KALRO
Kenya Agricultural & Livestock Research Organization

KCSAP
Kenya Climate Smart Agriculture Project

Prevention and Control of Small and Large Hive Beetles in Bee Hives

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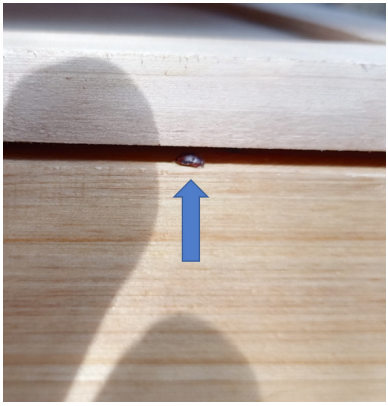
Introduction

The small hive beetle (*Aethina tumida*) is a common pest in bees. It is a destructive pest of honey bee colonies, causing damage to comb, stored honey and pollen. If beetle infestation is sufficiently heavy, they may cause bees to abandon their hive. Beetle maggots may tunnel through combs of honey, feeding and defecating, causing discoloration and fermentation of the honey. In highly infested colonies where larval feeding is extensive, bees generally abscond.



Small hive beetle adult found during hive inspection. Note the smallness of the beetle. Photo courtesy of Dr Muo Kasina

Description

Adult hive beetles are 5-7 mm (1/4”) in length, oblong or oval in shape, tan to reddish brown, dark brown or black in colour, and covered in fine hairs. The size and appearance can be highly variable within a population.

The adults are usually observed in the hive with their heads tucked down beneath the thorax, so that antennae and legs are often not apparent. Honey bees are not able to efficiently remove adult beetles from the hive, and their hard shells resist stinging.

In addition:

- The maggots of this beetle live in pollen and honeycombs.
- The adult maggots leave the hive to pupate in the earth in front of the apiary.
- The period of development from egg to adult beetle is at least four to five weeks.

Large hive beetiles at the hive entrance (left) and rooming in honey comb (right). Photo courtesy of Dr Beatrice Nganso

Economic importance

Economic damage from hive beetles occurs when the bee population is insufficient to protect the honeycombs from the scavenging beetle maggots. When adult beetles first invade a colony, they may go unnoticed until their populations increase through reproduction or immigration.

Both adult and larval beetles will prey upon honey bee eggs and brood. When large numbers of beetle eggs hatch in weak colonies, the combs of honey can become "wormy" and take on a glistening, slimy appearance. Unlike wax moths, these beetle maggots do not necessarily damage the combs themselves and do not produce extensive webbing.

When large numbers of adult beetles defecate in the honey, they introduce yeasts, causing the honey to ferment and run out of the cells. In this case, the queen bee may cease laying, and the entire colony may abscond. Honey contaminated by hive beetles is rejected by bees, is entirely unfit for human consumption, and should never be bottled or mixed with other honey for packing.

Pre-disposing factors

- Weak colonies are particularly vulnerable to attack, but even strong colonies can be overwhelmed by large populations of beetles.
- Nucleus colonies used for queen production or colony splits can be especially vulnerable to beetle attacks.
- Beetles can create sudden problems if bee escapes are used prior to harvesting, and supers of honey are left virtually undefended by bees.
- If honey is removed from the hive, but not immediately extracted, beetles can invade the honey house and quickly ruin a large portion of a honey harvest.
- Wet cappings from recently extracted honey are also extremely attractive and vulnerable to beetle infestation.

Detection

- Beetles are easily detected by visual inspection of colonies.
- When a hive is opened, adult beetles may be observed running across the underside of the outer cover, on either side of the inner cover, and on the top bars of frames.
- Also, beetles may be seen running across the surfaces of combs.
- To detect beetles in the top hive body, open the hive and place the outer cover on the ground in a sunny spot, and place the top hive body into the cover
- Conduct normal colony inspection activities on the rest of the hive.
- If present in the top super, adult beetles will retreat from the sunlight, and after about 10 minutes you may lift the hive body and look for beetles in the cover.
- Beetles in the lower hive body will similarly retreat to the bottom board as the colony is disturbed.

Small hive beetle adults rooming around comb (left) and maggots (right). Photo courtesy of J Kilonzo

Prevention and Control

A combination of cultural and mechanical controls will usually help to maintain beetle infestations within a manageable range. Keep bee colonies healthy and strong. Reduce stresses from diseases, mite parasitism, and other factors.

Maintain colonies with hygienic traits that are better able to detect and remove pests and diseased brood. Eliminate, requeen, or strengthen weak colonies.

Making splits from heavily infested hives can cause a serious outbreak if insufficient numbers of bees remain to protect the hive. Avoid over-supering hives, which increases the area that the bees must patrol. Maintain a clean apiary and honey house to reduce attraction to beetles.

Pollen traps should not be left on heavily infested hives for extended periods. The unprotected pollen can serve as a substantial protein source for beetles, as well as a protected breeding site. Use mechanical traps in the hive to reduce the number of adult beetles that can produce eggs.

