by mid of next year, the construction will be cocluded and made ready for the planned objectives.



Figure: photo that shows status of construction G+3 office building

In addition to this grand building construction,

- ✓ Gedo and Holeta stations' fences, totaling 250 meters long (100 meters for Holeta and 150 meters for Gedo), have been repaired.
- ✓ 05 vehicles and two motorcycles have been repaired and made ready for operation
- ✓ Various facilities, materias and mationary repaing were repaired. Accodngly, 50 mt of internet line, 10 desktop computers, 6 printers, 1 generator, 02 refrigerators, 1 incubter, 1 wood cutting machine and 1 photocopy machine were repaired and put into operation
- ✓ In aquiring new facilities, 03 laptop computers, 01 heavey duety printer, 08 high back chairs, 03UPS 1500VA, and many other office supplies were purchased and transferred for office use.

2.3. Implementation of planned works during the year

HBRC has a number of research, demonstration, scaling-up, and training activities planned, largely in Oromia as well as in some other regions. As the country's national hub for organizing apiculture research, different partners provide funding for a significant percentage of our operations. This year have seen the completion of 10 out of the 51 research and scaling up/out activities, with the majority currently undergoing data analysis and final write-up. Additionally, numerous training events have been held across the country under the sponsorship of GOs and NGOs in addition to what is being supported by the OARI. The Center has carried out all of the aforementioned research activities at the four research stations, namely Holeta, Menagesha, Suba and Gedo and pre-scaling up and demonstration activities at the beekeepers' backyard.

The necessity to scale up or demonstrate agricultural innovations for the farming and pastoralist communities was specifically highlighted in the present government's development agenda. In this

regard, HBRC is making a lot of efforts to address the beekeeping communities in our region and beyond with the already developed and proven technologies. Therefore, the outcomes of all experiments, trainings, demonstrations, and scaling-up that the center carried out throughout this fiscal year, as well as the financial utilization and advisory services provided, are thus compiled and presented in this report.

Table 1. Plan and Implementation of OARI budgeted trials and technology/information generation

S/ N	Team	Annual plan	Annual implementation	% (P/I)	Completed activities		% (P/I)
					Annual plan	Annual implementation	
1	Bee breeding and Genetic Improvement	3	3	100	0	0	0
2	Bee forage development and pollination ecology	10	10	100	2	2	100
3	Bee products Quality Improvement and Value Addition	5	5	100	2	2	100
4	Bee health	8	8	100	1	1	100
5	Post-harvest management and Food Engineering	2	2	100	1	1	100
6	Socio-economics	4	4	100	2	2	100
7	Research Extension and Technology promotion	7	7	100	1	1	100
Total		39	39	100	9	9	100

Table 2 Plan and Implementation of non-OARI budgeted trials and technology/information generation

No	Team	Source of fund	Annual plan	Annual implementation	% (P/I)	Completed activities		
						Annual plan	Annual implementation	% (P/I)
1	Bee breeding and Genetic Improvement	EIAR	2	2	100	0	0	0
2	Bee forage development and pollination ecology	EARI	2	2	100	0	0	0
3	Bee products Quality Improvement and Value Addition	EARI	1	1	100	0	0	0
4	Bee health	EARI	3	3	100	0	0	0
5	Post-harvest management and Food Engineering	EARI	0	0	0	0	0	0
6	Socio-economics	EARI	2	2	100	1	1	100
7	Research Extention and Technology promotion	EARI	2	2	100	1	0	0
Ida'ama			12	12	100	2	1	50

Reasons for under performance of the trials for non-OARI funded technology/information generation:

- ✓ One activity couldn't be implemented due to serious security issues in the project's implementation location hindered trial implementations during the data collection periods. However, these circumstances were not taken into account when the activity was it eas planned.
- ✓ The created gaps in this year implementation will be compensated to improve the plan in the next year annual works.

Brief summary of the interim results from some ongoing trials performed this year by different research teams

Bee forage development and pollination ecology

Activity title 1: Investigating nectar secretion dynamics and honey production potential of *Eucalyptus globulus*, *Eucalyptus camaldulensis* and *Erica arborea*

Brief highlights of the achievements thus far:

Nectar Secretion Dynamics

The nectar secretion duration of *Eucalyptus globulus* was the whole day time while the nectar secretion duration was up to 15 hours (9:00 local time) of the day time. This indicates that the nectar secretion duration is varied from plant species to species.

The highest nectar volume of *E. globulus* was obtained at 18 hours followed by 9 hours while the lowest was at 12 hours (Table 1). On the other hand, the highest mean nectar concentration (30.3%) was recorded at 15 hours while the lowest was at 9 hours.

Nectar volume and concentration of *E. camaldulensis* were significantly different ($p < 0.05$) at different times of the day. The highest nectar volume (7.42 μ l) of *E. camaldulensis* was found at 9 hours whereas the lowest was at 15 hours (Table 1). For many plant species, the nectar volume is the highest early and at sunset due to the high humidity and low temperature of the local area. On the other hand, the uppermost nectar concentration was obtained from 12 hours of the day while the lowest was at 15 hours. Early in the morning, *E. camaldulensis* flowers released the nectar to honeybees. It is immediately visited by honeybees early in the morning. Depending on the weather, it begins to stop nectar secretion after 12:00, but areas with shade and cloudy weather release nectar until 15:00 hours of the day.

Table 1: Mean nectar volume (μ l) and Nectar concentration (%) per flower at 3 hours intervals with \pm standard error (SE) of *Eucalyptus globulus* and *Eucalyptus camaldulensis* from 9:00–18:00 hours in Ejere District

Table: Effect of Temperature and Humidity on Nectar Volume and Concentration

Time (hr)	<i>E. globulus</i>		<i>E. camaldulensis</i>	
	Volume + SE	Conc. + SE	Volume + SE	Conc. + SE
9:00	65.81 \pm 9.84b	21.67 + 0.89b	7.42 \pm 0.31a	15.98 \pm 0.80b
12:00	42.12 \pm 5.30b	29.06 + 1.47a	6.6 \pm 0.34a	22.79 \pm 0.85a
15:00	57.70 \pm 5.98b	30.30 + 1.79a	4.22 \pm 0.50b	22.16 \pm 3.21a
18:00	115.56 + 14.86a	25.29 + 1.85ab	-	-
Overall mean	70.30 \pm 5.55	26.58 + 0.84	6.76 \pm 0.24	19.64 \pm 0.74

Temperature (°C) was positively correlated with nectar volume and concentration of *E. globulus*. However, the effect of temperature on the nectar volume and concentration were insignificant (Figure 1).

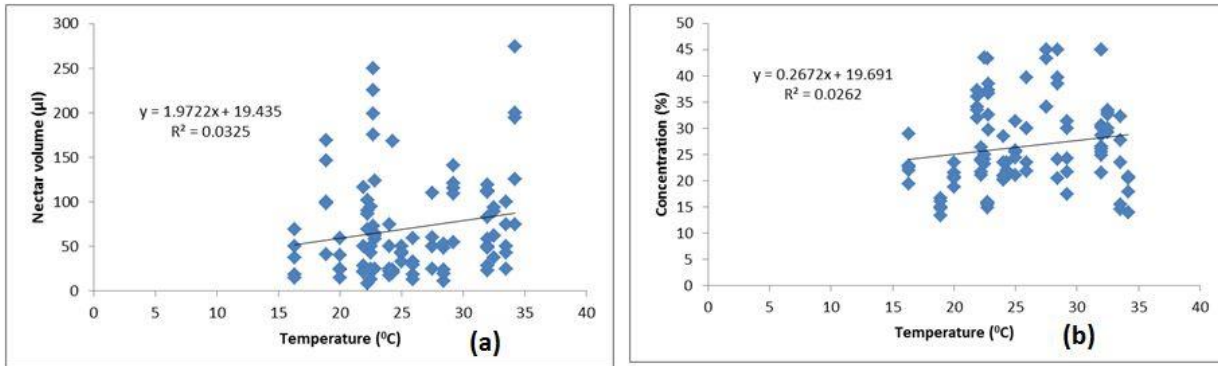


Figure 1: Effects of temperature on nectar volume (a) and concentration (b) of *E. globulus*

Humidity was negatively correlated with both nectar volume and nectar concentration of *E. globulus* (Figure 2). The highest nectar volume and concentration were recorded between 35- 60% of humidity in local area. The influence of humidity on the values of nectar volume and concentration were insignificant.

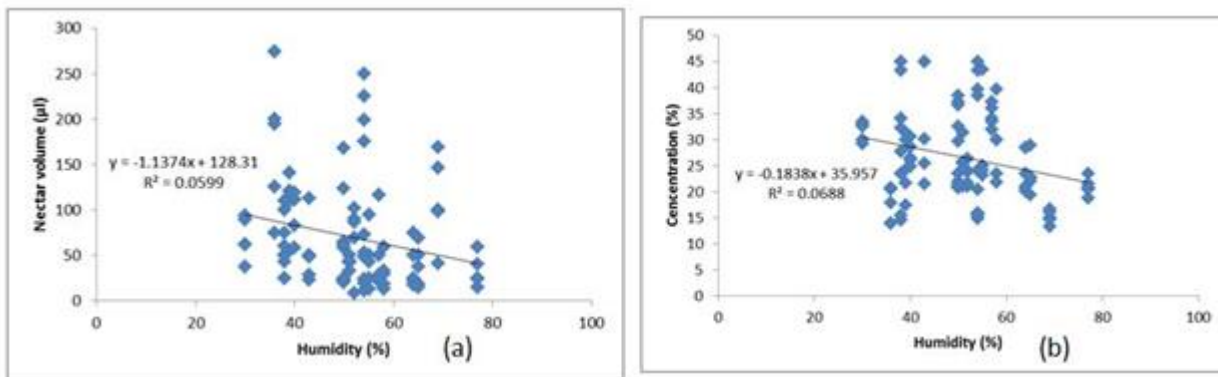


Figure 2: Effect of air humidity on nectar volume (a) and concentration (b) of *E. globulus*

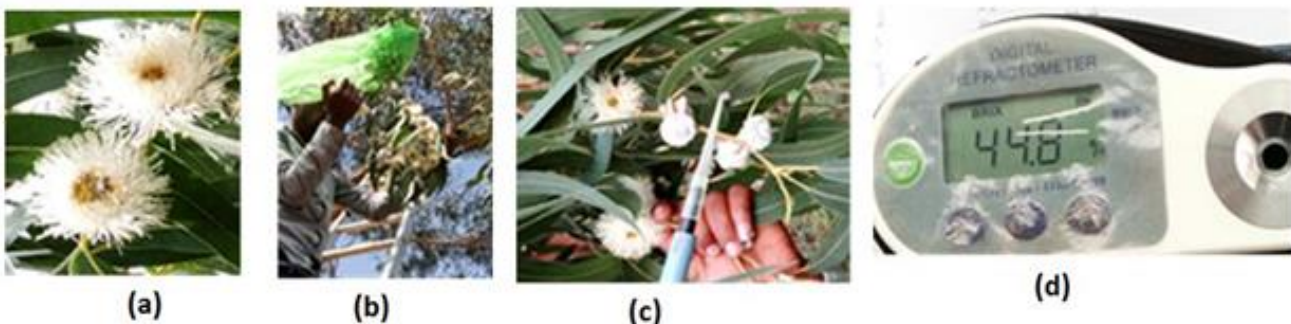


Figure 3: Flowers of *E. globulus* while honeybees collect nectar (a), while measuring nectar volume using Micropipette (b and c), and reading of nectar concentration measured by digital refractometer (d)

The temperature of the study area was negatively correlated with the nectar volume of *E. camaldulensis* (Figure 4(a)). At the lowest Temperature the highest nectar volume values were obtained.

The temperature was positively correlated with the nectar concentration of *E. camaldulensis* (Figure 4(b)). It influences the nectar concentration by 17.41%. The peak nectar concentration was obtained above 30°C.

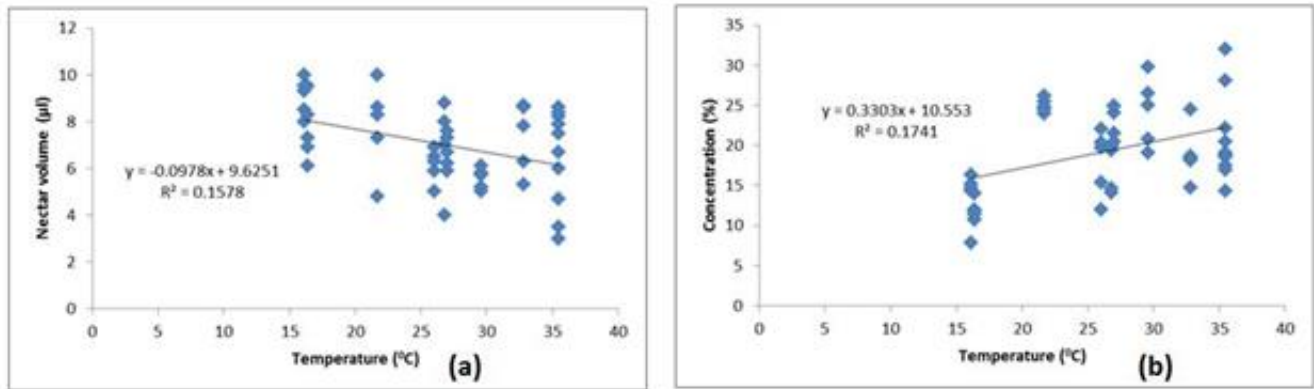


Figure 4: Effects of temperature on nectar volume (a) and concentration (b) of *E. camaldulensis*

The air humidity of the study area was positively correlated with the nectar volume of *E. camaldulensis* (Figure 5 (a)). The highest nectar volume was obtained between 60% air humidity of the local area. On the other hand, the air humidity was negatively correlated with the nectar concentration of *E. camaldulensis* (Figure 5(b)). It influences the nectar concentration by 16.37%. The peak nectar concentration was obtained between 35 and 45°C.

Microclimate determines the chances of changes in nectar volume and concentration; patterns of daily and or seasonal changes in nectar variables; and pollinator behaviour (frequency, duration of visits, and foraging behavior).

