

Review Article

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Pre Extension Demonstration of Production of Coffea Arabica Mono Floral Honey Production at South Western Oromia, Ethiopia

Wongelu Endale* and Admasu Addi

Holeta Bee Research Center, Oromia Agricultural Research Institute, Oromia Region, Ethiopia

ABSTRACT

This research activity is conducted with the main objectives to evaluate and demonstrate production of *Coffea arabica* mono floral honey under farmers' management and create awareness on the importance of the technology. As to the method, selection of two sites and 20 beekeepers were undertaken for technology evaluation. Group apiaries used as centers of learning and technology evaluation. At each sites, farmers, development agents and experts trained and experimental colonies established. Honeybee colony follow up and technology evaluation activities undertaken in partnership with beekeepers, development agents and experts. Better honey yield on average of 16.2kg per hive pure honey harvested from honeybee colonies under management for demonstration. Additionally, 13.2kg per hive pure coffee honey harvested after a month from honeybee colonies mentioned above. In monetary value, the beekeepers obtained net additional 15,070 Birr per hive from improved management practices under coffee honey production from sell of coffee honey. From the results of the demonstration, awareness creation on improved beekeeping management practices that improve yield per hive and increase frequency of honey harvest per year is critical for our beekeepers. Therefore, it is suggested to further pre scale up the technology in other areas.

*Corresponding author

Wongelu Endale, Holeta Bee Research Center, Oromia Agricultural Research Institute, Oromia Region, Ethiopia.

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Introduction

Honeybees and flowering plants have a well-developed system of interdependence. Flowering plants provide food to honeybees in the form of nectar and or Pollen [1].

Honey is a natural source of antioxidants which has medicinal value against various diseases such as the anti-ageing, cancer, cardiovascular disease, reduced wound healing, gastrointestinal inflammatory diseases and Atherosclerosis [2]. The main cause for antioxidant effect of honey is due to presence of bioactive compounds such as phenols, flavonoids, carotenoids, vitamins, organic acids and other compounds [3]. The chemical composition of honey varies by its floral and geographical origin [4].

Coffee is perennial crop that belongs to the family Rubiaceae originated from Ethiopia [5,6]. It is the most important cash crops for trading and exports since the 18th century, providing jobs for millions of families worldwide. The majority of coffee varieties have highly aromatic flowers with mass flowering produce abundant nectar and pollen making the plant highly attractive to honeybees [7]. Coffee honey is important product and contains some basics nutritional composition. Coffee honey produced in areas where coffee is intensively grown particularly in Brazil and Indonesia and Ethiopia. In Ethiopia, Coffee grows in a wide range of agro-ecological conditions mainly from the range of altitudes 1200 to 3000 m [8]. Coffee is a major source bee plant in Southwestern and Southeastern parts of Ethiopia [1].

Coffea arabica honey is usually harvested during harvesting period of *Vernonia amygdalina* since there is overlap of flowering period of both species [9]. According to preliminary test using pollen analysis of honey from Yayu in Iluababore zone of Oromia indicated that over 75% of the pollen count of Coffee pollen was found in honey samples analyzed for botanical origin. This indicated that it is possible to produce coffee mono floral honey by integrating beekeeping with coffee production. Based on the result from previous on farm study, on average of 31.25 kg of *Coffea arabica* honey per season per hive harvested from introduction of 9 honeybee colonies per hectare of coffee farm [1]. Therefore, the intention of this activity was to demonstrate and evaluate *Coffea arabica* mono floral honey production under farmers' management.

Objectives

- To evaluate and demonstrate *Coffea arabica* mono floral honey production under farmers' management
- To create awareness on *Coffea arabica* mono floral honey production

Materials and Methods

Materials

To evaluate and demonstrate *Coffea arabica* mono floral honey production technology package under farmers' management, 20 box hives, 20 honey bee colonies and 60 kg pure beeswax used during the study period.

Site and Farmers Selection

The activity was demonstrated and evaluated in Hurumu and

Yayyo Woredas, Iluabor Zone, Oromia Region. The selection of demonstration sites and farmers were purposive. One demonstration site per Woreda, 10 beekeepers in one Woreda were selected as a member of Farmers Research Group (FRG). Experienced beekeepers on box hive selected as one of selection criteria to evaluate the technology package. Demonstration and evaluation of the technology was conducted with these FRG members. Apiaries of model beekeepers used as center for learning and technology demonstration and evaluation. Selection of the sites and beekeepers were carried out in close consultation with the respective Woreda Bureau of Agriculture (BOA).

Experimental Design

The study had two treatments to demonstrate and evaluate the technology.

