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Pre-extension Demonstration and Evaluation of Top Feeder Honeybee Feeding Technology at Wolmera Woreda, Oromia Region

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ABSTRACT

To maintain optimum honeybee colony population during dearth of floral resources, feeding of honeybee colonies with supplementary feeds is important. This research activity is conducted with the main objectives to evaluate and demonstrate top feeder technology under farmers' management and create awareness on the importance of the technology. As to the method, selection of demonstration sites and farmers was purposive due to the reason that the evaluation of the technology requires modern box hive and experience on this hive. Two demonstration sites at two Village Administrations selected and Farmers research groups were used for technology evaluation. One FRG which contain 10-15 beekeepers strengthened at each demonstration site and group apiaries of FRG members 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 these FRG members, development agents and experts. As to the result, by using top feeder, the beekeeper can feed many colonies in short period of time. The average time taken to feed one honeybee colony using top feeder was only 55.85 seconds where as it was 107.26 seconds using plastic bucket under farmer's management. Moreover, feeding using top feeder also reduced honeybee colonies disturbance during time of feeding. In conclusion, technologies like top feeder that saves beekeepers time and also reduce disturbances of honeybee colony are critical for our beekeepers. Therefore, it is suggested to further pre scale up the technology in other areas

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Back ground & Justification

Ethiopia has potential of producing over 500,000 tons of honey per year and the annual production of honey and beeswax is low compared to its potential [1]. Ethiopia stands eighth by producing about 21% of the total world and about 21.7% of total African honey production [2].

Beekeeping in Ethiopia plays an important role in income generation for farmers. Nationally, an average of 420 million Ethiopian Birr (ETB) is obtained annually from the sale of honey [3]. Honey production of the country also meets beverage requirements of the urban and rural population. It is also demanded for its nutritional and medicinal values.

Our beekeeping system traditionally utilizes flowering events which provide sufficient quantities of nectar and pollen to stimulate colonies build up and maintain optimum colony populations. However, nowadays, maintaining optimum colony population during dearth of floral resources is becoming a major problem for the beekeepers. The shortage of floral resource availability leads to declining of colony's population eventually resulting in weaker colonies. Such colonies are also vulnerable to absconding, natural pests and predators of honeybees [4]. The first option to minimize the effect of dearth period starvation is feeding of colonies with supplementary feeds [5]. Supplying sugar syrup (sucrose) to honeybee colonies can be a valuable management tool for beekeepers [6]. Feeding sugar in a syrup form is the most

popular and probably the most effective method [7]. Different types of sugar syrup feeder have been invented, tested and used by beekeepers worldwide for feeding honeybee colonies of different races with varying behaviors. To select and recommend the better feeder, on station evaluation of different feeder types conducted by biological researchers and top feeder feeding technology was selected based and on time required to feed a colony (42.90 ± 1.86) and number of dead bees under hive stand (1.60 ± 0.58) [8]. Thus, the intention of this study is to demonstrate and evaluate the technology under farmer's condition.

Objectives

To evaluate and demonstrate top feeder technology under farmers' management
To create awareness on the importance of the technology
To improve farmers' knowledge and skill of application/use of the technology

Materials and Methods

Site and Farmers Selection

The activity demonstrated and evaluated in Wolmera Woreda, Oromia region. The selection of demonstration sites and farmers was purposive due to the reason that the evaluation of the technology requires modern box hive and experience on this hive. Two demonstration sites namely Goleliban and Wajitu selected and FRGs which consist 10-15 beekeepers at each sites strengthened for the evaluation of the technology. Demonstration and evaluation of the technology conducted with these FRG members. Group's apiaries used as center for learning and technology evaluation.

Experimental Design

In this study, two treatments arranged to evaluate the technology. These were:

- Five colonies in box hive to be feed with bucket feeder as one treatment and
- Five colonies in box hive with top feeder feeding technology as the second treatment used as a treatment per site.

Technology Evaluation and Demonstration Methods

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

Data Type & Method of Data Collection

Primary and secondary, qualitative and quantitative data collected during the study period. Data collection sheet, personal observation, participant interview and focused group discussion used to collect primary data and secondary data collected from reports and internet search.

Method of Data Analysis

Quantitative data analyzed descriptively by using statistical techniques such as frequency counts, arithmetic means and t – test. After analysis of the data, the data presented using table for easy understanding and representation. The qualitative data analyzed through explanation of idea and opinion.

Result and Discussion

Capacity Building

Capacity of selected FRG members, DAs and experts to evaluate and apply improved beekeeping technology package built through theoretical and practical training conducted at their beekeeping site, Village Administration. Practical training is given for three consecutive days on improved beekeeping technologies and management practices, seasonal management of honey bee colonies, protection of bee colonies from pest and predators and value addition to beekeeping products and marketing aspects. On the training, 34 beekeepers, two DA and one expert attended the trained. See Table 1 below.

Table 1: Number of Beekeepers, Development Agents, and Experts participated on training

No	Category	Number of trainee		
		Male	Female	Total
1	Beekeeper	22	12	34
2.	Development Agent	2	0	2
3.	Expert	1	0	1

Source: Own data, 2022

Technology Demonstration and Evaluation

Colony Establishment and Follow up

For the demonstration and evaluation purpose, 10 honey bee colonies at each site, a total of 20 honeybee colonies, transferred to box hive and 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 for both treatments undertaken seasonally with these FRG members.

Relative advantage of the technology in terms of time saving

By using top feeder, the beekeeper can feed many colonies in short period of time. The average time taken to feed one honeybee colony using top feeder was only 55.85 seconds where as it was 107.26 seconds using plastic bucket under farmer’s management. The result of the evaluation was in line with the finding of with Zewdu et.al., 2021 which states feeding honeybee colony using top feeder takes less time as compared plastic bucket. See Table 2 two below.

Table 2: Mean time of feeding between plastic bucket and top feeder

Treatments	Mean + SD	T	P-value
Plastic bucket	107.26 + 9.8a	20.997	0.000
Top feeder	55.85 + 4.87b		

Different letters show significance differences

Relative advantage of the technology in terms of convenience for feeding

Feeding honeybee colonies using plastic bucket more disturbs honeybee colonies as it requires either removal of hive frames from the hive or adding hive volume on existing hive. Once top feeder is installed in a position, it is easy to refill the syrup at any time and allows colony feeding with a minimum disturbance to the colony. It was observed that feeding honeybee colonies using top feeder disturbs less when compared to plastic bucket and FRG members witnessed this.

Farmer’s Feedback on Top Feeder

Mini group discussions which consist of 5-6 FRG members made at both sites to collect farmers feedback on performance of top feeder. Most of FRG members were happy with the technology attributes specifically on time to feed the colony and colony disturbance.

Conclusion and Recommendations

In conclusion, technologies like top feeder that saves beekeepers time and also reduce disturbances of honeybee colony are critical for our beekeepers. Therefore, it is suggested to further pre scale up the technology in other areas.

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Conflicts of Interests

The authors declare no conflict of interest

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