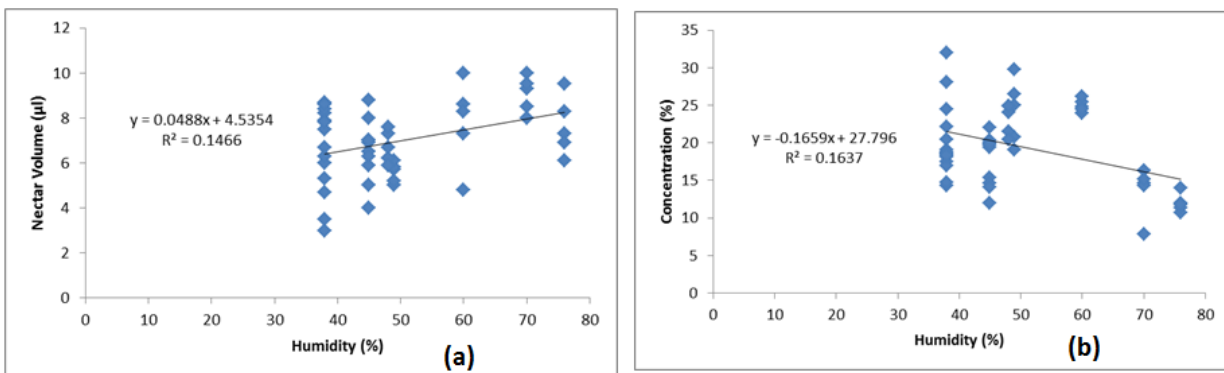


Figure 5: Effect of air humidity on nectar volume (a) and concentration (b) of *E. camaldulensis*



Figure 6: Field data collection from flowers of *E. camaldulensis*

Estimating the Amount of Sugar and Honey Production Capacity

The amount of sugar per flower per flowering season was 141.20 mg for *Eucalyptus globulus*. When this amount of sugar was converted to honey, it was 172.2 mg per flower per flowering season (Table 2).

For *Eucalyptus camaldulensis*, the amount of sugar per flower per flowering season was 10.40 mg. When this amount of sugar was converted to honey, it was 12.69 mg per flower per flowering season (Table 2). The honey production potential of the bee plant species is very important to determine the number of honeybee colonies required to be placed in the selected area.

Table 2: Mean amount sugar (mg) and honey (mg) per flower in 3 hours interval per flower with \pm standard error (SE) of *E. globulus* and *E. camaldulensis* in 9:00 to 18:00 hours of the day

Time (hr)	Sugar (mg/flower) + SE	<i>E. globulus</i>		<i>E. camaldulensis</i>	
		Honey mg/flower) \pm SE	Sugar (mg/flower) + SE	Honey mg/flower) \pm SE	
9:00	110.94 \pm 16.40b	135.28 \pm 20.00b	9.35 \pm 0.48ab	11.40 \pm 0.59ab	
12:00	97.72 \pm 13.09b	119.17 \pm 15.97b	12.01 \pm 0.67a	14.65 \pm 0.82a	
15:00	143.33 \pm 13.88ab	163.81 \pm 16.94ab	7.65 \pm 1.71b	9.33 \pm 2.08b	
18:00	221.83 \pm 34.77a	270.52 \pm 42.40a	-	-	
Overall mean	141.20 \pm 11.63	172.20 \pm 14.19	10.40 \pm 0.45	12.69 \pm 0.55	

In conclusion, based on the dynamics and the amounts of nectar secreted per flower both species can be considered as a potential honey source plants for the study area. However, the honey production potential of *Eucalyptus globulus* is better than that of *Eucalyptus camaldulensis*.

Bee product quality improvement and value addition

Activity 1: Proximate and mineral composition of *Meliponula beccarii* bee honey from potential areas of Oromia

- 20 honey samples of *M. beccarii* were collected from West Shoa Zone and 12 SBH samples were collected from Jimma and Ilu Aba Bora zones
- Laboratory analysis of the samples were done in HARC (Crude protein and phosphorus contents) and others in HBRC laboratory (MC and AC)
- Mineral analysis is underway in HARC Laboratory and sample collected in June/2015EC will be sent to concerning Laboratories after samples preparation in this year
- *M. beccarii* bee honey collection from remaining potential zones of Oromia and laboratory



a)



b)

Fig. a) SBH collected from Jimma and I/A. Bor zone b) SBH from West Shoa zone

Activity 2: Evaluating the potential of Karl jenter kit for the Royal Jelly production

Brief Status

- About 15 bee colonies are under inspection at Mannagesha apiary site
- Bee colony feeding was performed to strengthen the colonies

- Mother colony will be formed from the maintained bee colony to produce RJ in the coming active season



Fig. Bee colony for RJ production in Mannagesha Apiary site

Activity 3: Investigation Methods Used for Retarding Crystallization in Major Monofloral honeys

- Preliminary experiment is under way on monoflora honey samples collected from different districts of West Shoa, Jimma and Ilu Aba Bor zones



Fig. Experiment on some monoflora honey crystallization

Activity Funded by None IQOO

Activity 1. Antimicrobial properties of honey and pollen of bees from different agro-ecologies of West Shoa Zone

- Honey samples (*A. mellifera*) honey Was taken from Bako, Gedo and Mannagesha apiary sites

- Bee collected pollen Was trapped from Gedo and Mannagesha apiary sites
- Antimicrobial properties of the bee products (honey and pollen) from the two apiary sites were tested in Holeta Agricultural biotechnology center on four bacteria
- Completing the tests on honey samples collected from Mannagesha sites and trapping pollen of the season from remaining areas is the work remained in this year

3.3. Bee health team activities

Activity 1: Assessment and Identification of Stingless Bee (*M. beccarii*) pests and predators in West Shoa Zone

Objective:

- To assess the occurrence/ prevalence of stingless bee pests and predators.
- - To identify pests and predators, and determine their economic importance's –
- To generate base line information on how to prevent and/or control the most economic important pests and predators

Activity performed

Stingless bee pest and predators survey was conducted in 3 districts, and 9 PAs of west shoa Zone.6 pest and predators of stingless bee were mentioned. A total of 48 stingless bee hunters were interviewed using checklist. During field observations pests and predators found around and near the nest of stingless bee were: Wasp, birds, sugar ants (red & black), spider, ants, Snake.

Activity 2: Assessment and testing Plants as Ant Repellent

Objective

- To identify plants those, repel ants.
- -To determine which parts of plants is responsible to repel ants/prevent
- To determine the best ant repellent plants among identified plants

Activity Performed

Assessment and testing of plants as Ant repellent was conducted in Iluababor, Buno Bedele and Jima Zones.

From each zone two Districts were selected purposively based on the presence of Beekeepers that use plants to protect their honeybee colonies from Ant attacks.9 different plants used to repel ants were identified and tested on Ant.

No .	plants	Tr t	No. ants on combs	No. ants running away	No. ants remaining	%	Places
1	Hida buqe bofa	T1	87	81	6	94.18	shebe
		T1	1150	100	150	86.95	shebe
		T1	600	500	100	83.3	shebe
2	Timban Timbo	T2	276	250	26	90.57	shebe
		T2	178	153	22	85.95	shebe
		T2	1500	1450	50	96.6	shebe
3	Tiroftu	T3	207	124	83	59.9	shebe
		T3	376	220	156	58.52	shebe
		T3	238	82	109	54.28	shebe
4	sekonde	T4	134	82	52	61.2	shebe
		T4	310	193	117	62.2	shebe
		T4	366	250	116	68.3	shebe
5	Girichille	T5	1368	1030	338	75.29	
		T5	1770	1340	430	75.7	
		T5	617	414	200	67.2	



Activity 3: Study on Infestation Rate and Associated Risk Factors of Honeybee Pest, *Aethina tumida* Murray in West and South West Shoa Zones

Objective: To identify the infestation rate of *Aethina tumida* and its associated risk factors on honeybees

Activity Performed

Effectiveness of the plans were tested and identified on ant as it were ant repellent. Its effectiveness or ability to repel ants was calculated using the formula:

Repellent Efficacy% = $\frac{\text{Ants run away from the comb}}{\text{No. of ants run away} + \text{number of ants remained on comb}} \times 100$

No. of ants run away + number of ants remained on comb



Activity4: Diagnostic survey of honeybee diseases and pests around Yayo Forest Biosphere, Ilubabor, Oromia Region

Objective:

- To generate baseline information on the current status of economically important honeybee diseases and pests in Yayo Forest Biosphere,

Activity performed

- Discussion was made with Zonal and Districts Livestock and Fisheries Development and Marketing Office
- Secondary data were collected
- Site selection was done

Activity 5: Establishing method of bee health monitoring in Oromia

Objective:

- To study honey bees' health status and determine daily loss rates and
- To determine economic, threshold number of dead honeybees in local condition.

Activity performed

Five bee hive stands were constructed and each hive stand carries 4 movable hives were constructed.

Experimental colonies were established and set up at Holeta apiary site.

Honey bee dead trapping trap was constructed for all experimental colonies / hives.



- Bee hive construction and colony establishment and colony establishment were not performed at Bako b/c security problem.

Activity 6: Distribution and diversity of Oplostomus species (*Coleoptera: Scarabaeidae*), the pest of honeybees in Oromia Regional state

Objective:

- To carry out a detailed survey of honeybee colonies for the scarab beetles in Oromia:
- To investigate and document the occurrence and distribution of LHB in suspected beekeeping areas of Oromia Regional State before it expands further and causes damage to the sector
- To identify which Oplostomus species is/are found in the region based on their morphology

Non- IQQO

Activity1: Study on Economic Threshold level for varroa in central high and mid lands of Ethiopia

Objective:

-To determine varroa mite economic threshold in honeybees of central high and lowlands of the country

- To determine the varroa infestation level in different seasons of the year
- To detect high varroa infestation level at which action is taken to reduce the mites loads, avoid potential spreads

Activity performed

Varroa mites were collected by three methods:

Sticky board , alcohol wash and brood and population of adult bees , brood area and others were collected in every 21 days. At Bako apiary site not yet established because of security problem

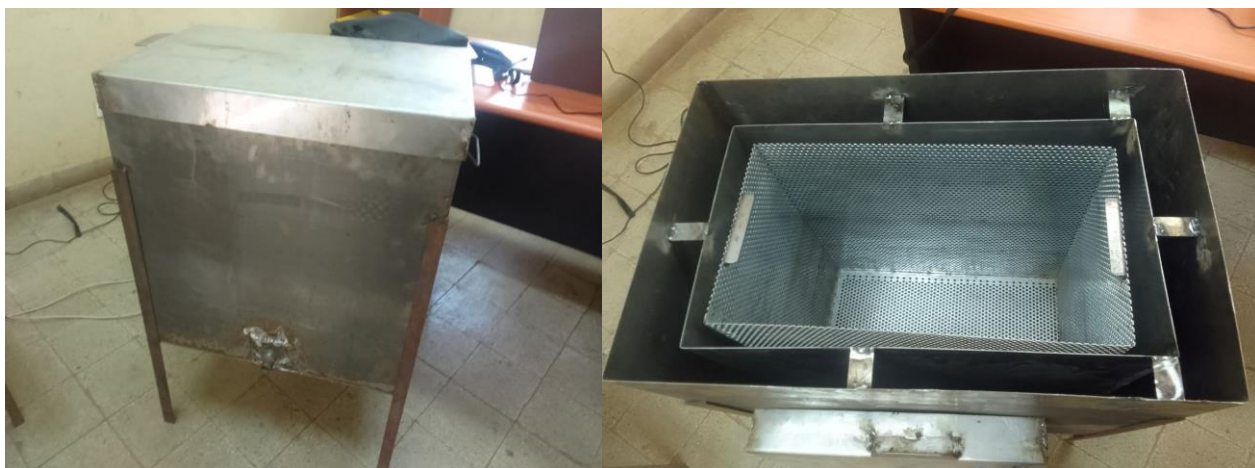


3.4. Post-Harvest and Food Engineering Team

Activity title 1: Development and Evaluation of Steam beeswax extractor

Brief highlights of the achievements thus far:

- Prototype was done
- Safaf wax was collected(purchased)
- Purchasing crude wax is on way
- Final write up will be done within the coming two months



3.5. Socio-economics Team

Activity 1. Honey value Chain Analysis in Oromia zone

Start year: 2013

Expected year of completion: 2015

Objectives of the project

- To identify value chain function and mapping
- To evaluate the competitiveness of farmers along the value chain
- To identify stakeholders and actors along value chain
- To identify strategic options and leverage points along the value chain
- To evaluate value chain performances
- To identify factors affecting the marketed supply

Abstract

- Oromia region shares larger portion of colonies and honey production with relative lower honey productivity. Among major factors, the region is characterized by distorted honey value chain which has a back-and-forth negative implication on honey production. To address these events, the data was collected from 166 sample farmers from South-Western Oromia using snowballing or theoretical sampling. the study was challenged with the data asymmetry from different actory due to distorted value chain. with this fact, the study proved that honey value chain is highly distorted with full of asymmetric data. The honey value chain passess in the function *input supply → Production → Processing → Marketing → Consumption*. However, the marketing function is full of sasymeticy both interms of quality and information. From the study, about 91% of the households have tradtional beehives from which about 63% of the households have atleast two types of beehives at a time ffrom which about 68% of the household harvests aleat twice a year. The farmers optained 52% of its yield from 0% of MFH whereas generate only 35% of yield from 58% of tradtional beehives. In any case, honey and rarely wax is the only bee product used by the society. Generally, 76% of farmers are selling their product directly to either/or to retailers, collectors, exporters and wholesalers in which they are not depedent on a single buyer. Withese findings, the study recomeds market development and promotion of other beekeeping products, enumeration of honey production potential and clear MOU among stakeholders with a clear demarcation of role and responsibility demand prompt action.

The study was conducted within a tight of numerous squeezing challenges. Particularly, the study was conducted over three years with hypothetical stages to obtain data. however, the challenges from shortage of logistics including budget and field vehicles are very critical particularly eve to the level of inability to contact stakeholders. Additionally, inconsistency of data from different data hub including data from FAO, CSA, Bureau of Agriculture at regional, Zonal, Districts and kebeles kebele level were challenges faced along.

Activity 2. Impacts of modern beekeeping technology packages on the income in the potential areas of Oromia region

Objectives of the study

- To assess community perception of improved beekeeping technology
- To assess the impact of improved beekeeping technology in Oromia region.

Brief description

This activity was planned to be conducted partial in the fiscal year 2014/15 but due to challenges in logistic arrangement it could not be conducted except question and checklists preparation.

Activity 3. Assessment of Gender role in beekeeping activities A case of Oromia Regional state, Ethiopia

Objectives of the study

- To assess the roles of men and women played in beekeeping activities
- To identify technical, institutional and socio environmental constraint and opportunities in the role of gender in beekeeping activities

Brief description

This activity was planned to be conducted partially in the fiscal year 2014/15 but due to challenges in logistic arrangement it could not be conducted except question and checklists preparation. With the current state, the activity was completed only 5%. With this activity, the activity need to be completed in this year.

