

Understanding and awareness on risks of synthetic pesticides use on honey bee colonies in Western Amhara, Ethiopia

Dr Baye Berihun Getahun^{1*}, Dr Adane Tesfaye², Atalo Belay³ and Dr Janet Lowore⁴

¹Bees for Development Ethiopia, P.O. Box 0786, Bahir Dar, Ethiopia *Email: bayegethun@beesfordevelopment.org

²Bahir Dar University, College of Agriculture and Environmental Sciences P.O. Box 5501, Bahir Dar, Ethiopia

³Pesticide Action Nexus Association(PAN-Ethiopia), P.O.Box 25765 Code 1000 Addis Ababa, Ethiopia

⁴Bees for Development UK Monmouth, UK



1 Background

In Ethiopia, excessive use of synthetic pesticides in agriculture threatens honey bee colonies. This is largely due to low awareness of eco-friendly pest control methods. From 2022 to 2025, we delivered a project in the Amhara Region to support beekeepers and farmers through awareness campaigns, skills training, and field demonstrations.

Objectives:

- Raise awareness on the risks of synthetic pesticides on honey bees.
- Promote agroecology and Integrated Pest Management (IPM) practices.
- Assess changes in knowledge, behaviour, and practice.

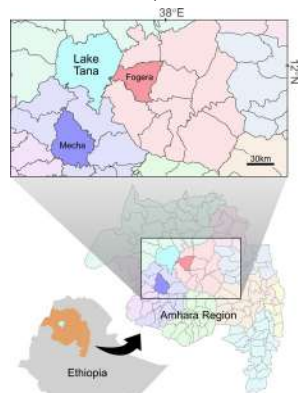
2 Methods

- Conducted capacity-building training for beekeepers on agroecology, Integrated Pest Management (IPM) and sustainable hive management.
- Demonstrated the efficacy of IPM through Farmer Field Schools by comparing:
 - IPM Plot: Applied improved IPM-based practices.
 - Non-IPM Plot: Followed traditional practices.
- Monitored colony productivity and number
- Assessed behavioural change through structured questionnaires.
- The approach allowed us to assess both practical outcomes and behavioural changes among trained beekeepers.

Data collection methods :

- Survey before and after the implementation of the project.
- [KoboToolbox](#) was deployed to conduct the survey and analyses.

Figure 1. Maps showing Fogera and Mecha, where the work took place, in relation to Amhara and Ethiopia as a whole.



4 Results

Figure 3. Stacked bar charts showing the responses of farmers and beekeeper to questions about the value of bees and insects on their land.

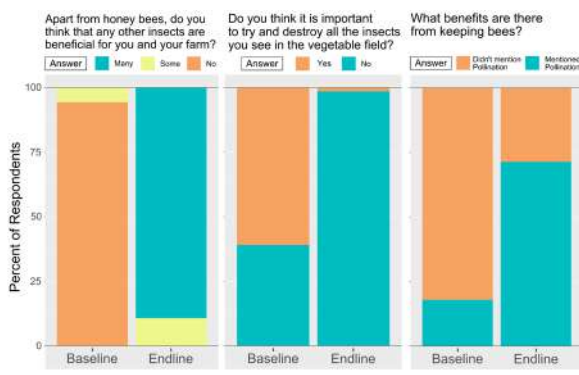


Figure 4. Boxplots showing a) the number of different IPM practices implemented by farmers, b) The farmers' awareness of the problems associated with pesticide use, including health, environmental, and economic issues and c) The farmer's knowledge and understanding of the benefits of beekeeping.



Figure 5. Boxplots showing a) the competency of beekeepers across four apiculture tasks and b) the knowledge of beekeepers concerning successful management of honey bees.



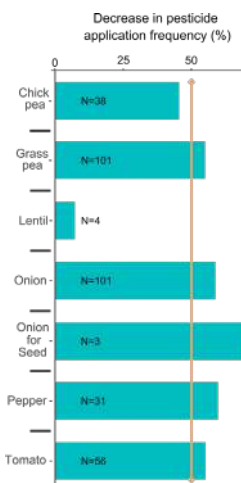
3 Results

- 850 (224F) farmers trained on agroecology IPM, and beekeeping
- 22 Farmer Field Schools established
- 692 (193F) farmers participated in the FFS on average 230 farmers in each season.

Table 1. The average change in indicators of beekeeping success per capita before and after the project.

Indicator	Existing Beekeepers	New Beekeepers
Honey production	+31.5 kg	-
Income (ETB)	+15,836	+5,036
Number of Colonies	+6	+5.36

Figure 2. A bar chart showing the percentage decrease in pesticide application after the project, with an orange line to represent our 50% target.



5 Conclusions and Next Steps

- Reduction in pesticide spraying led to increased bee colony health and income.
- IPM was proven to be viable alternative to chemical pesticides.
- Farmer Field School was effective for practical learning and adoption.
- Agroecology-based education changed attitudes and behaviour of farmers.
- Direct participation of stakeholders was important for achieving sustainable solutions.

Next steps

- Scale-up IPM-FFS in similar agroecological zones.
- Promote regulatory control of hazardous pesticides.
- Strengthen local extension services on pollinator-friendly practices (integration of disciplines)



Project Webpage

Acknowledgements

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Baye Berihun Getahun¹, Adane Tesfaye Lema², Atalo Belay Berhanu³, Janet Probyn Lowore⁴

¹Bees For Development Ethiopia, Bahir Dar, Ethiopia

²Bahir Dar University, College Of Agriculture And Environmental Sciences, Bahir Dar, Ethiopia

³Pesticide Action Nexus Association (Pan-Ethiopia), Addis Aababa, Ethiopia

⁴Bees For Development Uk, Monmouth, Uk

In Ethiopia, the impact of synthetic pesticides overuse in agriculture becomes a significant concern on honey bee colonies. Most synthetic pesticides are toxic to honey bees, leading to direct mortality upon exposure. Studies carried out around Lake Tana, Ethiopia confirmed that, the main pesticides used on vegetable and pulse crops production during irrigation season are highly toxic to bees and other beneficial insects. However, farmers in the study area are highly dependent on these pesticides to manage crop pests. Presence of inadequate knowledge on the alternative pest management practices and risks of synthetic pesticides in the ecosystem is the underlying reason for over reliance of farmers on pesticides. Considering this as a major driver of honey bees' colony collapse in Amhara region, a project was developed focusing on agro-ecological farming methods. The overall, objective of the project was to promote agro-ecological farming methods via Integrated Pest Management (IPM) approach and address the very low awareness of farmers about the risk of pesticides on honey bee colonies and other beneficial insects. The project was implemented and supported beekeepers for three years (March 2022 to March 2025) in Fogera and North Mecha districts of Amhara Region, Ethiopia. Training has been provided for 83 development workers and 883 farmers on the harmful impacts of pesticides on honey bee colonies, and on the IPM concept. Farmers Field School (FFS) approach was deployed and 22 IPM-FFS groups were established with 630 members. As a result, the IPM vs conventional pest management practice demonstration indicated that, on average farmers conventionally applied 16kg/ha and 20kg/ha active ingredient agro-chemical on their grass pea and onion crops respectively which is maximum as compared to the global average. Farmers understood, the IPM approach is feasible economically and environmentally compared with the conventional approach. Currently more than 250 farmers are practicing IPM in their own farm and the interest of farmers to practice IPM and the income of beekeepers increased by 68% and 53% respectively. The result is indicative that we can reduce the risk of agro-chemicals on honey bee colonies and on the agro-ecology at large.