

Research Application Summary

**The state of knowledge on key pests and parasites afflicting honeybee colonies in Uganda**

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**Abstract**

Productivity of the beekeeping industry in Uganda is lower than expected. One of the reasons for this is the prevalence of pests and parasites that affect the honeybee (*Apis mellifera*) colonies and constrain productivity. In this study we set out to determine the key pests afflicting the industry and establish the severity of two pests that are also of global concern. Furthermore, control measures for these two pests will be evaluated and recommendations for improved apiary management developed and passed onto beekeepers. The goal is to improve hive productivity at household level which should result into improved incomes from beekeeping. Methods to achieve the objective include stakeholder participation, diagnostic surveys, field experiments and capacity building workshops. To-date the project has determined the key pests affecting managed honeybee colonies in Uganda and identified areas for action that if addressed should help beekeepers improve apiary practices to limit pest damage. Field evaluation of proposed control tactics is on-going. Preliminary conclusions are that pest management in the beekeeping industry is warranted if the industry is to improve production levels.

Key words: Apiary management, *Apis mellifera*, pest management, Uganda

**Résumé**

La productivité de l'industrie de l'apiculture en Ouganda est plus faible que prévu. L'une des raisons pour cela est la prévalence des ravageurs et des parasites qui affectent les colonies d'abeilles (*Apis mellifera*) et limitent la productivité. Dans cette étude, nous avons cherché à déterminer les principaux ravageurs qui affligent l'industrie et établir la gravité des deux ravageurs qui sont aussi une préoccupation mondiale. En outre, des mesures de

contrôle pour ces deux organismes nuisibles seront évaluées et des recommandations pour une meilleure gestion apicole seront développées et transférées aux apiculteurs. L'objectif est d'améliorer la productivité des ruches au niveau des ménages qui devrait se traduire par une amélioration des revenus venant de l'apiculture. Les méthodes pour atteindre l'objectif comprennent la participation des parties prenantes, des diagnostics, des expériences sur le terrain, et des ateliers de renforcement des capacités. À ce jour, le projet a déterminé les principaux ravageurs affectant les colonies d'abeilles gérées en Ouganda et identifié les points d'action, qui si traités, devraient aider les apiculteurs à améliorer les pratiques apicoles pour limiter les dommages des ravageurs. L'évaluation sur terrain des tactiques de contrôle proposées est en cours. Les conclusions préliminaires sont que la gestion des ravageurs dans l'industrie apicole est justifiée si l'industrie veut améliorer les niveaux de production.

Mots clés: la gestion apicole, *Apis mellifera*, la lutte antiparasitaire, l'Ouganda

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## Background

Honeybee (*Apis mellifera*) colonies world over are facing decline largely due to the unprecedented threat from pests, parasites and diseases. Concerted effort to manage the diseases and parasites and pests is warranted to safeguard pollination and the income from beekeeping enterprise.

In Uganda, beekeeping is an enterprise that contributes to the livelihoods of several households through sale of hive products, particularly honey. The enterprise has been identified as a vehicle for rural development because of the potential it holds for job creation and securing income to individuals. Nevertheless, hive productivity is well below the touted 500,000 metric tonnes of honey per year that the country is purportedly capable of producing. Reasons for the below par productivity are multifaceted but certainly include the limitations imposed upon honeybee colonies by pests, parasites and diseases. Before the 2000s, honeybee colonies in Uganda were reportedly largely disease free and the most problematic pest was the greater wax moth (GWM; *Galleria mellonella*). The GWM was also envisaged as a manageable pest with little cause for concern where honeybee colonies were strong (i.e. consisting of several thousand colony members). Interest in the health status of honeybee colonies in East Africa was aroused by a report on the presence of the varroa mite (*Varroa destructor* Anderson & Trueman) in the region (Fazier *et al.*, 2010). Anecdotal reports on the small hive beetle (SHB) [*Aethina tumida* Murray 1867 (Coleoptera: Nitidulidae)] suggested that it was an important pest. In Uganda, a report of the Black Queen Cell Virus (BQCV) in certain honeybee colonies (Kajobe *et al.*, 2010) provided further impetus for research in the health of the country's honeybee colonies. The aims of this project are to (1) document the key pests and parasites afflicting honeybee colonies in Uganda and determine the severity of varroa and small hive beetle, (2) evaluate control options for the varroa mite and the small hive beetles, and (3) build capacity to manage honeybee pests, within Uganda at the beekeeper level and through graduate training of two MSc students. The project focused on varroa and SHB because of their importance globally in the apiculture industry.

## **Methods**

The study started off with a diagnostic survey across nine districts that fall within four agroecological zones of Uganda. Beekeepers were queried on their perceptions of colony strength and health, state of knowledge of pests and diseases on their colonies and their coping mechanisms for the pest and disease problems. Additionally, sampling for varroa mite and SHB was conducted in three apiaries in each district. Outcomes of the diagnostic survey were further enriched by contributions made during a meeting with key stakeholders drawn from central and local government authorities concerned with apiculture, the national research organization (NARO), selected beekeepers and the apex body (TUNADO) representing beekeepers' interests in Uganda. We are now evaluating selected varroacides and trapping devices for their potency against varroa and SHB, respectively.

## **Findings and discussion**

Our findings show that a range of arthropod pests afflict honeybee colonies across all the nine districts. There is a very low level of knowledge of symptoms and signs of pests and diseases infestation within honeybee colonies. The most important pests from beekeepers' perspectives are the GWM and ants. Beekeepers are generally unaware about varroa and only a few reported specifically on SHB. Perceptions on colony strength are mixed but all beekeepers were in agreement that the pest challenge was a major constraint to hive productivity. It also emerged that beekeepers in the country had little to no access to professional help for the honeybee problems they faced. It appears that there is not enough expert help in the country and the available is often not within reach of beekeepers. Beekeepers are heavily reliant on fellow beekeepers and NGOs that provide occasional expert help to beekeepers.

In the four AEZ, the number of varroa mites per 100 bees was in the range of 1.3 – 2.1. The SHB was present in all districts but was particularly higher in the Lake Victoria crescent districts ( $67 \pm 16.9$  beetles) and least in the districts of the Elgon Farmlands ( $10.4 \pm 9.7$ ). There were no apparent associations between infestation of varroa and other parameters like altitude. For SHB however, hive location and quality of body appeared to influence severity of infestation.

Over the remaining project lifetime, the plan is to conduct capacity building workshops for selected beekeepers to impart competencies at identifying pest problems and recommended apiary practices for GWM and the ants. A key recommendation that emerged from the stakeholders workshop was for government to institute an annual surveillance exercise for key pests of honeybees, particularly varroa. We also plan to develop an appropriate SHB trapping tool that is compatible with the hive types in Uganda; we have determined that the current SHB traps do not work well for the bar hives and traditional hives that dominate the beekeeping in the country. Evaluation of the potency of two selected varroacides is on-going and results will be reported subsequently.

### **Acknowledgements**

This project is funded by the Regional Universities Forum for Capacity Building in Agriculture (RUFORUM) Grant Number: RU 2015 GRG-123. We also appreciate the cooperation received from the beekeepers we have worked with during this project.

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