Activity 4. Adoption of modern beehives and its determinant at Wonchi districts Southwest Shewa Zone, Oromia, Ethiopia

Objectives of the study

- To determine adoption status of improved hive technology in the study area.
- To investigate factors adoption rate of improved box hive in the area
- To identify the opportunities and constraints of improved box hive in the area

Brief description

This activity was planned to be conducted total last year but except site selection and questionnaire preparation, it could not be conducted except question and checklists preparation.

Activity 5. Institutional factors and its effect on honey market supply along honey value chain in Ethiopia

Objectives of the study

- ✓ To identify role of institutional arrangements in honey supply system
- ✓ To evaluate institutional factors affecting the market surplus
- ✓ To identify strategic option to enhance the institutional arrangements in the honey supply

Abstract

Oromia region shares larger portion of colonies and honey production with relative lower honey productivity. Among major factors, the region is characterized by distorted honey value chain which has a back-and-forth negative implication on honey production. To address these events, the data was collected from 166 sample farmers from South-Western Oromia using snowballing or theoretical sampling. The study was challenged with the data asymmetry from different actors due to distorted value chain. With this fact, the study proved that honey value chain is highly distorted with full of asymmetric data. However, the marketing function is full of asymmetry both in terms of quality and information. From the study, about 91% of the households have traditional beehives from which about 63% of the households have at least two types of beehives at a time from which about 68% of the household harvests at least twice a year. The farmers obtained 52% of its yield from MFH whereas generate only 35% of yield from 58% of traditional beehives. In any case, honey and rarely wax is the only bee product used by the society. Generally, 76% of farmers are selling their product directly to either/or to retailers, collectors, exporters and wholesalers in which they are not dependent on a single buyer. With these findings, the study recommends market development and promotion of other beekeeping products, enumeration of honey production potential and clear MOU among stakeholders with a clear demarcation of role and responsibility demand prompt action.

Activity 6. Market Linkage for Sustainable Income: effects of honey market linkage on the income of beekeepers and honey production in selected areas of Oromia Regional State, Ethiopia

Objectives of the study

- ✓ To identify factors affecting linkage between buyers and sellers
- ✓ To evaluate effect of market linkage on honey **production, productivity, and income** of beekeepers

Brief of the activity

This study has been conducted at Goma and Gera districts of Jima zone, Ale and Yayo district of Ili abba bor zone, Wolmera, Ejere and Ejersa Lafo districts of West Shewa zone. Generally, 9 FRG were established under the target of this activity but it remains very far to achieve this objective. These FRG were capacitated through training, but to create market linkage poor budget and logistic arrangements become a challenge.

3.6. Socio-economics Team

Activity 1. Pre-extension Demonstration and Evaluation of Top Feeder Honeybee Feeding

Technology in West Shewa

Objectives of the study

- To create awareness on the importance of the technology
- To improve farmers' knowledge and skill on use of the technology
- To evaluate profitability of the technology under farmers' management

Abstract

The study was conducted at Goleliban and wajetu Kebeles of Walmara district with the objectives to demonstrate and evaluate the top feeder under farmers' condition. As to methodology, established FRG apiary was used by using 15 beekeepers at each kebele. For the study, five box hives were used as a control and five bee colonies as a treatment. The study shows that top feeder feeding was found advantageous over bucket types in terms of reducing colonies disturbance and loss of colonies during dearth period of colonies feeding. The ultimate goal of feeding is to maintain population of colonies in dearth period. Furthermore, top feeder saves time and minimizes problem of contamination of sugar syrups which affects health of bees. Beneficiaries also aired their opinion that top feeder is preferable compared to bucket types since bucket type usually tends to break unlike top feeder which is stronger. Hence, the technology recommended reaching wider areas and large number of beekeepers.

Activity 2. Pre-ext demo of beekeeping technology Package via FTC: Waliso District

Specific objectives

- To improve farmers' knowledge and skills of beekeeping technology
- To strengthen linkage among stakeholders
- To evaluate the role of FTC in transferring of beekeeping technology
- Develop model apiary to be used as learning center and technical exchange visits for surrounding communities

Tasks so far performed

Appropriate FTC where potential in beekeeping together with 20 beekeepers including women was identified at Obpii Kebele in Waliso district. Agreement was made among beekeepers, Woreda agriculture bureau office and HBRC over how to implement the activity for further dissemination of the knowledge. At the selected site, basic beekeeping training was provided for 18 farmers, one DA and three Woreda experts for three days. Detailed discussion on bottlenecks in beekeeping was held with beekeepers, DAs and woreda experts. Accordingly, farmers identified major problems including beekeeping accessories, inputs and weak follow up. Fortunately, head of agriculture bureau office

agreed to grant site at FTC as learning center whereas HBRC will take the leading in curbing the above aforementioned problems. For this activity, 31,905 Birr consumed.

The next plan will be actual activity implementation (apiary set up) and inputs procurements on time to avoid activity lagging.

Activity 3. Pre-extension demonstration & evaluation of Beeswax extraction technology: Ilugelan District, W/shewa Zone

Specific objective

- To create awareness on beeswax extraction technology in the study area
- To increase farmers' skills and knowledge on the technology
- Beneficiaries' feedback on the beeswax extraction technology

Tasks so far performed

Memorandum of understanding was signed between HBRC and Ilugalan bureau of agriculture office to share roles and responsibilities. Following agreement, two appropriate site potential in beekeeping was identified including Sadanilu and Tullunitii kebeles from where 20 target beekeepers was involved in the project.

Then, demonstration together with training was arranged for 17 farmers and four bee experts at target area. 70% of the training time was spent on practical session. Then, 14 kg of *sefef* crude beeswax was used after about two kg impurities removed. Finally, approximately 0.5 kg of extracted beeswax obtained after boiling. Once again, the remaining *sefef* was boiled as the entire beeswax was not melted and squeezed out through abidjedi and obtained about 0.38kg. To sum up, a total of approximately 0.83 of processed bees wax was obtained from 120kg of sorted sefef beeswax which is below on station result (3.93) while that of manual is 3.03 kg from sefef. Perhaps, low yield may be due to higher impurities of sefef.

The next plan will be further diffusion of the technology. Crude honey and comb honey will be used for further confidence development in the technology.



Figure1. Bees wax extraction through clearing impurities, boiling, squeezing and separation of wax cream.

Activity 4. Promotion of Beekeeping technologies for water shade rehabilitation and as source of income in Ejere Woreda, W/Shewa

Specific objectives

- To improve the income of the youth via improved beekeeping technology package while conserving the water shade.
- To improve bee forage resources of the water shade by planting and conserving bee forage plant species
- To build the capacity of the youth on improved beekeeping

Tasks so far performed

As very common, memorandum of understanding was signed between HBRC and Ejere Woreda bureau of agriculture office to share roles and responsibilities. Besides, the objectives and expected outputs of the activity explained. Following agreement, one appropriate site potential in beekeeping was identified each woreda from where 10 target beekeepers was involved in the project.

Then, 20 farmers and three Woreda experts were attended three days training on improved beekeeping management.

Activity 5. Pre-scaling up of stingless bees (*meliponiculture*) adaptation using pot hive technology in T/kutaye & Ambo-West Shewa Zone

Specific objectives

- To create awareness on stingless bee adaptation and management practices
- To increase production of stingless honeybee using pot hive technology
- To increase farmers' skills in applying the technology in the area

Tasks so far performed

Memorandum of understanding was signed between HBRC and respective woredas bureau of agriculture office to share roles and responsibilities. Besides, the objectives and expected outputs of the activity explained. Following agreement, one appropriate site potential in beekeeping was identified each woreda from where 20 target beekeepers was involved in the project. According, 15 colonies were transferred at backyard of individual host farmers in both Woredas dated on 20-21/05/2015 E.C. Then, as planned stingless bee management training was organized for 30 farmers and eight SMS at both districts (See Table & Figure below). Besides, inspection had done together with fence and shading. At Ambo site, five stingless bee colonies damaged by honey badger, said host farmer. In the next year additional 30 stingless bee colonies will be placed at farmer's backyard. For this, 30 pot hives will be prepared in advance. Finally, the technology will be displayed to non-target beekeepers and other stakeholders.

Activity 6. PDE of Production of Coffea arabica Honey Production in Yayo & Mana districts

Specific objectives

- To create awareness on coffee honey production
- To increase farmers' skills in applying the technology in the area

Tasks so far performed: The site selection was conducted; input preparation was conducted. **Reason:** The planned assumption failed to achieve due to high cost of since small fraction of budget allocated for the activity. Inputs costs including, box hives, bee colonies, sugar, protective cloths. Etc. and personal costs together with fuel cost are higher than allotted budget. Hence, we request sufficient budget for activity to be implemented at thousands of kilometers from our HBRC.

Activity 7. PED of Effect of shading on honey productivity: Walmara & Ilugelan Districts

Specific objectives

- To create awareness on shading effect practices on honey production
- To evaluate the effect of shading on the productivity and absconding of bee colony
- To increase farmers' skills in applying the technology in the area

Tasks so far performed

Memorandum of understanding was signed between HBRC and Walmara Woreda bureau of agriculture office to share roles and responsibilities. Besides, the objectives and expected outputs of the activity explained. Following agreement, one appropriate site potential in beekeeping was identified each woreda from where 20 target beekeepers was involved in the project. According, 5 colonies with shade and 5 bee colonies without shade were under follow up. Then, 15 target women and 5 men as well as two Woreda experts were attended three days training on improved beekeeping management. Due to long rainy season sufficient honey

was not harvested from the experimental colonies; the colonies were full of brood. Only 50% of the plan conducted.

4. Technology and Information released this year

As indicated under the introduction section, 11 activities were planned to release new technologies or information. But due to security problem in the western Oromia to collect data from the on-farm activity, only 10 activities completed and new technology and information released. Out of the total 10 released technologies, 9 were funded by OARI while 1 was an activity sponsored by a partner. The information on the released technologies is presented in the next subsection.

Table 3. Technology and Information released this year from the activities conducted by the OARI Budget

No	Team	Annual plan	Annual implementation	% (P/I)
1	Bee forage development and pollination ecology	2	2	100
2	Bee health	1	1	100
3	Bee products Quality Improvement and Value Addition	2	2	100
4	Post-harvest management and Food Engineering	1	1	100
5	Socio-economics	2	2	100
6	Research Extension and Technology promotion	1	1	66.7
Total		9	9	66.7

Table 4. Technology and Information released this year from the activities conducted by the non-OARI Budget

No	Team	Annual plan	Annual implementation	% (P/I)
1	Socio-economics	1	1	100
2	Research Extension and Technology promotion	1	0	0
Total		2	1	50

4.1. Description of Technologies and information released in this year

Name of Team: Bee Forage and Pollination Ecology

Activity title 1: Ecological Suitability analysis for beekeeping in Oromia Region

- Secondary and primary data were collected from 9 zones of Oromia Region.
- Around 112 bee forage plants were identified
- Final write up will be done within the coming two months

Name of team: Bee product quality improvement and value addition

1. Proximate composition and antioxidant property of major monofloral honey types in Oromia

- Monoflora honey samples were collected from Jimma, West Shoa and Iluababor zones
- Pollen sources of monoflora honey were identified

- Proximate (Moisture contents, ash content, protein, carbohydrate) , antioxidants characteristics (phenol, Flavonoide and radical scavenging activities) and physicochemical properties analysis are in progress
2. **Assessment of Physico-chemical parameters for detection of beeswax adulterations**
- Ash contents, ester values, saponification points, density, specific gravity and acid values of white beeswax were analyzed
 - Crude beewax was collected from Jimmaa and Ilubabor zones for yellow and dark beeswax and purification and adulterants preparation is underway
 - Data of acid value, ester values, saponification point, ratio number, density, ash content and melting points were entered into computer

Activity title 2: Assessment of floral resource utilized by stingless bee (*Melluponela beccarii*) in west shoa zone

- All necessary data collection will be accomplished until the end of this month.

Team Name: Bee Health

Activity 1: Evaluating the hygienic and grooming behavior of local honeybees (*A. m. bandansii*) for the survival of Varroa mite (*V. destructor*) infestation:

Objective:

- To evaluate the hygienic and grooming behaviour of our local honeybee species (*A. m. Bandansii*) against varroa mite
- To generate information for selection and rearing strategies of resistant colony breeds in the future

Abstract of the activity

This study was conducted at Holeta Bee Research center Apiary site to know hygienic and grooming behavior of local honey bees for the survival of varroa mite (*V. destructor*) infestation.

- Grooming Behavior of local honey bees (*A. m. bandansii*) to varroto mite (*V. destructor*) Observed from 15 Langstroth bee hive mites dropped in 72 hours mites from honey bee colonies to white card board coated with sticky petroleum jelly grabbing ,crushing in their mandibles.



Data of Hygienic behavior of local honey bees (*A. m. bandansii*) to varroa mite (*V. destructor*) infestation was collected.

A section of 6 x 5.5 cm comb containing young pupae was pin killed and after 24, 48, 72 hrs the number of open and capped cells were counted from 15 Langstroth bee hive.



5. Pre-extension demonstration activities

The agricultural extension team is conducting technology demonstrations as it is necessary to introduce the newly released bee technologies to the farming community and get their feedback before they enter the extension system after their prototypes are proved. This will not only make users aware of the technology, its benefits and applications and create interest but also evaluate the effectiveness of the technologies and provide feedback to the research system. Accordingly, it is targeted to organize 7 farmer groups to conduct demonstration of 6 beekeeping technologies during this fiscal year. A total of 80 bee farmers were participated in the demonstration (table 7).

Table 7. Number of technologies demonstrated, FRGs established and farmers involved

No	Activities	No	Annual plan	Achievements	%
1	Selecting the districts	No	5	5	100
2	Preparing technology	No	5	4	80
3	Establish the FRG	No	5	7	140
4	Conduct Farmer Elections	No	65	70	108
5	Manuals/leaflets demonstrating	No	420	1465	347
6	Perform demonstration	Cycle	2	2	100
5	Collect data and conduct monitoring	Cycle	4	4	100

Table 8. Types of technologies demonstrated and farmer participated.