- Five colonies in box hive under management for Coffea arabica mono floral honey production as one treatment and
- Five colonies in box hive for regular honey production according to honey season of the area as the second treatment will be used as a treatment per site.

Technology Evaluation and Demonstration Methods

As to the method, memorandum of understanding with bureau of agriculture signed before implementation of the activity to have common understanding on the objectives of the activity. Practical training for beekeepers, Development Agents (DAs) and Experts was given and experimental colony set up conducted after initial training on the technology packages. Regular follow up of experimental colonies seasonally; demonstration and evaluation of the technology conducted by Holeta Bee Research Center (HBRC) technical staff in partnership with FRG members, DAs and Woreda level experts.

Data Type & Method of Data Collection

Qualitative and quantitative data types from primary and secondary data sources collected during the study period. To collect primary data, data collection sheet, personal observation and participant interview methods used. Secondary data collected from research reports and internet search.

Method of Data Analysis

Quantitative data analyzed descriptively by using statistical techniques such as frequency counts, percentages, arithmetic means, t-test and partial budget analysis. After analysis of the data obtained, the data presented using tables for easy understanding and representation. The qualitative data analyzed through explanation of idea, opinion and concept explanation method.

Result and Discussions

Capacity Building

Capacity of the beekeepers, DAs and experts on improved beekeeping management practices and coffee honey production technology built through theoretical and practical trainings conducted at their respective village administration.

Table 1: Number of Beekeepers, Development Agents and Experts Participated on Training

No	Category	Number of trainee		
		Male	Female	Total
1	Beekeeper	16	4	20
2.	Development Agent	1	1	2
3.	Expert	6	0	6

Source: Own data, 2024

Besides the training, FRG members were participated on regular honeybee follow up activities seasonally during both active and dearth period



Photos on trainings at Hurumu and Yayo, 2024

Technology Evaluation Method

Colony Establishment and Follow Up

For the demonstration and evaluation purpose, 20 honeybee colonies transferred to box hive and experimental colony established at both sites. Regular honeybee follow up activities such as inspection, adding hive volume, harvesting, reducing hive volume and feeding of the honey bee colonies during dry season undertaken seasonally with these FRG members during the study period.



Hive distributions for honeybee colony establishment at Hurumu and Yayo, 2024



Established demonstration sites at Hurumu and Yayo, 2024

Honey Yield

In this study, honey yield harvested from demonstration hives during the demonstration period 2024-2025 used for evaluation of the technology. The main honey season of the area is from December- February. Accordingly, honey yield harvested in December, February and end of May from experimental colonies used for the evaluation.

Table 2: Average Annual Honey Yield from Demonstration Hives

Treatments	Honey yield + SD	p-value
Honeybee colonies under beekeepers management (control)	8.9±2.02	0.005
Honeybee colonies under management for demonstration	16.2±2.02	
Honeybee colonies for coffee honey production	13.2±1.8	

Source: Own data, 2024-2025

Financial Benefit of the Technology

To estimate the profitability of coffee honey production, a simple financial analysis has done. In order to compare the profitability, wax and labor cost as cost and honey yield as income recorded

and compared assuming other costs (hive and colony) are similar for both treatments. The analysis was done to arrive at net return per hive from both treatments.

Table 3: Financial Benefit of the Technology Using Partial Budgeting

Column 1 Expenses				Column2 Income	
Added costs (Birr)	Beekeepers practice	Improved management	Income (Birr)	Beekeepers practice	Improved management
Beeswax cost	0.00	2,250	Honey yield /hive/ year in kg	19.8	32.4
Labor cost	2,300	3,600	Coffee honey yield/ hive	0	13.2
Total costs of production	2,300	5,850	Income from sell of honey	11,880	19,940
			Income from coffee honey	0	10,560
			Total income/hive	11,880	30,000

Source: Own data, 2024-2025

Hint: honey price in 2025: 600Birr/kg for pure honey and 800/kg for coffee honey

Net income from box hive under beekeepers management/control: 11,880 – 2,300=9,580 ETB

Net income from box hive under improved management practices 19,940-4,850=15,090 ETB

Net income from box hive for coffee honey production 10,560 - 1,000(additional labor cost)= 9,560 ETB

Net benefit from improved management practices under coffee honey production: 15,090+9560-9580=15,070/hive

In general, the beekeepers obtained additional income of 150,700 Birr from 10 demonstration hive per site as a result of intervention

Conclusion and Recommendation

In conclusion, awareness creation on improved beekeeping management practices that improve yield per hive and increase frequency of honey harvest per year is critical for our beekeepers. Therefore, it is suggested to further pre scale up the technology in other areas.

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