# Improving beekeeping using a landscape approach to maintain ecosystem health, agricultural yield, and promote agroecology

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## Introduction

- Miombo woodlands provide a good habitat for bees among other ecosystems.
- Bees are an integral part of ecosystems and they live less than 40 days but visit 1000 flowers and produce less than a teaspoon of honey.
- They support biodiversity, plant survival, forest regeneration and enhance agricultural production systems.
- Over 80% of our crops rely on bee pollinators.

- Beekeeping or Apiculture is the art and science of maintaining bee colonies, often in artificial beehives.
- Beekeeping provides benefits that go beyond honey production.
- However, the question is, how can beekeeping be mainstreamed in agroecology to increase food production and a healthy environment?





## Problem and Objectives

- Given the global decline in pollinator populations, enhancing Apiculture practices is crucial for agroecological principles.
- The specific objective of this study was;
  i. To assess how the current Apiculture practices reconcile habitat conservation, agroecology, pollination and ecological stability.

## Methods

- To gain a better understanding of Apiculture practices, a transdisciplinary co-production approach, biophysical measurements and the surveys were conducted with 120 farmers in Tabora Region of Western Tanzania Miombo woodlands.
- Purposive and stratified sampling were used in two districts, Uyui and Sikonge of Tabora region, Western Tanzania.
- The data was analyzed via descriptive statistics of IBM SPSS Statistics and DBH was computed.




## Results

**Fig 1.** Sources of beekeeping skills

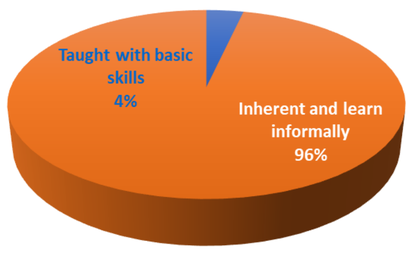



**Fig 2.** Percentage of beekeepers having Apiculture training

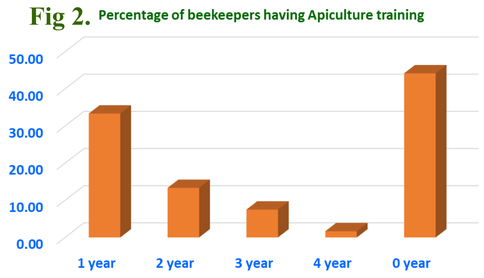



**Fig 3.** Materials used to make hives

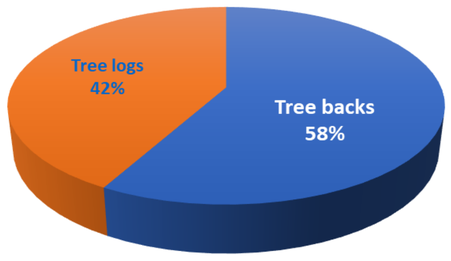
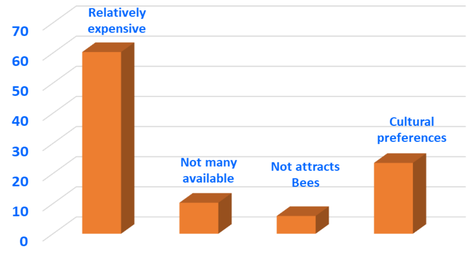



**Fig 4.** Constraints to use modern woodbox hives




## Implications of Apiculture practice on healthily ecosystem and pollinators

- 95.8% of beekeepers use conventional hives, 57.9 % made of tree bark and 42.1 % wood logs.
- The removal of tree bark for hive construction leads to deforestation with trees with average DBH of 4.89 are mostly peeled off (Table 1).
- The majority (74.3%) utilize smoke, while a minority (25.7%) employ bush fires to remove bees from hives during honey harvesting.
- Fire and smoke disperse bees, destruct habitats, restrict pollination capability, and result in biodiversity loss.
- Insecticides applied by livestock keepers and pesticides in agriculture displace bees from their natural habitats.

Trees are peeled off to make bark hives

**Table 1. The sizes of Beehives used by the farmers in the study areas (*n* =20)**

| N | Radius | Length (ft) | Length (cm) (x*30.48) | Circumference (cm) (r*2*3.14159) | DBH (cm) |
|---|---|---|---|---|---|
| 1 | 15.4 | 5 | 152.4 | 96.76 | 4.90 |
| 2 | 18 | 4.6 | 140.208 | 113.10 | 5.73 |
| 3 | 16 | 4 | 121.92 | 100.53 | 5.09 |
| 4 | 14 | 4.5 | 137.16 | 87.96 | 4.46 |
| 5 | 14.5 | 5 | 152.4 | 91.11 | 4.62 |
| 6 | 17.2 | 4 | 121.92 | 108.07 | 5.47 |
| 7 | 13.6 | 4.5 | 137.16 | 85.45 | 4.33 |
| 8 | 17.3 | 3.8 | 115.824 | 108.70 | 5.51 |
| 9 | 15 | 6 | 182.88 | 94.25 | 4.77 |
| 10 | 14.6 | 5 | 152.4 | 91.73 | 4.65 |
| 11 | 17 | 4.2 | 128.016 | 106.81 | 5.41 |
| 12 | 16 | 4.5 | 137.16 | 100.53 | 5.09 |
| 13 | 13 | 5 | 152.4 | 81.68 | 4.14 |
| 14 | 15.5 | 4.8 | 146.30 | 97.39 | 4.93 |
| 15 | 14.7 | 4.9 | 149.35 | 92.36 | 4.68 |
| 16 | 15 | 5 | 152.4 | 94.25 | 4.77 |
| 17 | 15.2 | 5.2 | 158.50 | 95.50 | 4.84 |
| 18 | 17 | 5 | 152.4 | 106.81 | 5.41 |
| 19 | 14 | 5 | 152.4 | 87.96 | 4.46 |
| 20 | 14.5 | 4.9 | 149.35 | 91.11 | 4.62 |

## Conclusion and recommendation

- Given Bees are important pollinators and contribute to crop yields and biodiversity; adaptive Apiculture management, such as the landscapes approach, can improve food output, biodiversity, and ecological stability.
- Farmers need to be trained in adapting modern apiculture practices.