Lakk	Mata duree yaalii agarsiisaa	Maqaa teekinolojii agarsifamu	Pakajii waliin karorfame	Hirmaannaa qonnaan/horsiisee bulootaa				
				Male elder	Female elder	Male youth	Female youth	Total
1.	PED of Top Feeder Honeybee Feeding Technology in Walmera Woreda	Top Feeder Honeybee Feeding Technology	Top feeder feeding, box hive, honey processing, Ant-control	10	5	5	0	20
2.	PED of Effects of shading on honey productivity: Walmara & Bako District	Hive shading	Box hive, Shading, Ant-control, honey processing	7	3	6	4	20
3.	PED of Production of <i>Coffea arabica</i> Mono Floral Honey Production at Yayo and Mana Woredas	Production of <i>Coffea arabica</i> Mono Floral Honey	Box hive, Ant-control, honey processing,	8	2	0	0	10
4.	PED of beeswax extraction technology: Ilugelan District, W/shewa Zone	Beeswax extraction	Sub-merged beeswax extraction, & manual extraction method	8	6	4	2	20
Total				33	16	15	6	70

6. Pre-Scaling up

The target of pre-scaling up research is to create a strong stakeholder relationship platform to create a favorable environment for extension work. With this regards, about 5 bee technologies in different agro-ecologies in this working year were planned. In this work, the extension team together with the technology development teams are planned to benefit the beekeepers organized under 7 FRG (Farmer Research Group) groups (Table 9-11).

Table 9. Number of technologies promoted, FRGs established, and number of farmers involved in technology expansion

No	Activities	No	Annual plan	Achievements	%
1	Selecting the districts	No	6	5	100
2	Preparing technology	No	5	5	100
3	Establish the FRG	No	7	7	100
4	Conduct Farmer Elections	No	80	90	112.5
6	Perform demonstration	Cycle	2	2	100
5	Collect data and conduct monitoring	Cycle	4	4	100

Table 10. Types of technologies prevalent and farmer participation

Demo title	Demo. Technologies	Package with tech	Participant				
			Male elder	Female elder	Male youth	Female youth	Total
1. Beekeeping Technologies Promotion through FTC in Waliso District	Beekeeping Technologies	Box hive, Chefeka hive, Ant-control, honey & beeswax processing, bee forage	10	0	0	0	10
2. Beekeeping as intervention for water shade rehabilitation and source of income using unemployed youth group in Ejere Woreda	Beekeeping as intervention for water shade rehabilitation	Box hive, Chefeka hive, Ant-control, honey processing, forage seedling	8	0	2	0	10
3. Pre-scaling up of stingless bees (<i>meliponiculture</i>) adaptation using pot hive technology in T/kutaye and Ambo	Pot hive technology	Training, Pot hive	20	0	0	0	20
4. Promotion of improved beekeeping technology through unemployed youth group in Ambo Woreda	Improved beekeeping technology	Box hive, honey processing, Ant-control	13	7	0	0	20
5. Promotion of beekeeping technologies through women group in creating access to beekeeping technology in Ilugelan District	Beekeeping technologies	Box hives, honey processing, Ant-control	5	15	5	5	30
Total			56	22	7	5	90

Table 11. Types of technologies demonstrated and farmer participated.

Lakk	Demo title	Demo. Technologies	Package with tech	Participants			
				DhG	DuG	D	S
1	Promotion of Improved Beekeeping Technologies Using Youth Group Ambo	<ul style="list-style-type: none"> Improved beekeeping technology 	<ul style="list-style-type: none"> A*. Box hives, B*. Ant control C*. honey processing D*. 	13	7	0	0
2	Promotion of beekeeping technologies through women group in creating access to beekeeping technology in Ilugelan District	<ul style="list-style-type: none"> Improved beekeeping technology 	<ul style="list-style-type: none"> A*.box hives & C*.Chefeka hives, d*. bee forages 	5	15	5	5
3	Beekeeping Technologies Promotion through FTC in Waliso District	<ul style="list-style-type: none"> Improved beekeeping technology 	<ul style="list-style-type: none"> A*. Box hives, B*. Ant control C*. Chefeka D*. honey processing 	10	0	0	0
4	Pre-scaling up of stingless bees (meliponiculture) adaptation using pot hive technology in T/kutaye and Ambo	<ul style="list-style-type: none"> Pots hive 	<ul style="list-style-type: none"> Pot hive 	20	0	0	0
5	Promotion of Beekeeping technologies for water shade rehabilitation and as source of income in Ejere Woreda	Beekeeping as intervention for water shade rehabilitation	Modern box hive, ant-protection method & honey processing	8	0	2	0
Total				56	22	7	5

7. Technology multiplication activities

Table 7.1a. Plan and technology multiplication implementation (as per the prorsparity plan for technology multiplication)

S/N	Team	Tyapes of technologies	Annual plan	Annual Implem entation	% (P/I)	Reason for low or higher performance
1	Bee forage development and pollination ecology	Improved honeybee seeds	4	4	100	Wild animals damade on the field
		Improved bee forage seedlings	12	14	117	Demand from the community/stake hoders increased
2	Technology multiplication	Type Methods used to multiply	1	1	100	

	and center development	technologies				
		Type of technologies multiplied by type	5	5	100	
Total			22	24	109	

7.1b. Types of basic technologies multiplied

Lakk	Team	Name of technologies multiplied	Explanation
1	Bee forage development and pollination ecology	<i>Phacelia</i> , <i>Coriandrum sativa</i> (Gadissa), <i>Coriandrum sativa</i> (Darara), <i>Sinapis alba</i> ,	Improved honeybee seeds
		Coffee, Avocado, Apple, Acacia, Cordia, Vernonia, Bottle brush, Dombia, Arangama, eucalyptus, Tabab, Jacaranda, Osimaum, and Three-month tree	Improved bee forages seedlings
2	Technology multiplication and center development	Honey bee colonies	By Garafting method
		Improved beehive	Langstroth & Zander
		Pollen trap	
		Nucli boxes	Langstroth & Zander
		Queen cage	Mesh wire

7.2. Plan and implementation of basic technology multiplication Technology multiplication

7.2.1a Multiplication of corop and animal forage seeds

Procees / Team	Multiplied variety	Seed class	Annual plan		Annual Impelentation		Annual Performance (%)	
			Land (ha)	Yield (Kun))	Land (ha)	Yield (Kun)	Land (ha)	Yield (Kun)
Bee forage development and pollination ecology and Technology multiplication and center development in partnership	<i>Phacelia</i>	Basic	0.002	0.05	0.002	0.2	0.2	100
	<i>Coriandrum sativa</i> <i>Gadissa</i>	Basic	0.002	0.03	0.002	0.1	0.05	50
	<i>Sinapis</i>	Basic	0.006	0.07	0.006	0.2	0.1	50
	<i>Coriandrum sativa</i> <i>Darara</i>	Basic	0.0025	0.05	0.0025	0.1	0.15	150
Overall						0.6	0.5	83

7.2.1b Multiplication of crop and animal forage seeds

Team	Type/name of multiplied Technology	Unit	Annual plan	Annual implementation	Plan implementation (%)
Technology multiplication and center development	Bee colonies	No	65	141	210
	Improved bee forages seedlings	No	50,000	52000	104
	Improved honeybee forage seeds	Kg	60	50	83
	Modern beehive	No	235	203	86.4
	Pollen trap	No	100	97	97
	Mite trap	No	100	100	100
	Nucli box	No	100	120	120
	Queen cage	No	100	100	100

NB: Budget deficit and lack of manpower are reasons for low performance in some areas of technology multiplications

Multiplied technologies by photos



Figure: Picture indicating different queen rearing activities in Lab at Holeta in the plan year



Figure: multiplied bee colonies on the field at Holeta in the plan year



Figure: multiplied Dovialis seedling in the plan year



Figure: multiplied three-month tree seedling in the plan year



Figure: Cofee seedlings ready for distribution and transplating to field



Figure: Multiplied and grafted Avocado seedling ready for distribution in this year

7.3.3. Distributing Multiplied technologies to users

Multiplied Techenology	Unit	Annual plan	Number multiplied	Number/amou nt of tec. distributed	Additional explanation if any
Bee colobies	No	65	141	84	The remaining colonies were used for center activities
Improved bee forages seedlings	No	50,000	52,000	45470	
Improved honeybee seed	Kg	60	50	10	The remaining amount is maintained for next year seed multiplication
Modern beehive	No	235	203	195	The remaining are maintied to be used for experiment next year
Pollen trap	No	100	100	100	
Nucli boxes	No	100	120	120	
Queen cage	No	100	100	100	

7.3.4. Basic technologies distributed in this plan year

Team	Distributi on	Unit	plan	Implement ation	% (P/I)	To who the tech distributed	Number of beneficieries		Total
							M	F	
Bee forage development	Bee forage seedlings	No	5000	4500	15	Beekeepers organized under FRG	30	5	35
	Improved bee forage seeds	kg	40	10	25	Beekeepers,	8	2	10
Research Extention and Technology promotion	Super of modern beehives	No	120	80	67	FRG member beekeepers	27	24	51
Technology multiplication and center development	Box Hive	No	235	188	80	Beekeepers organized under FRG and different organizations	10	10	20
Extension	Veil	No	24	18	89	FRG members	33	15	48
Extension	Tutta	No	24	18	89	FRG members	33	15	48
Extension	Glove	No	24	18	89	FRG members	33	15	48
Extension	Stingless beehive	No	30	30	100	FRG members	22	8	30

8. Training provided to the different community group this year

8.1. Training provide to the bekeepers and different beekeeping stakeholders

S/N	Process/Team	Plan and excution		
		Plan	Excution	Excution %
1	Post-harvest management and Food Engineering	40	40	100
2	Beekeeping and Genetic improvement team	30	107	315
3	Bee forage and Pollination ecology team	35	46	131
4	Bee health	32	60	187.5
5	Bee products quality and value addition team	19	76	400
6	Extension and Technology promotion team	267	274	102.62
7	Socio-economics team	132	121	91.67
	Overall total	555	724	130.5

8.2. Provided training and topics

Team	Topic of training	Period of training (day)	Experts (SMS)			DAs			Beekeepers					
			M	F	T	M	F	T	Adults (mal)	Adult (fem)	Young	Girl	T	T
Engineering	Construction and specifications of beehives	15	40	-	40	-	-	-	-	-	-	-	-	40
Genetic Improvement	bee biology and seasonal colony management and colony multiplication, Stingless bee domestication method	33	63	6	69	0	2	2	28	6	2	0	30	107
Bee Forage	Apiary site selection, bee colony management	5	0	0	0	5	1	6	0	0	33	7	40	46
Bee Health	Bee health	07	27	0	27	2	1	3	27	11	4	4	46	76
Bee product	Bee product pre and post-harvest harvest ,processing and handling	6	56	4	60	0	0	0	0	0	0	0	0	60
Socio - economics	Horsiisa kanniisaa bu'uraa	4	19	5	24	11	2	13	144	45	34	14	237	274
Extension	Gabaa dammaa fi bu'aa dabalataa	4	24	3	27	3	1	4	64	16	8	2	90	121
Total		74	229	18	247	21	7	28	263	78	81	27	443	724

8.3. Number of FRG established and members participated on Technology promotion accross different activities

Title of the activity	Number of FRG			Total number of FRG members				
				Adult (M)	Adult (F)	Youth (M)	Youth (F)	Total
	Existing	New	Total					
Pre-extension Demonstration and Evaluation of Top Feeder Honeybee Feeding Technology in Walmera	2	0	2	10	5	5	0	20
Promotion of Improved Beekeeping Technologies Using Youth Group Ambo	1	0	1	13	7	0	0	20
Promotion of beekeeping technologies through women group in creating access to beekeeping technology in Ilugelan District	2	0	2	5	15	5	5	30
PED of shading effect on hive productivity in Walmera	0	1	1	7	3	6	4	20
PED of Production of Coffea arabica Mono Floral Honey Production in Mana	0	2	2	0	8	2	0	10
PED of beeswax extraction technology: Ilugelan District	0	1	1	8	6	4	2	20
Beekeeping Technologies Promotion through FTC in Waliso District	0	1	1	10	0	0	0	10
Pre-scaling up of stingless bees (meliponiculture) adaptation using pot hive technology in T/kutaye and Ambo	0	2	2	20	0	0	0	20
Promotion of Beekeeping technologies for water shade rehabilitation and as source of income in Ejere Woreda	0	2	2	8	0	2	0	10
Ida'ma	5	9	14	81	44	24	11	160

9. National Apiculture Research Coordination works

Introduction

Beekeeping, or apiculture, plays a crucial role in Ethiopia's agricultural landscape, contributing to food security, poverty reduction, and environmental conservation. To further strengthen the apiculture sector, a comprehensive Apiculture Research Program was undertaken across ten research centers in Ethiopia which are located in highly beekeeping potential regional states: Oromia, Amhara, South, and Beneshangul Gumuze. The program aimed to promote sustainable beekeeping practices, enhance bee health, and contribute to food security and poverty reduction. The apiculture Research program has been and is executing four research projects that encompass twenty two research activities. This report presents an overview of the program, its objectives, achievements, ongoing research efforts, challenges faced during implementation, and the strategic way forward to ensure the success and sustainability of beekeeping practices in the country.

Overview of research program

Apiculture Research Program developed four projects namely: 1 Enhancing the Productivity of Beekeeping through Developing and Adopting Appropriate Technologies, 2 Enhancing the Role of Beekeeping in Food Production, Ecosystem Conservation, and Resilience to Climatic Change, 3: Improving Bee Product Handling, Diversification, and Commercialization Techniques for Value Addition and Marketing and 4 Apiculture Technology Transfer and Socio-Economics. Each project have its objectives and research activities. The Apiculture Research has a broad scope with 22 research activities, seven of which have already been completed.

Table 1 Research activities statuses by project and responsible centers

No	Projects	Statuses of activities		Total	Implementing centers
		Completed	ongoing		
1	Enhancing the Productivity of Beekeeping through Developing and Adopting Appropriate Technologies	2	11	13	HBRC, Pawe, Assosa, Tepi, Bonga, Andasa, and Arbaminch Research Centers
2	Enhancing the Role of Beekeeping in Food Production, Ecosystem Conservation, and Resilience to Climatic Change		1	1	HBRC
3	Improving Bee Product Handling, Diversification, and Commercialization Techniques for Value Addition and Marketing	1	1	2	HBRC and Harosabu Research Center
4	Apiculture Technology Transfer and Socio-Economics	4	2	6	HBRC, Sinana, Adami Tulu and Pawe Research Centers
Tot al	4projects	7	15	22	10 Research Centers

Project1: Enhancing the Productivity of Beekeeping through Developing and Adopting Appropriate Technologies

This project addresses key challenges faced by beekeepers and focuses on developing and adopting appropriate technologies to improve the productivity of beekeeping. The project encompass a wide range of objectives, from evaluating honey harvesting frequency to identifying appropriate hive designs for native honeybees (*A. mellifera*) and *trigona* species, improving honeybee queen rearing through supplemental feeding, improving the productivity of local honeybees through selection, and determining the economic threshold level for varroa mite infestation. It consists of 13 Research activities of which two of them have been already completed at June 30 /2015.

