

Detection, Distribution and Incidences of Insect Pests and Predators of Honeybees (*Apis mellifera* L.) in Sudan

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Introduction

- Honeybees in the tropics suffer more from pests attack than from diseases caused by microorganisms.
- Vigorous and healthy honeybee colonies are necessary so as to be protected from their enemies.
- There were about 200,000 honeybee hives in the country, and the total number of beekeepers was estimated as 50,000. About 99% of this number were traditional beekeepers and only 1% using modern beekeeping technology.

- The activity of the honeybees and their enemies are greatly affected by the environmental factors, such as climate and vegetation. They are more active during summer periods.
- The adequate rainfall (200-1600mm), large areas covered by natural vegetations plus the different cultivated crops grown in various agricultural schemes, make the environment in Sudan very conducive for establishing great honeybees industry.

- The important known insect pests and predators of honeybees include different species among the insect orders, Hymenoptera (e.g. wasps and ants), Diptera (e.g. *Braula coeca*), Coleoptera (e.g. the small hive beetle and large hive beetle) and Lepidoptera (e.g. *Galleria mellonella*). Few species of such pests and predators were recorded in Sudan.
- Although, great interest has been given to the Sudanese honeybees in recent years, much more information is needed in that field, especially regarding pests and diseases of bees, which were emphasized by several scientists.

- Moreover, thousands of honeybee colonies were imported during the last few years for commercial purposes, so the threat of spreading exotic pests and diseases was expected.
- It was aimed in this work to recognize the main insect pests and predators of honeybees prevailing in Sudan and to study their incidences and effects on bees' production in different parts of the country.

MATERIALS AND METHODS

- Surveys + questionnaires were carried out in Sudan during the years 2002-2003.

Detection of pests and predators:

- Different bee colonies, kept in modern and traditional apiaries, and even wild colonies, were inspected in eight different States as shown in the following list:

| States | No. of apiaries | No. of wild colonies | No. of samples (colonies) |
|---|-----------------|----------------------|---------------------------|
| Khartoum Lat.14 45-16 45 Long.31 30-34 30 | 3 | 11+25# | 23 +324* |
| Kordofan Lat.9 00-16 30 Long.26 30-32 30 | 2 | 3 | 11 |
| Darfur Lat. 9 00-20 00 Long.21 30-28 00 | 6 | 1 | 25 |
| Blue Nile Lat.9 20-12 00 Long.33 10-35 40 | - | 18 | 18 |
| Kassala Lat.12 40-17 00 Long.33 40-37 00 | 1 | - | 6 |
| Gezira Lat.13 30-15 30 Long.32 30-34 30 | 1 | 3 | 4 |
| White Nile Lat.12 00-15 15 Long.31 30-33 35 | 1 | - | 4 |
| River Nile Lat.16 00-22 00 Long.31 50-35 50 | 1 | - | 26* |
| Total | 15 | 36 | 117 |

(-) = no apiaries or wild colonies were inspected. ; # = 25 colonies of *Apis florea* ; =324 colonies (3 patches) of Carnio- Egyptian honeybees imported from Egypt •(Khartoum Air Port) + 26 colonies Carnio- Egyptian honeybees from River Nile State.

- Samples of the detected insects from the above locations were collected for identification.
- Moreover, The hive entrance and foraging honeybees were also observed several times in different locations.
- The insect predators found preying on honeybees were caught, either by a sweeping net or a bait trap. However, in rare cases only notes were taken for those insects which were difficult to catch.
- The collected samples were mostly identified at the Insect Collection of the Agricultural Research Corporation, Sudan, but the authors, depending on literature cited, recognized few species.
- Accordingly, lists of important insect species (pests and predators) were prepared, including some arachnids as well.

Incidence and damage inflicted

- The most commonly detected species were counted in all the covered States. The ways and degrees of damages induced, whether on hives, wax combs, honey or honeybees individuals, were reported.
- The percentages of infested colonies were, therefore, indicated for most notorious pests, as computed by the number of infested colonies/ number of inspected colonies, in each sample.
- A questionnaire was also performed to check the awareness of the beekeepers and honey hunters, about the important pests of honeybees and the measures adopted for handling their problems.

RESULTS AND DISCUSSION

Pests and predators detected and their incidences

- More than twenty species of insects were recorded during this study, including pests of wax combs, honey and hives, while others are predators (some are spiders).
- The already documented species include the bee wolf (*Philanthus* sp.), hornet, ants, hawk moth and greater wax moth. On the other hand, the bee lice and locust were documented only by questionnaire, while the rest of the list was considered as new records.

pests of wax combs

- The important pests of wax combs is the greater wax moth, *Galleria mellonella* (Plate 1).
- This species was considered as the most dangerous pest of the wax combs. It is widely spreading in most investigated areas and well known to the beekeepers.
- *Galleria* moths were found to attack all colonies of honeybees, but strong ones were able to resist it .



. Pl. 1. Larva of *Galleria mellonella*

- All the inspected colonies of *Apis florea* during the present work were found to be free of wax moth. This could be due to the fact that the wax moth as noctuid insects they preferred dark habitats, but *Apis florea* used to build its nests in open areas which seem to escape infestation in most cases.

pests of honey and hives

- The hawk moth, *Acherontia atropos*,** robbing honey from bee hives, found in Khartoum State(Plate 2).



-The hive beetles:

- The small hive beetle, *Aethina tumida* (Pl.3), and the large hive beetle, *Hyplostoma fuligineus* (Pl. 4), were recorded for the first time in Sudan.
- They were only observed in Southern Darfur (near Kabom) and Blue Nile (near Abu Gomi) States.
- The large hive beetle was found to be well known by the honey hunters and traditional beekeepers.



Pl. 3. *Aethina tumida*



Pl. 4. *Hyplostoma fuliginosus*

- Ants were also considered as important pests of natural honeybee colonies and apiaries in Sudan. They were found to be the most serious, wide spread (77.3% infested colonies) and well-known pests.
- White ants (termites) were considered as the first important insect pests of wooden hives because of their wide spread and voracious habits of feedings for nearly all kinds of wooden materials(Pl.5).



Pl.5. Termites damage

- The results of the questionnaire showed that most of the investigated persons have good ideas about the wax moth, ants and beetles as major pests.
- About 64.5%, 95.7%, 22.6%, 7.5%, 59.1%, 8.6% and 2.2% of the respondents mentioned wax moth, ants, wasps, hawk moth, beetles, termites and spiders as pests of honeybees in Sudan, respectively.

- The results of insect pest counts in the different States were also proved more or less the same things as shown by the questionnaire.
- The mean percentages of infested colonies by greater wax moth, ants (different species), small hive beetle, large hive beetle, and hawk moth were, 86.3 % 77.3 %, 2.4 %, 2.2 % and 0.5 %, respectively.

The adopted control measures

- The Sudanese honeybees show good hygienic behaviour.**
- The beekeepers were found aware about most of the prevailing pests, and rely 80% on preventive measures for control.**
- No friendly chemicals were yet recommended for honeybees in the country.**

The major predators

- Among predators were two species of bee wolves, *Palarus latifrons* (Pl.6) and *Philanthus triangulum* (Pl.7).**
- They were dominant mainly in western Sudan.**



Pl.6. *Palarus latifrons*



Pl. 7. *Philanthus triangulum*

- However, it was also indicated from observations that the bee wolves were the most important predators of honeybees, but no true counts on their numbers were performed.
- A number of salticid and thomisid spiders were also observed preying on adult bees when visiting plants in the field.