Trap: There is a trap that can work for both hive beetles (especially the large hive beetles) and waxmoths as described below:

Small hive beetle maggots infesting brood combs. Photo courtesy of Dr Beatrice Nganso

Hive beetle control using locally made traps

A simple trap is used to attract and kill the hive beetles and also wax moths.

The trapping system is comprised of

1. **Bottle trap** which holds the attractant.
    a. The bottle can be of any form and doesn't need to be new but rather recycled.
    b. The common drinking water/juice drink/cola drinks bottles in the market are sufficient or the common soap containers
    c. A 2-liter bottle is recommended so as to have enough space for keeping the trapped pests
    d. The bottle is cut open (about 1-inch-wide hole) just near the top to allow moth and beetles inside to the attractants
    e. Have a string or wire to hold the trap on to the branch
    f. A clear bottle is preferred for easy monitoring of performance
2. **Attractants**: apparently, the moths and beetles are more attracted to the fermenting materials. As such an effective concoction has been developed to place inside the bottle
    a. A ripe banana peel
    b. Yeast (used in the normal cookery) or vinegar or cider vinegar
    c. Sugar
    d. Water

How it works

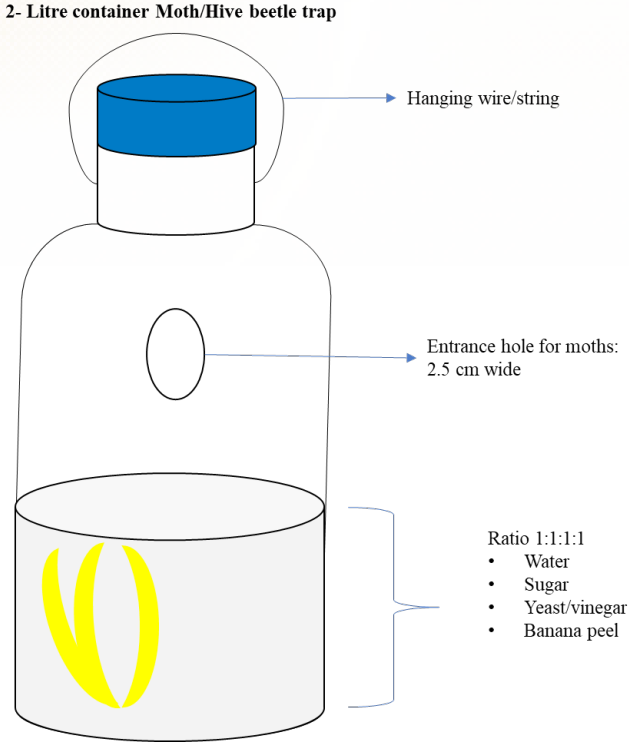
- Prepare the trap container based on the amount of liquid you may wish to place.
- Insert water, yeast (or vinegar/vinegar cider) and sugar at the ratio of 1:1:1 (i.e. equal measure)
- Add the banana peel to the mixture. No need to chop it to small pieces
- Place the trap on the apiary. It will start to attract the pests upon starting fermentation

- 1 bottle per tree with several hives
- Place the trap slightly above the hive height.

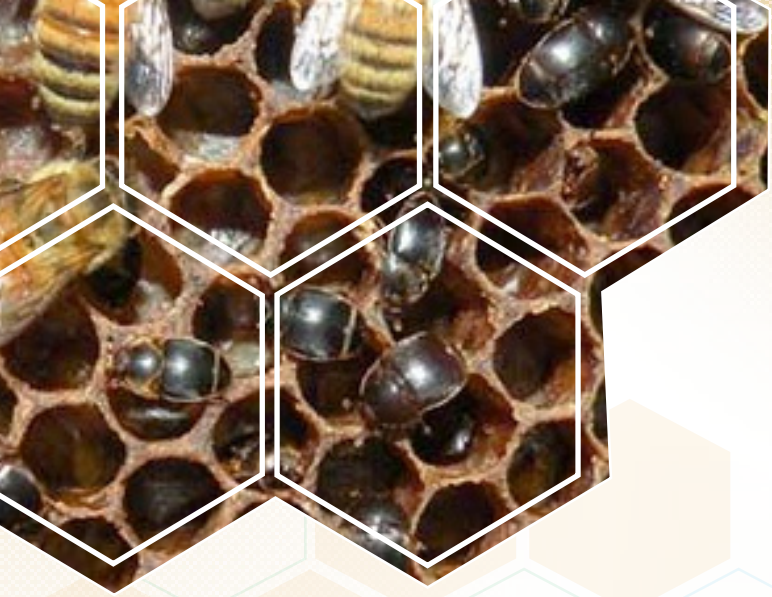
Replacement and disposal

- The trap content can be replaced if it fills up with the moths and other insects. The idea is to keep checking and when filled up (above the content), then empty it
- The content can be replaced and you reuse the trap as long as it is not defaced. Change the whole trap if it becomes defaced and difficult to observe

Plastics can be harmful to environment due to long delay before degradation. Therefore, it is better to dispose by burning the trap bottle. The rest of the contents are organic



Large hive beetles on a honey comb (Taita Hills, Kenya). Photo courtesy of J Kilonzo



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