Completed activities from Project 1

From Project 1, two activities have been completed this fiscal budget year. These are **Habitat Characterization and Behavioral and Physiological Interaction of Small Hive Beetles and Honeybees** and **Evaluating Small Hive Beetles Trapping Techniques to Minimize the Effects of Small Hive Beetle, *Aethina tumida*, on Honeybees, *Apis mellifera***. The output of each of these activities are briefly presented below.

Habitat Characterization and Behavioral and Physiological Interaction of Small Hive Beetles and Honeybees

This activity aims to characterize the habitat preferences and interactions between small hive beetles and honeybees. The successful completion of this activity provided valuable insights into the habitat preferences and interactions between Small Hive Beetles (SHB) and honeybee colonies. Understanding these interactions will help develop effective strategies to minimize SHB's negative impact on honeybee health and productivity.

Evaluating Small Hive Beetles Trapping Techniques to Minimize the Effects of Small Hive Beetle, *Aethina tumida*, on Honeybees, *Apis mellifera***

This activity culminated in the identification of efficient methods and techniques to minimize or control the infestation of honeybee colonies by Small Hive Beetles. These findings are essential for improved management practices to safeguard honeybee colonies from SHB infestations, or reducing beetle populations and mitigating their negative effects on honeybee health and honey production promoting healthier and more productive colonies.

Ongoing activities status in Project 1

Project 1 encompasses 11 smoothly ongoing activities, each strategically targeting specific objectives:

Activity 1: Evaluation of Continuous Honey Harvesting Frequency for Better Honey Production

This activity aims to assess the impact of continuous honey harvesting on honey production in honeybee colonies. Researchers compared different honey harvesting frequencies and evaluated their effects on overall honey production, colony health, and bee behavior. The study will provide valuable insights into optimizing honey harvesting practices for sustainable and increased honey yields.

Activity 2: Screening of potential herbaceous, trees, and shrubs honey plants for beekeeping development in Beneshangu Gumuz

This activity focuses on identifying and evaluating potential honey plant species in the Beneshangul Gumuz region. Researchers are under screening herbaceous plants, trees, and shrubs to assess their

suitability as bee forage. The study aims to enrich beekeeping practices by providing beekeepers with a diverse range of forage options to support honeybee colonies and enhance honey production.

Activity 3: Performance Evaluation of different Coriander varieties for bee forage developments in Arsi and East Shoa Zones

This activity aims to evaluate the performance of different coriander varieties as a source of forage for honeybees in the Arsi and East Shoa Zones. Researchers continued assessing the attractiveness of various coriander varieties to bees and measure their potential impact on honey production. The findings will guide beekeepers in selecting the most suitable coriander varieties for bee forage development.

Activity 4: Honey Production Potentials of Some Herbaceous Bee Forages

In this activity, researchers focused on evaluating the honey production potential of selected herbaceous bee forage plants. The study is in progress in determining the nectar secretion capacity and attractiveness of these plants to honeybees. Understanding the honey production potentials of various bee forages will aid in promoting sustainable beekeeping practices and enhancing honey yields.

Activity 5: The Effect of Supplemental Feeding of the Queen Rearing on the Quantity and Quality of Honey Bees

This activity aims to investigate the impact of supplemental feeding during queen rearing on honeybee colonies. Researchers prepared different rations to assess the quantity and quality of honeybees produced under different supplemental feeding conditions. The study will contribute to improved queen rearing techniques, ultimately enhancing bee population and honey production.

Activity 6: Study on economic threshold level for Varroa Mite in Central High and Mid Lands of Ethiopia

This activity focuses on studying the economic threshold level for the Varroa mite infestation in honeybee colonies in the central high and midlands of Ethiopia. Researchers collected different data to determine the threshold level at which intervention becomes necessary to prevent significant economic losses due to mite infestations. The findings inform effective mite management strategies.

Activity 7: Evaluation of Ant-repellents plant as control and prevention methods of Ants at Tepi, Southwest Ethiopia

Researchers evaluated and continued to evaluate the efficacy of ant-repellent plants as control and prevention methods to protect honeybee colonies from ant infestations. The study assesses the effectiveness of various plant species in repelling ants and safeguarding beehives, promoting better colony health, and honey production.

Activity 8: Honeybees stock improvement through selective breeding in Islands of Lake Abaya, Southern Ethiopia

This activity seeks to enhance desirable traits such as disease resistance, productivity, and behavioral characteristics in honeybee populations, leading to improved colony performance and honey production. Researchers are selecting experimental honeybee colonies and gathering them at the Island of Lake Abaya. The activity is behind the schedule due to responsible investigator went out for further education. Thus this activity is running by junior researcher who need technical back up from Holeta Bee research Center to implement selective breeding programs to improve the genetic stock of honeybees Southern Ethiopia.

Activity 9: On station adaptation of Stingless bees (*Meliponula beccarii*) using different hive types

This activity aims to adapt stingless bees (*Meliponula beccarii*) to different hive types under controlled on-station conditions. Researchers are studying the preferences and behavior of stingless bees in different hives, providing valuable insights into their colony development and honey production potential and it is going smoothly as per the schedule.

Activity 10: On station adaptation of Stingless bees (*Trigona*) using different hive types at Bonga Agricultural Center

Similar to the previous activity, this study focuses on adapting stingless bees of the *Trigona* species to different hive types at the Bonga Agricultural Center. The research aims to identify hive types that optimize the health and productivity of *Trigona* colonies, benefiting beekeepers and enhancing stingless beekeeping practices and is smoothly going as per the plan.

Activity 11: Molecular Analysis of Chemosensory Organs in the Honey Bee Parasite *Varroa destructor*: A Comprehensive Examination of the Potential Carriers for Semiochemicals (PhD Thesis)

This activity is a comprehensive PhD thesis project that focuses on molecular analysis of the chemosensory organs in the honey bee parasite *Varroa destructor*. The study aims to identify potential carriers of semiochemicals within *Varroa* mites, which could have implications for controlling this destructive pest and improving honeybee health. The student is working hard to complete this activity by next budget year.

Project 2: Enhancing the Role of Beekeeping in Food Production, Ecosystem Conservation, and Resilience to Climatic Change

This project focuses on the crucial role of beekeeping in sustainable natural resource management, ecosystem conservation, and climate change resilience. The project's outcomes contribute to promoting the integration of beekeeping into food production systems and fostering ecosystem conservation in Ethiopia. For the time being the project encompasses only one research activity named **Assessing and modeling the effect of climate change on honey production in Oromia and southern Ethiopia.**

Ongoing activities status in Project 2

Activity 1. Assessing and modeling the effect of climate change on honey production in Oromia and southern Ethiopia.

This research activity enhances the understanding of climate variability's impact on honey yield, paving the way for informed decision-making and adaptation strategies in beekeeping practices. Pertinent data was collected from Gamo zone of South region and West Hararghe zone of Oromia region.

Project 3: Improving Bee Product Handling, Diversification, and Commercialization Techniques for Value Addition and Marketing

With a strong focus on value addition and marketing of bee products, this project aims to improve the handling, diversification, and commercialization techniques in apiculture. It aims to enhance the value addition and marketing of Ethiopian honey. It provides valuable information to support branding, labeling, and building traceability in the honey supply chain. This report highlights the objectives, progress, and expected outputs activities under this project. The project comprises two research activities namely: **Physi-cochemical properties, antioxidant and antibacterial activities of monofloral honey (*Apis mellifera* L.) types produced in Ethiopia** which is completed this budget year and **Antimicrobial properties of honey and honeybee collected pollen from different agro-ecology of West shoa** which is undergoing activity.

Completed Research activity in Project 3

As indicated above, **Physi-cochemical properties, antioxidant and antibacterial activities of monofloral honey (*Apis mellifera* L.) types produced in Ethiopia**, was completed at the end of June 2015(2022/2023). Extensive analyses of different monofloral honey types produced in Ethiopia have been conducted to determine their physicochemical properties, antioxidant activities, and antibacterial effects. The results provided valuable insights into the quality and potential health benefits of Ethiopian honey. The findings will contribute to value addition and market expansion, benefiting beekeepers, consumers, and the broader beekeeping industry in Ethiopia. It will laying the groundwork for branding, labeling, and building traceability in the honey supply chain.

Ongoing activities status in Project 3

Activity 1. Antimicrobial properties of honey and honeybee collected pollen from different agroecology of West shoa

As stated above this activity is the only ongoing research activity under project 3. The activity holds great potential in enhancing the value and marketing of Ethiopian honey and pollen. The evaluation of antimicrobial properties in honey and honeybee-collected pollen from diverse agroecological regions of West Shoa Zone is smoothly undergoing. This knowledge is vital for understanding the potency and effectiveness of these honey and pollen grains against pathogens.

Project 4: Apiculture Technology Transfer and Socio-Economics

This project, coordinated by the Holleta Bee Research Center (HBRC) and implemented in collaboration with Sinana, Adami Tulu, and Pawe Agricultural Research Centers, aims to enhance the dissemination of improved apiculture technologies and achieve rapid and inclusive progress in beekeeping development. The project also addresses socio-economic aspects related to beekeeping, market linkages, and gender empowerment. This project comprises six research activities of which four of them have been completed this year.

Completed activities in project 4

The completed activities have already showcased promising results, benefiting women, beekeepers, and the overall beekeeping value chain. Four Research activities have been completed. These includes, **On-farm demonstration of honeybee pollination services on *Coriandrum sativum*. L at Goro Districts of Bale zone of southeastern Oromia, Demonstration of different bee forage species in selected districts of Metekel zone and Awi zone in northwestern of Ethiopia, Demonstration of improved beekeeping technology package to enhance employment opportunity in rift valley, lowlands of Bale and west shoa and Institutional factors in honey value chain: Analysis of its effect on honey market surplus in Ethiopia.**

- 1. On-farm demonstration of honeybee pollination services on *Coriandrum sativum*. L at Goro Districts of Bale zone of southeastern Oromia**

The activity demonstrated and evaluated the role of honeybee pollination on coriander seed yield and economic significance of pollination services. The activity has been successfully demonstrated the crucial role of honeybee pollination in increasing the seed yield of *Coriandrum sativum* (coriander) in Goro Districts of Bale Zone

2. Demonstration of different bee forage species in selected districts of Metekel zone and Awi zone in northwestern of Ethiopia

Through on-farm demonstrations, different bee forage varieties were showcased to beekeepers, enabling them to optimize honey production. Bee forage varieties demonstration hold the potential to uplift the socio-economic status of beekeepers and enhance the commercial viability of apiculture.

3. Demonstration of improved beekeeping technology package to enhance employment opportunity in rift valley, lowlands of Bale and west shoa

It has been actively promoted and demonstrated improved beekeeping technologies in these regions to empower unemployed user groups and enhance productivity. The unemployed user groups were empowered with income from beehive products and enhance their beekeeping skills. The activity has already made significant strides in promoting gender equity and socio-economic empowerment.

4. Institutional factors in honey value chain: Analysis of its effect on honey market surplus in Ethiopia

Researchers evaluated the role of institutional arrangements in the honey supply system and identified potential areas for improvement and efficiency. The results laid the groundwork for enhancing the institutional arrangements within the honey supply chain.

Ongoing activities status in project 4

Activity 1. Promotion of beekeeping technologies through women's groups in creating access to beekeeping technology

Women's groups have been engaged in beekeeping technology promotion, leading to enhanced knowledge and skills among participants. As a result, women's income has improved, contributing to their socio-economic empowerment.

Activity 2. Market linkage for sustainable income: Effect of honey Linkage on the Income of Beekeepers and Honey Production in Selected Areas of Oromia, Ethiopia

The activity has been and is evaluating the effect of market linkage on the income of beekeepers and honey production in selected areas of Oromia. The findings and strategic recommendations will contribute to sustainable income generation for beekeepers and is going smoothly.

In conclusion, the cumulative efforts of the four projects contribute significantly to advancing apiculture research and development in Ethiopia. By addressing various aspects of beekeeping, from technology transfer to value addition and market linkage, these projects are shaping a more sustainable,

inclusive, and prosperous beekeeping industry. We are confident that the findings and outcomes of these projects will have a lasting positive impact on beekeepers' livelihoods, ecosystem conservation, and food production in Ethiopia

Training and other activity Report

Besides executing research activities, The National Apiculture Research Programs has also conducted training of Farmers, Development agents (DA) and Subject matter specialists (SMS) and participated in lecturing and advising of post graduate students of different Universities. The details are presented below

Training

The training on improved beekeeping aimed to enhance the knowledge and skills of farmers, development agents (Das), and Subject matter specialists(SMS) in modern beekeeping techniques, sustainable practices, and the promotion of beekeeping as a vital component of apicultural development.

Objectives

The training program had the following key objectives:

- To train participants on modern and sustainable beekeeping practices to improve honey production and hive management.
- To promote the adoption of advanced techniques for bee health management and disease prevention.
- To build the capacity of development agents and subject specialists to disseminate beekeeping knowledge and support farmers effectively.

Training Methodology

The training employed a combination of theoretical sessions, practical demonstrations, and hands-on exercises. Group discussions and interactive teaching and learning were used to provide a holistic learning experience.

Training Contents

The training program covered the following topics:

- Importance of Bees in Agriculture and Biodiversity Conservation.
- Hive inspection techniques.
- Seasonal honeybee colony management
- Honey and bees wax harvesting and Post-Harvest Handling
- Identifying and Preventing Common honeybee pests
- Sustainable Practices in Beekeeping.
- Value Addition and Marketing of Honey Products and chefeke hive making

Achievements

The Apiculture Research program exceeded its targets, reaching approximately 592 farmers, 98 SMs and 50 DAs, which is more than 100% of the planned number (400, Farmers, 25 SMS and 25DAs). The

remarkable success of the program can be attributed to several factors: The strong interest and enthusiasm among beekeepers, development agents, and subject matter specialists in adopting improved beekeeping technologies contributed to the higher-than-expected attendance and collaborating with Ministry of Labor and Skill, and Ministry of Irrigation and Lowlands facilitated the organization and successful execution of the training especially training of subject matter specialists. More over the program planned to train 30 researchers on the nutrition requirement of honeybees and related researchable agendas and successfully trained 32 researchers (28male and 4 female).

Outcomes

The training on improved beekeeping for farmers, Development agents, and Subject matter specialists has equipped participants with the necessary skills and knowledge to foster sustainable beekeeping practices. This initiative will contribute to increased agricultural productivity, biodiversity conservation, and improved livelihoods in the region

The training had a positive impact on the participants:

- Farmers gained valuable knowledge and practical skills to implement improved beekeeping practices on their farms, leading to increased honey production and better hive management.
- Development agents developed a comprehensive understanding of beekeeping techniques, enabling them to provide informed advice and support to farmers in their respective regions.
- Subject matter specialists enhanced their expertise in beekeeping and could contribute to research and extension services more effectively.
- Researchers gained knowledge on honeybee nutrition requirements to implement problem solving research on the area
- Improved Awareness: All participants gained a heightened awareness of the significance of bees in pollination, environmental conservation, and sustainable agriculture.

Table 2. Training beneficiaries

No	Beneficiaries	Plan of 2015			Achievement				Total trainees trained	% total
		Male	Female	Total	Male		Female			
					No.	%	No.	%		
1	Farmers	350	50	400	503	143.7	89	178	592	148
2	SMS	20	5	25	88	440	10	200	98	392
3	DA	20	5	25	42	220	8	160	50	200

4	Researcher	25	5	30	28	112	4	80	32	106 .7
		415	65	480	661		111		772	160

Pre scaling up technologies

The Apiculture Research program for this fiscal year aimed to demonstrate improved beekeeping technologies (improved bee forages, honeybee managements, Processing and handling of hive products) to 445 beekeepers, 45 Development agents, and 60 subject matter specialists. The primary objective was to showcase advanced beekeeping techniques, sustainable practices, and innovative technologies to enhance honey production. Surpassing expectations, the program successfully reached 603 farmers, 56 DAs and 122SMS exceeding the initial target by over 100%. For the detail see table below

Table 3. Beneficiaries of demonstration of technologies

No	Beneficiaries	Plan of 2015			Achievement				Total trainees trained	% total
		Male	Female	Total	Male		Female			
					No.	%	No.	%		
1	Farmers	400	45	445	430	107.5	173	384 .4	603	135.5
2	SMS	50	10	60	111	220	11	220	222	370
3	DA	40	5	45	50	125	6	120	56	140
		490	60	550	591		190		881	160

This performance indicated that the Apiculture Research program has been a resounding success, surpassing its targets and effectively demonstrating improved beekeeping technologies to a larger audience than initially planned. The enthusiasm and engagement of the participants highlight the relevance and significance of such programs in advancing beekeeping practices and supporting sustainable agricultural development.

Technology Multiplication

The National Apiculture Research Program has undertaken an important initiative to multiply proven technologies and distribute them to beneficiaries in order to enhance the apiculture industry. The program aimed to replicate and disseminate 80 honeybee colonies, 75 varroa trapping hives, and 30,000 bee forage seedlings. This report presents a detailed overview of the technology multiplication process and the successful outcomes achieved by the program.

Objective

The main objective of the Technology Multiplication Program was to boost the apiculture sector by multiplying and distributing key technologies. By propagating honeybee colonies, varroa trapping hives, and bee forage seedlings, the program sought to strengthen beekeeping practices, mitigate varroa mite infestations, and improve the availability of bee forage, ultimately leading to increased honey production.

Methodology

1. Honeybee Colony Multiplication

The multiplication of honeybee colonies involved employing a systematic approach to ensure healthy and robust colonies. The process included the identification of strong and disease-free colonies as parent colonies for propagation. Through methods like Grafting techniques and colony splitting, 80 new honeybee colonies were successfully multiplied and established.

2. Varroa Trapping Hive Multiplication

For the multiplication of varroa trapping hives, the program used existing trapping hives as prototypes. Skilled technicians produced 75 additional varroa trapping hives by following standardized construction protocols. These hives were designed to help beekeepers manage varroa mite infestations, thus promoting the health and survival of honeybee colonies.

3. Bee Forage Seedling Multiplication

The multiplication of 30,000 bee forage seedlings of different forages involved careful selection of high-quality seeds. A dedicated nursery was established to nurture and propagate these seeds into healthy seedlings. The seedlings were then distributed to beneficiaries, contributing to improved foraging opportunities for bees and enhanced ecosystem services.

In general the National Apiculture Research Program's Technology Multiplication has proven to be a remarkable success. The achieved results, which closely matched the planned targets, demonstrate the program's efficiency and commitment to the apiculture sector. The dissemination of honeybee colonies,

varroa trapping hives, and bee forage seedlings has had a positive impact on honey production, varroa mite management, biodiversity, and capacity building within the beekeeping community. These technologies play a crucial role in sustaining bee populations, supporting apicultural productivity, and conserving natural ecosystems

Postgraduate Student Mentorship and External Thesis Evaluation

The program has successfully executed the advice and mentoring of postgraduate students, including 3 PhD and 11 MSc students, from different universities: from Bhairdar 4MSc, Addis Ababa 2PhD and 1MSc, Bonga 3MSc, Ghent 1PhD, Ambo 1MSc, Arsi 1MSc, and Haromaya 1MSc students. Additionally, as an external examiner, the program evaluated about 4 MSc students' theses in Bahir Dar and Ambo universities. The program's objective was to contribute to teaching and learning by producing qualified and well-trained human resources to further academic and research excellence.

Postgraduate Student Mentorship (advise)

The program provided valuable mentorship and guidance to a total of 3 PhD and 11MSc students from eight prominent universities. The mentoring process involved:

- **Research Guidance:** The students were provided with research guidance to define clear research objectives, formulate research questions, and design robust methodologies for their dissertations.
- **Literature Review:** Assistance was offered in conducting comprehensive literature reviews to ensure that the students' research was built on a strong foundation of existing knowledge.
- **Data Analysis:** Support in data analysis techniques and tools enabled the students to effectively analyze their research findings.
- **Thesis Preparation:** The program guided the students in structuring and presenting their theses in a professional and academic manner.

External Thesis Evaluation

The program actively participated as an external examiner in the evaluation process of 4 MSc students' theses from two universities. The evaluation process included:

- **Thesis Assessment:** Thoroughly evaluating the quality and originality of the research conducted by the students, ensuring adherence to academic standards.
- **Feedback Provision:** Constructive feedback was given to the students, highlighting the strengths and areas for improvement in their research work.
- **Ensuring Academic Rigor:** As an external examiner, the program ensured the integrity and academic rigor of the evaluation process, maintaining the standards of the respective universities.

In general the program's involvement in mentoring postgraduate students and evaluating their theses has made significant contributions to teaching and learning in the following ways:

Enhanced Research Skills: By providing mentorship and guidance, the program has enhanced the research skills of the students, enabling them to conduct high-quality research independently.

Quality Thesis Production: The thorough evaluation of the students' theses has contributed to producing well-structured, rigorous, and academically sound research work.

Knowledge Dissemination: The research outcomes of the postgraduate students have contributed to the dissemination of knowledge, both within the academic community and beyond. The program's execution of postgraduate student mentorship and external thesis evaluation has been successful, contributing to teaching and learning by producing well-trained and qualified human resources. The impact of this endeavor extends to research excellence and knowledge dissemination. The program looks forward to continued collaboration with universities to further strengthen academic development and research in the region.

Annual National Apiculture Research Planning

The National Apiculture Research Planning Workshop was held on [Insert Date] to bring together about 35 Researchers from 13 federal and regional Agricultural centers engaged in apiculture research. The primary objective of the workshop was to assess the current status of ongoing research activities, completed research achievements, and discuss new research proposals in the field of apiculture. This report summarizes the key outcomes and decisions made during the workshop. On the forum 15 ongoing, 7 highlights of completed activities and 29 new proposals were presented.

Status of ongoing research activities

Representatives from each participating center presented updates on their ongoing apiculture research projects. These presentations covered a wide range of topics, including honeybee management, colony health, honey production, pollination services, and sustainable apiculture practices. The updates offered valuable insights into the progress of existing research activities and identified potential areas for improving, collaboration and resource-sharing.

Highlights of Completed Research Activities

Researchers also presented the outcomes of completed apiculture research activities. Notable achievements included improvement in beekeeping techniques, pest management strategies, and insights into the outcomes of demonstrated technologies. Constructive comments were forwarded by attendees that enrich the results of completed activities. The success stories shared during this segment of the workshop encouraged participants to further explore successful methodologies and build upon previous research.

New Research Proposals

Over 29 new research proposals were presented during the workshop, reflecting the enthusiasm and commitment of the apiculture research community. These proposals covered a wide array of subjects, including the study of bee forage, effects of climate change on bee health, botanical and nutritional diversity and promotion of beekeeping technologies for the development of sustainable beekeeping.

Proposal Acceptance and Budget Allocation

Among the new research proposals, approximately 26 (24 new and 2 reinitiated) were accepted for further consideration based on their scientific merit and potential impact on the apiculture industry. However, due to budget constraints, only 16 activities were prioritized and allocated funding for execution. The selection process aimed to focus resources on projects that demonstrated the highest potential for significant advancements in apiculture research.

In conclusion, the National Apiculture Research Planning Workshop proved to be an essential platform for federal and regional Agricultural centers to come together, discuss their progress, share knowledge, and explore new avenues of research in apiculture. By prioritizing and funding 16 new and 15 ongoing research activities, the program will run a total of 31 Research activities in upcoming year.

Participation in Research Planning and Review of Southern Agricultural Research Institute

The annual research planning and review activities in the Agricultural Research Institutes of Southern Regional State aimed to assess the progress of ongoing research projects and evaluate new research proposals in various agricultural sectors, including the apiculture subsector. As the chairperson for the evaluation of the apiculture subsector, I actively contributed to enriching the research agenda through valuable comments and recommendations. Participating as the chairperson in the annual research planning and review of the apiculture subsector in Southern Regional States was a rewarding experience. The process allowed for critical evaluation of ongoing research, shaping the future research agenda, and fostering collaboration among stakeholders. I believe that these efforts will contribute significantly to the development and advancement of the apiculture sector and agricultural research as a whole.

Constraints

Despite the progress made in the research program, several challenges were encountered during the implementation:

Inadequate Budget and Timely Release: Insufficient funding and delays in budget release affected the timely execution of certain activities, slowing down progress all centers.

Inadequate Researchers and Non-Professionals in Federal Research Centers: The shortage of qualified researchers and non-professionals in federal research centers impacted the efficient handling of activities, leading to potential delays and compromises in the quality of research.

Shift of Research from Apiculture to other professions: Frequent move of research personnel from apiculture research team to other team in some centers resulted in disruptions and loss of institutional knowledge, affecting the continuity of ongoing activities.

Lack of Field Vehicles: The unavailability of sufficient field vehicles hindered fieldwork and data collection, particularly in remote locations, limiting the scope of some activities.

Way Forward

To address the constraints and ensure the successful completion of the research program, the following steps should be taken:

Budget Allocation and Timely Release: Efforts should be made to secure adequate funding and ensure timely release to facilitate smooth program execution.

Capacity Building and Retention of Researchers: Initiatives for capacity building and retention of researchers should be undertaken to strengthen the workforce and maintain continuity in research activities.

Collaboration and Resource Sharing: Collaboration among research centers and resource sharing, including field vehicles, should be encouraged to overcome logistical challenges and EIAR should also work hard to avail field vehicle at least for program coordinating center.

Stakeholder Engagement: Involving stakeholders and beekeeping communities will foster support and participation, ensuring the program's success and sustainability.

Continuous Monitoring and Evaluation: Regular monitoring and evaluation of ongoing activities should be conducted to track progress, identify bottlenecks, and implement corrective measures as needed.

10. Articles published in this plan year by different teams

Team	write full citation	Quarter	Additional explanation
Beekeeping & Genetic Improvement	Evaluation of pollen supplementary diets for honeybee (<i>Apis mellifera</i>) colonies and their effects on same biological activities. <i>Advances in bioscience and bio-engineering</i> (2022), 10(3): 54-60.	1 st	Journal
	Determining the Performance of <i>Apis Mellifera Bandasii</i> Populations under Different Agro-Ecologies of Central Ethiopia. <i>Hindawi: Advances in Agriculture</i> Volume 2022, 6 pages https://doi.org/10.1155/2022/2591154	2 nd	Journal
	Nesting ecology and nest characteristics of stingless bees (<i>Apidae: Meliponini</i>) in Oromia Regional State, Ethiopia Zewdu Ararso Hora, Alemayehu Gela Bayeta & Taye Negera <i>International Journal of Tropical Insect Science</i> https://doi.org/10.1007/s42690-023-00946-3	3 rd	Journal
Bee Forage and Pollination Ecology	Tura Bareke, Admassu Addi, Kasim Roba, Tolera Kumsa (2022). Effect of storage temperature and packing materials on seed germination and seed storage behavior of <i>Schefflera abyssinica</i> . <i>Nusantara Bioscience</i> , 14 (2): 141-147.	1 st	Journal
Bee Forage and Pollination Ecology	Tura Bareke and Admassu Addi (2022). Quantifying Nectar Secretion Potential of	2 nd	Journal

	Hygrophila auriculata (Schum.), Heine (Acanthaceae), and Salvia leucantha Cav. (Lamiaceae) for Honey Production. <i>Advances in Agriculture</i> , 2022 (6):1-8. https://doi.org/10.1155/2022/8301903		
Bee product quality improvement and value addition	Deressa K., Alemayehu G., Teferi D., Meseret G., Gemechis L. (2022). Evaluating the Effect of Plants Extracts Against Varroa Mites (Varroa Destructor) of Honeybees (<i>Apis Mellifera</i>), Vol.14, No.2	1 ^{ffaa}	Journal
	Gemeda M, Kebebe D, Demto T (2022) An assessment of indigenous knowledge of apitherapy in the Oromia region, Ethiopia. <i>Open J Biol Sci</i> 7(1): 005-010. DOI: https://dx.doi.org/10.17352/ojbs.000029	1 ^{ffaa}	Journal

11. Produced Extension materials, manuals, leaflet, production guidelines, posters etc and distributed to the users

Various extension leaflets were prepared to make farmers' training effective and to bring about improved bee technologies that should be researched and changed. For this purpose, the Agricultural economics and Agricultural Extension Team was prepared extension leaflets in a manner that can be easily used by the users in collaboration with technology research teams (Table below). Accordingly, the documents described in the table below will be prepared with special attention to this work in this year's plan.

Team	Types of text	No. of prepared	No. of distributed		Total	Additional explanation
			For beekeepers	For other bodies		
Apiculture Technology generation	Banar	2		2	2	Exhibition
	Poster	16		16	16	Exhibition
Bee Forage and Pollination Ecology	Leaflet (3 types)	90		90	90	Production of different bee forages
	Poster	1		0	0	Exhibition
	Banner	2		0	0	Exhibition
Bee Health	Leaflet	26	0	26	26	Bee health protection guidelines
Bee product quality	Leaflet	150	0	100	100	<i>Honey and</i>

improvement and value addition						<i>beeswax processing and managment</i>
Socio-economics	Leaflet	120	80	40	120	Honey value chain: Key forward
Agricultural extension	Leaflet	20	20		20	Preparing Chefeka hive
Agricultural extension	Leaflet	20	20		20	Honey bee feed
Agricultural extension	Leaflet	120	120		120	Bee management
Agricultural extension	Leaflet	160	160		160	Honey harvesting
Total		727	400	274	674	

12. Human Resource and Center Development Works

It is inherent and imperative for an organization to enhance the capability of its workforce in order to fully carry-out plans and targets towards achieving its goals and objectives. After all, the most important asset of any organization is its human resource. Like any organization, our center performed the following major activities under human resource development and capacity building:

12.1. Long term training

S/N	Process/Team	Level of Education	Plan and implementaion			Reason for under performance if any
			Annual plan	Excution	Excution %n	
1	Socio-economics team	PhD	1	0	0	Due to scarcity of human power to take responsibility for the planned activities
	Over all		1	0	0	

12.2. Total number of employees on study leave during this plan year

S/N	Process/Team	Level of education	No of staff started edu in 2015 E.c		No of staff started edu in 2014 E.c		No of staff started edu in 2013 E.c		No of staff started edu in 2012 E.c		Total	
			Dhi.	Dub.	Dhi.	Dub.	Dhi	Dub	Dhi.	Dub.	Dhi	Dub
1	Apiculture Technology Generation process	PhD	-	-	1	-	1	-	1	-	3	-
2	Apiculture Technology Generation process	MSc	-	-	-	-	-	-	1	-	1	-

3	Socio-economics and extention and technology promosion process	PhD	-	-	-	-	-	-	-	-	-	-
4	Socio-economics and extention and technology promosion process	MSc	-	-	-	-	-	-	-	-	-	-
4	Post harvest and Food Engineering team	MSc	-	-	-	-	1-	-	-	-	1	-
5	Center development technology multiplication team	MSc	-	-	-	-	1	-	-	-	1	-
		Overall total	-	-	1	-	3	-	2	-	6	-

12.3. Number of staff participated on short term training in 2014 EC.

S/ N	Team	Topic of the training	Number of participants			Number of training days	Place of training	Remark
			M	F	Total			
1	Agricultural Economics and Agricultural Research	Diffusion of Innovation	3	1	4	5	Addis Ababa	EIAR
2	Beekeeping and Genetic improvment	Genetic selection and Breed improvement in honey bees	9	1	10	10	Holeta	Sponsred by HBRC and CASO
3	All staff	Standard planning and evaluattion of the results	89	28	117	2	Holeta	Sponsoed by HBRC
4	All staff	Awraennes creation and training on staff handling and work etics	17	3	20	2	Holeta	Sponsoed by HBRC
5	Human Resorce managment	Digilizing Human resource managment	2	0	2	2	Addis Ababa	OARI
		Total	120	33	153		-	

12.4. Total human resource of the center by gender and level of education

S/N	Team	PhD		MSc/MA		BSc/BA		Diploma/level		Certificate		Kan biroo		Ida'ama	
		M	F	M	F	M	F	M	F	M	F	M	M	M	F
1	Technical	4	-	14	3	3	1	17	10	-	-	-		39	15
2	Support staff	-	-		-	7	3	4	5	0	1	30	6	45	15
3	BPR flouter	-	-	-	-	-	-	-	-	-	-	2	0	2	0
	Total	4		14	3	10	4	21	15	0	1	32	6	86	30
116															

12.5. Other activities carried out related to human resource development

- Adequate explanation was given to the monitoring and evaluation team from OARI on the work being done by the Development and Human Resource Management Team in the center
- Experiences on adjusted common structure have been shared with the OARI by experienced staff of our center through different media (telephone, email and direct discussion)
- Volunteery contribution on office and campus cleaning works, planting seedlings for free as part of green legacy are well done.
- For promotion of researchers, required data compiled and reviewed by researcher promotion committee and evidence of 5 researchers sent to OARI
 - preparation and annual performance evaluation are coordinated and conducted starting from overall center activities to the individual employee. Records and document storage department operations are being carried out in a legal manner and.

The security and property adimin work both at office and research stations are properly implemented and helped capacity development efforts fruitful.

13. Community service activities carried out

Several community service activities were performed in this plan year. Some of the works done are summarized in the following table:

Table 13.1. Community service provided and number of beneficiaries per each service

S/N	Service provided	M	F	Total	Remark regarding the services
1	Advisory service on how to start beekeeping	36	9	45	Technical advice was given to farmers of Walmara district who wish to enter into modern beekeeping business, 1 private enterprise and 1 local NGO, 4 from Wolega university, 16 veterinary students from Dasse University,

2	Intertaining visitors	35	69	104	15 from Bahir dar University, 15 veterinary students from Wallega University, 15 veterinary students from Salalae University, 4 individual experts from Woleggaa University and 50 TVET students from HOLETA colluge were visited our center facilities.
3	Exprience sharing to different community groups	52	95	147	PhD students from Addis Abeba and Walayta universities, as well as BSc students from Wallo, Sooddoo, Wolkitte, Addis Abeba, Wollega, Hawassa, Wallo & Selale Universities, received knowledge and experience on bee feed plants, pollination ecology, and pollination services.
4	Sample analysis	3	1	3	141 samples of honey were analyzed in our Quality lab for students from various universities, different research centers and private companies and for each sample seven parameters were checked and results were provided to the service seekers
5	Advisory service & exteranal exminer for MSc students	4	4	8	Addis Ababa University1., Walayita Soddo 3, 2 Bahirdar University, 1 Haramayya university, Asoosaa 1
6	Advisory services for individual on how to determine the colony carrying capacity of forest area for beekeeping investment	1	0	1	Private oprator
7	Honey plants were identified from 117 honey samples by preparing 351 pollen slides based on the honey pollen analysis in our botany lab	0	1	1	351 permanent pollen reference slides are prepared for future use
8	Honey pollen analysis 108	1	8	9	216 slides were prepared and botanical origin of the honey samples identified for the service seekers
9	Honey bee disease identification analysis was done for Msc student		1	1	Student from Jima University
10	10 years strategy document for queen rearing and Training were developed	3		3	For Oromia Bureau of Agriculture

14. Budget and its utilization

14.1. Utilization of capital budget utilization from OARI

No	Team/Process	Annual plan	Annual utilization	% (P/U)
1	Apiculture Tech Generation	2,175,000	2,074,327.82	95.4
2	Socio-economics	351,400	311,669.97	88.7
3	Extension and Technology promotion	463,600	457118.66	98.6

4	Center Development and Tech multiplication	1,150,200	1,149,200.36	99.9
5	Post harvest and food engineering	234,300	193,584.71	82.6
	Overall total	4,374,500	4,185,901.52	95.7

14.2. Utilization of capital budget utilization from non-OARI sources,

S/N	Team	Plan and utilization level		
		Annual plan	Annual utilization	% (P/U)
1	Apiculture Tech Generation, Socio-economics and Extension and Technology promotion	1,267,870	1,129,820	89
	Total	1,267,870	1,129,820	89

14.3. Utilization of regular budget utilization from OARI

S/N	Budget category	Plan and utilization level		
		Annual plan	Annual utilization	% (P/U)
1	Running costs	2,277,126	2,072,311.65	91.0
2	Employees' salary	12,495,260	10,897,997.80	87.2
	Total	14,772,386.00	12,970,388.65	87.8

15. Internal revenue collection

Annual plan (ETB)	Annual Collection (ETB)	% (P/C)	Remark
123,730	133,664	108	

16. Cross cutting issues

16.1. Implementation of the public service transformation tool package, leadership roles and activities, and manifestations of good governance

S/N	Works planned	Unit	Annual plan	Annual Implementation	% (P/I)
1	Team meeting	No	4	3	75
2	Process meeting	No	4	3	75
3	Management meeting	No	12	11	91.7
4	Monitoring and evaluation of plan implementation	No	2	2	100
5	Partnership meeting with different stakeholders	No	2	3	150
6	Work ethics and anti-corruption promotion committee meeting	No	4	6	150

16.2. Implementation of gender mainstreaming, youth participation and HIV AIDS prevention activities

S/N	Planned Activities	Unit	Annual Plan	Annual Implementation	% (P/I)
1	Technology demonstration by involving beekeepers				
A	Male (Adult men)	No	26	4	15.4
B	Female (adult women)	No	14	10	71.4
	Total		40	14	35
2	Technology and experience expansion by involving beekeepers				
A	Male (Adult men)	No	48	83	173
B	Female (adult women)	No	32	17	53
	Total		90	100	91
3	Provision of Training for SMS				
A	Male	No	25	4	16
B	Female	No	25	10	40
	Total		50	14	28
4	Provision of Training for DAs				
A	Male	No	25	2	8
B	Female	No	25	1	4
	Total		50	3	6

5	Training on gender concepts and Gender mainstreaming staff	No	113	90	79.6
6	Training to create awareness on how to prevent HIV/AIDS to the total staff of the center	No	113	90	79.6
7	Conducted monitoring and evaluation of planned activities by using a checklist	No	4	2	50
8	Supporting impoverished kids who lost their parents due to a variety of causes, including the HIV/AIDS crisis	No	14	20	143

Additional activities performed includes:

- ✓ World Women's Day was celebrated in the presence of all staff of the center to create awareness about gender equality



- ✓ Regarding public support activities, ETB 14,000 has been donated to people living with HIV/AIDS, 25 quintals of cement for house construction for the poor, 35 quintals of house tiles, 100 kg of various types of nails, 30 house tiles nails for school construction support donated.

16.3 Ethical Promotion Activities

15.3.1 Key activities during the plan year regarding ethical promotion activities

- ✓ The Council Forum on Crime Prevention and Anti-Corruption and Promotion of Good Ethics has created a feeling of accountability across our center
- ✓ Monitoring and auditing of assets and finances have been done in order to ensure that the government budget is only used for the job at hand and that it can produce the desired results. In cases where there is a financial shortage, the employees also complete the assignment by forgoing personal benefits like paying out of pocket for daily remuneration and travel expenses.
- ✓ Different kinds of monitoring were done to make sure the equipment provided to the workers was handled properly and utilised for workplace functions. Additionally, through conversations with the personnel, a particular focus has been placed on improving equipment management
- ✓ New regulations and guidelines have been identified and employees have been made aware of them

- ✓ With the oversight and assistance of the anti-corruption and ethical development council at all levels, workplace ethics and efficiency have increased, which enhances the delivery of services in most areas
- ✓ Ongoing education on the monitoring efforts being made to make sure that staff members uphold workplace cultures and ethics was done at various periods.
- ✓ The Crime Prevention and Anti-Corruption Council's performance has been evaluated, and an action plan for 2015 has been prepared.
- ✓ To collect ideas and grievance, suggestion box has placed at a visible space and comments and complaints related to service delivery and work ethics collected from employees and external bodies/customers. Based on the comments and complaints, corrective measures were taken as part of the ongoing improvement in the regards
- ✓ The center and the nearby residents have been able to avoid trouble thanks to the clearance of the old trees that were among the dangers to human property and lives in Holeta down research station

In addition to these facts, the table below provides a summary of the main initiatives undertaken to support the growth of ethical conduct and the oversight of ethical concerns.

Table 16.3.2. Performance of Ethical Promotion Activities of the Center

S/N	Main activities planned	Unit	Annual plan	Annual implementation	% (P/I)
1	Collect customer feedback on our services and analyze public satisfaction levels	Quarter	4	4	100
2	Monitoring the use of the government's budget to ensure that it is put to good use and produces the desired outcomes	Quarter	4	4	100
3	Observing how center staff use government equipment and materials to ensure that they are solely used for office tasks	Quarter	4	4	100
5	Assess any potential ethical dilemmas or difficulties at work, and respond right away if they arise	Quarter	4	4	100
6	Support the ethics and anti-corruption councils of the centers; establish a schedule for debating any ethical issues and processes for resolving them if they arise	Quarter	4	4	100

7	Monitor presence and application of important laws, rules, and regulations	No of monitored documents	4	4	100
8	Conduct studies on practices that leave room for fraud and misconduct	No	2	0	0
9	Collaborate with various groups to encourage moral conduct and a sense of responsibility at all levels in the center.	Quarter	4	4	100
10	If any corruption offense has been committed, is suspected of having been committed, or if any third-party complaints have been received, they will be registered and submitted to the center's director and OARI	Month	No of corruption offense or complaints	0	0
11	Employee ethics, those who set an example at work, those whose disciplinary infractions have been advised and who have received disciplinary punishment	Good model	8	0	0
		Advised	8	0	0
		Punished	8	0	0
12	Keep track of and make corrections to internal and external audit reports	Quarter	Reported Audit problem	0	0
13	Review ethical progress and remain vigilant on activities at various levels	Quarter	4	2	50
14	Receive and give feedback	Quarter	4	0	0
15	Enhance the preservation of evidence/documentation of ethical development and activity monitoring	Days	Working hours	Monitoring was done	Monitoring was done

15.3.2. Key problems happened in relation to Ethical Promotion Activities in this fiscal year
Some of the key problems encountered regarding ethical promotion in our center are the following:

- ❖ Lack of internal audit experts that results in irregular follow-up on internal audit reports
- ❖ Despite the best efforts being made to oversee the center's ethical development activities, there is no dedicated budget for expanding awareness training
- ❖ Due to Finance Pool's failure to make timely purchases, some critical operations were corruptible, leading to some major efficiency and cost-savings issues

16.4. Job creation activities for unemployed community groups
A. Job Opportunities on Technology Utilization Created for Unemployed Youth

S/N	Planned Works	Unit	Annual plan	Implementation	% (P/I)
1	Work with the Holeta Town Administration to create job opportunity for a group of youth on building a beekeeping enterprise employing both traditional and Modern beehives	S/N	30	40	133
2	Training in creating capacity to create job opportunity for two group of youth by constructing and selling Modern beehives in Holeta and Gedo towns	S/N	30	30	100

B. Job created for temporary workers (daily laborers)

Several youths acquired temporary jobs at different research sites of Center in this plan year. The following table shows total numbers and topics job opportunities created:

S/N	Planned activities	Unit	Annual plan	Implemented plan	% (P/I)	Remark
1	Set up a nursery and raise seedlings of various bee forage plants	No workers	20	16	80	Holeta main site
2	preparing the soil mix and seedling pots for the transplantation of coffee plants from the seed bed for a future field transfer	No of Workers	10	10	100	Holeta main site
3	Maintenance and beautification of the office compound,	No of Workers	10	6	100	Holeta and Gedo sites
4	Safeguarding of research trials at the research facilities at different sites	No of Workers	30	34	113	Bako, Gedo, Gindabaret, and Menagesha
	Total	No	70	66	94.3	

17. Citizenship Service Provision

The Holeta Bee Research Center saw it as imperative to foster the practice of giving back to the community without expecting money. Based on this knowledge, our center provided a variety of essential civic services to pursue the goals listed in the table below, which include ensuring sustainable growth and raising the standard of living in society;

S/N	Planned Works	Unit	Annual plan	Annual Implementation	% (P/I)
1	Digging a planting hole at different sites of the center	No	6000	5550	91.7
	Humanpower involved in this work	No	100	98	98
	M	No	70	65	92.9
	F	No	30	33	110
	Cash allocated for this work	ETB	60000	56250	93.4
	Cost estimate for the various pieces of equipment used for the operatio	ETB	12600	10900	86.5
	Estimated participation costs	ETB	30000	27500	91.7
	Professional Expenses	ETB	16000	13600	85
	Other costs	ETB	1000	1500	150
	Total participation expenses	ETB	119600	109750	91.8
	Community Benefited from the Work done	No	30	25	83.3
	M	No	18	16	88.9
	F	No	12	9	75
2	Planting Trees	No	6000	5500	91.7
	Humanpower involved in this work	No	80	72	90
	M	No	55	50	91
	F	No	25	22	88
	Cash allocated for this work	ETB	42000	36000	85.7
	Cost estimate for the various pieces of equipment used for the operatio	ETB	20000	18000	90
	Estimated participation costs	ETB	20000	21900	109.5
	Professional Expenses	ETB	12000	12000	100
	Other costs	ETB	1500	2000	133.3
	Total participation expenses	ETB	95500	89900	94.1
	Community Benefited from the Work done	No	12	13	108.3
	M	No	7	8	88.9
	F	No	5	5	100
3	Caring for the plants	No	3500	3672	104.9
	Humanpower involved in this work	No	9	11	122.2
	M	No	5	6	120

	F	No	4	5	125
	Cash allocated for this work	ETB	27000	39300	146
	Cost estimate for the various pieces of equipment used for the operatio	ETB	22000	18000	90
	Estimated participation costs	ETB	202000	181800	90
	Professional Expenses	ETB	16000	13600	85
	Other costs	ETB	1000	1500	150
	Total participation expenses	ETB	271518	257894	95
	Community Benefited from the Work done	No	12	14	116.7
	M	No	7	7	100
	F	No	5	7	140

18. Major problems Encountered during the Year

Process/team experienced challenges	difficulties encountered	Efforts made to address the problems	Recommended solutions
<ul style="list-style-type: none"> ✓ Apiculture Technology generation and all teams ✓ Extesion and technology promotion and socio-economics process, ✓ Post harvest and food technology engineering team ✓ Department of Procurement, Property Administration and Finance 	Security problems at the trial site	-	Change the working location for the upcoming year unless the security situation improves
	Very high budget deficit (Budget shortage)	An effort has been made to use budget resources more effectively and efficiently	To avoid quality componization in the implementation of planned research activities in the upcoming fiscal year, OARI must designate enough funding for the planned activities
	Lack of laboratory chemicals on the market and shortage of budget to buy those available	Asking for help from similar facilities and using a pooled budget to just buy a few lab supplies	Purchase of chemicals in pool at OARI and setting up enough money for this purchase
	Scarce human resources to run panned activities properly in some areas	Assigning available staff more duties in order to complete the planned job without providing additional compensation for the additional work	Allocate budget for filling the vacancies by shifting existing staff from other companies or hiring new workers from the market.

19. Summary of main initiatives scheduled for the upcoming fiscal year

- Prepare the 2015/16 center activities work plan
- For ongoing research activities, different data collection and recording will continue as per the project plan. For new activities/projects experimental set ups and starting data collection and recording will be started based on the budget situations
- Follow up on, help with, and keep an eye on the building of a new office project.
- Conduct numerous repairs, including expanding the woodshop at Holeta and repairing the 1050-meter-long fences that were broken at the Holeta site.
- Conduct maintenance and repairs on 3 motorcycles and 4 automobiles, clean and maintain the fields and properties throughout the center, and renovate demolished areas

- Encourage and support all employees to take part in various discussion workshops, have team meetings, and meticulously record and document all work and progress data
- Conduct surveys to identify beekeeping problems in different zones and areas, assess the demand for various technologies, and actively participate in various cooperation projects and discussions
- Compile information on the project's completed activities, then use that information to create scholarly articles and suggest exploitations the outcomes.
- Create fresh project concept notes and ideas based on the specific challenges in the beekeeping industry
- Hold a series of meetings at the center management level to discuss the planned activities status and any issues that have been found and encourage M &T team to actively participate in the monitoring and evaluation of the planned annual works of the center.
- Support and strengthen current FRG groups and establish new ones to carry out technology demonstrations and scale-ups in different 8 wordas in 4 zones
- Strengthen Citizenship Service Provision and Volunteering works
- Perform twice-yearly employee evaluations in the upcoming plan year
- Compile all events and progress and report them in monthly, quarterly, and annual reports.
-

List of IQQO funded Apiculture Research Process Activities for 2016 EC

No	Teams and Activity titles	Status	Year started	Year of completion	Remark on fund source
1	Bee keeping and Genetic Improvement	To be= 0 Ong=2, New=2, Total=4			
1.1	Assessing swarm catching and colony maintenance practices in Yayu Biosphere	Ongoing	2015	2017	OARI
1.2	Characterization of the gut microbiomes of stingless bees and studying their antibacterial effects, antibiotic resistance and probiotic properties of lactic acid bacteria, against the selected food born pathogens (PhD Thesis)	Ongoing	2015	2018	PhD Thesis of Taye (OARI)
1.3	Weight at emergence of virgin honeybee (<i>Apis mellifera</i>) queens and its effect on acceptance during introduction	New	2016	2019	OARI
1.4	Developing a prediction model for identifying beehive weight change	New	2016	2019	OARI
2	Bee Forage and Pollination Ecology	To be= 2 Ong=5, New=0, Total=7			
2.1	Enhancing seed production of Carrot (<i>Daucus carota</i> L.) using honeybee	To be completed	2015	2016	OARI

	pollination				
2.2	Nursery Observation of Alfalfa (<i>Medicago sativa</i>) accessions for bee and animal forage development	Extended but to be completed	2015	2016	OARI
2.3	The botanical and nutritional diversity of pollen grains foraged by honeybees from selected beekeeping sites of West Shoa Zone, Oromia, Ethiopia	ongoing	2015	2017	PhD Thesis Gemechis (OARI)
2.4	Germination pretreatment, storage behavior and nursery establishment of <i>Premna schimper</i> Engl.	Ongoing	2014	2017	OARI
2.5	Evaluation of <i>Ocimum basilicum</i> L. and <i>Lavandula angustifolia</i> Miller varieties for bee forage development	Ongoing	2015	2017	OARI
2.6	Determining honey production potential and honeybee colonies carrying capacity of Yayu Forest biosphere	Ongoing	2015	2017	OARI
2.7	Assessing Bee flora diversity and establishing flowering calendars for seasonal colony management in Yayu Forest Biosphere	Ongoing	2015	2017	OARI
3	Bee products Quality Improvement and Value Addition	To be= 1 Ong=2, New=2 Total=5			
3.1	Proximate and mineral composition of <i>Meliponula beccarii</i> honey from potential areas of Oromia	Extended but to be completed	2014	2016	OARI
3.2	Evaluating the potential of Karl jenter kit for the Royal Jelly production	ongoing	2015	2017	OARI
3.3	Evaluating Methods Used for Retarding Crystallization in Major Monofloral Honeys	ongoing	2015	2017	OARI
3.4	Enhancing the production of pollen without affecting the honey yield	New	2016	2018	OARI
3.5	Chemical characterization and variations of propolis of the honey bee colony in different agro ecology of West shoa Zones.	New	2016	2018	OARI
4	Bee Health	To be= 3 Ong=2, New=1, Total=6			
4.1	Survey of honeybee diseases and pests	To be	2015	2016	OARI

	around Yayo Forest Biosphere, Illubabor, Oromia Region	completed			
4.2	Assessment and Identification of Stingless Bee (<i>Meliponula Beccarii</i>) pests and predators in West Shoa Zone	Extended but to be completed	2013	2016	OARI
4.3	Study on Infestation Rate and Associated Risk Factors of Honeybee Pest, <i>Aethina Tumida Murray</i> in West and South West Shoa Zones	ongoing	2015	2016	OARI
4.4	Establishing methods of monitoring Honeybee health in Oromia Region	ongoing	2015	2018	OARI
4.5	Distribution and diversity of <i>Oplostomus</i> species (Coleoptera: Scarabaeidae), the pest of honeybees in Oromia Regional State	ongoing	2015	2017	OARI
4.6	Evaluation of different smoking on wax moth control	New	2016	2018	OARI

List of non-IQOO funded Apiculture Research Process Activities for 2016 EC

No	Teams and Activity titles	Status	Year started	Year of completion	Remark on fund source
1	Bee keeping and Genetic Improvement	To be= 2 Ong=1, Total=3			
1.1	Determining the optimum amount of sugar syrup required for dearth period feeding to honey bees (<i>Apis mellifera</i>) under Ethiopian context	Ongoing	2015	2017	FSRP (IQOO)
1.2	Evaluation of continuous honey harvesting frequency for better honey production	To be completed	2014	2016	EIAR
1.3	The effect of supplemental feeding of queen rearing on the quality and quantity of honeybee queens	To be completed	2014	2016	EIAR
2	Bee Forage and Pollination Ecology	To be= 2 Ong=1, New=1, Total=4			
2.1	Investigating nectar secretion dynamics and honey production potential of <i>Eucalyptus globulus</i> , <i>Eucalyptus camaldulensis</i> and <i>Erica arborea</i>	Ongoing	2015	2017	FSRP (IQOO)
2.2	Honey Production Potential of some herbaceous bee forage plants	To be completed	2014	2016	EIAR

2.3	Assessing and modeling the effect of climate change on honey production in Oromia and Southern Ethiopia	To be completed	2014	2016	EIAR
2.4	Multiplication and distribution of different bee forges	New	2016	2017	FSRP (EIAR)
3	Bee Health	To be= 3 New=1, Total=4			
3.1	Study on Economic Threshold level for varroa in central high and mid lands of Ethiopia	To be completed	2014	2016	EIAR
3.2	Identification and Evaluation of Ant Repellent plants in most Beekeeping Potential Zones of Oromia	To be completed	2013	2016	FSRP
3.3	The current distribution, infestation level and genotyping of Varroa mite (Varroa destructor) in honeybee (Apis mellifera L) Colonies of Ethiopia (PhD thesis of Alemayehu)	To be completed	2013	2016	EIAR
3.4	Spatial Distribution of small hive beetle and wax moth (Honeybee Pests) in Oromia	New	2016	2018	EIAR
4	Bee products Quality Improvement and Value Addition	To be= 1 New=2 Total=3			
4.1	Antimicrobial properties of honey and pollen of bees from different agro-ecologies of West Shoa Zone	To be completed	2014	2016	EIAR
4.2	Influence of feeding different type of pollen diet on colony population and workers physiological development (Gemechis Additional Thesis work)	New	2016	2017	EIAR
4.3	Characterization of honey in six selected honey producing potentials zone of Oromia Regional State	New	2016	2018	OSTA

List of Socio-economics and agricultural Extension and gender Research Process Activities for 2016 EC

No	Teams and Activity titles	Status	Year started	Year of completion	Remark on fund source
1	Socio-economics	Ong=, New=, To be= 2 Total=9			

1.1	Adoption of modern beehives and its determinant at Wonchi districts Southwest Shewa Zone, Oromia, Ethiopia	To be completed	2015	2016	OARI
1.2	Impacts of modern beekeeping technology on the income of farmers in the potential areas of Oromia region	ongoing	2015	2017	OARI
1.3	Analysis of Gender role in beekeeping activities a case of Oromia Regional state, Ethiopia	To be completed	2015	2016	OARI
1.4	Technical efficiency analysis of honey production in selected Zone of Oromia Region, Ethiopia	New	2016	2018	OARI
1.5	Market Linkage for Sustainable Income: effects of honey market linkage on the income of beekeepers and honey production in selected areas of Oromia Regional State, Ethiopia	To be completed	2014	2016	EIAR
2	Agricultural extension				
2.1	PED effect of shading on honey productivity in Wolemra and Ilu gela District	To be completed	2015	2016	OARI
2.2	PED of beeswax extraction technology: Ilugelan District, W/shewa Zone	To be completed	2015	2016	OARI
2.3	Beekeeping Technologies Promotion through FTC in Waliso District	To be completed	2015	2016	OARI
2.4	PDE of Production of Coffea arabica Mono Floral Honey Production	To be completed	2015	2016	OARI
2.5	Promotion of beekeeping technologies through women group in creating access to beekeeping technology in Ilugelan District	To be completed	2014	2016	EIAR
2.6	Pre-scaling up of stingless bees (meliponiculture) adaptation using pot hive technology in T/kutaye and Ambo	ongoing	2015	2017	OARI
2.7	Promotion of beekeeping technologies as intervention for water shade rehabilitation and source of income in Ejere Woreda, Oromia	ongoing	2015	2018	OARI
2.8	Pre scaling up of improved bee hive technologies as an alternative source of income for Peri-urban women beekeepers in Walmera and Ejere districts'	New	2016	2018	OARI
2.9	Pre-scaling up of beekeeping technology for income generation: Peri-urban	New	2016	2018	OARI

	jobless youth in Ada'a & Lumee, East Shewa Zone, Oromia				
2.10	Pre scaling up of top feeder honeybee feeding technology at West Shewa	New	2016	2018	OARI
2.11	Pre-scaling up of improved beekeeping technologies in Tiyo District of Arsi Zone, Oromia	New	2016	2018	OARI
2.12	Beekeeping technology for income and participatory forest conservation: Ilugalan, Districts West Shoa	New	2016	2018	EIAR
2.13	Economic empowerment of rural women and youth through creating access to improved beekeeping technologies	New	2016	2017	FSRP (EIAR)
2.14	Promotion of beekeeping technologies through demonstration and training	New	2016	2017	FSRP (EIAR)

List of Post Harvest and Food Engineering team Activities for 2016 EC

No	Activity titles	Status	Year started	Year of completion	Remark on fund source
1	Design and Optimization of Small-Scale Honey Moisture Reducer (Dehydrator)	To be completed	2015	2016	OARI

Report Compiled by

Name: _____ Signature _____ Date _____

Approved by:

Name: _____ Signature _____ Date _____