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Small Hive Beetle Infestations in *Apis mellifera unicolor* Colonies in Mauritius Island, Mauritius

Elliid Muli, Joseph Kilonzo and Preeduth Sookar

The small hive beetle (*Aethina tumida*) is native to sub-Saharan Africa, where beetles live as scavengers in colonies of African subspecies of Western honey bees (*Apis mellifera* L.) (Giangaspero & Turno, 2015; Neumann & Elzen, 2004). Over time, small hive beetles have been moved to new locations due to the global trade of honey bees and hive products (Cuthbertson et al., 2013) and have been reported in USA (since 1996), Canada (2002), Australia (2002), Jamaica (2002), Mexico (2007), Italy (2014), Philippines (2014), Nicaragua (2015), and Madagascar (2013), among other regions (Neumann, Pettis, & Schäfer, 2016). African honey bee subspecies are considered more resistant to the small hive beetles compared to European subspecies (Elzen, Baxter, Westervelt, Randall, & Wilson, 2000; Neumann & Elzen, 2004). Mauritius island is inhabited by the endemic honey bee subspecies *Apis mellifera unicolor* (Franck et al., 2001).

The small hive beetle lays eggs in cracks and crevices in hives. The eggs are pearly white, 1.4-mm long and 0.26-mm wide, and they are normally laid in clusters of 10–30 (Neumann et al., 2013). Eggs are normally incubated for 1–6 days, with the majority hatching within about 3 days. The small hive beetle larvae are the damaging stage, and these are creamy-white in colour, with large heads and a row of spines on the dorsal side of each body segment as well as two large spines protruding from the rear. The larval period lasts an average of 13.3 days inside the bee colony and pupation occurs over a period of 15–60 days in the soil depending on soil temperature. The beetle develops up until the stage of a wandering larva and then leaves the hive to pupate in the soil (Neumann et al., 2013). Small hive beetles disperse by natural flight and newly-emerged adults can readily locate honey bee colonies through odour, visual and chemical cues.

The date of introduction of the small hive beetle in Mauritius is not known, but beekeepers started reporting its presence in the year 2016, while Varroa mites (*Varroa destructor*) have been reported in Mauritius since 2014. During routine hive inspections conducted on 20 July 2017, a colony heavily infested by small hive beetles was found in St. Pierre (GPS coordinates S 20°12.880'; E 057°32.303'; Elev. 398 m.a.s.l). The apiary had four colonies, one of which was heavily infested. The other 3 colonies had populations of 11, 8 and 3 frames of bees, respectively (brood boxes only). The colony with the most occupied frames (11) had 5.5 frames of brood; the colony with an occupation of 8 frames had 4.0 brood frames; and the one with 3 frames had 0.25 brood frames. In addition to small hive beetles, the colonies were also infested with Varroa mites and bee lice (*Braula* sp.). Collected beetle specimens were confirmed as *A. tumida* by examining morphological features (length, width, antennae and elytra structure) (Neumann et al., 2013). The absence of webbing in the combs also confirmed that the larvae were small hive beetles and not wax moths. Individuals of *Braula* sp. were found on the upper (dorsal) part of the queens' thoraxes. The authors did not confirm the exact species of the *Braula* sp.

Key observations made on the heavily infested colony were:

- Abnormally high levels of infestation: 51 adult beetles and over 700 larvae were counted,
- the colony contained approximately half a frame of live bees and 200 dead worker bees,
- a small patch of capped brood was present,



Figure 1. Small hive beetle larvae aggregating on the lower bar of a frame in a heavily infested *A. m. unicolor* colony in St. Pierre, Mauritius island.



▲ **Figure 2.** Small hive beetle larvae invading a honeycomb in an infested *A. m. unicolor* colony. Notice the characteristic “slime” on the comb.

- the colony was queenless, which was confirmed by the absence of the queen, eggs and open brood, and no queen cells were observed,
- approximately two frames of honey/nectar were present,
- approximately one frame of bee bread was present.

Since this was a one-time observation, we cannot be certain whether these colony characteristics are exclusively associated with the small hive beetle infestation or were also secondary symptoms of the queen loss (Figures 1 and 2).

On 23 September 2017, another beekeeper (“beekeeper B”) who was visited and interviewed reported to have recently lost 17 colonies apparently due to small hive beetle infestation. Beekeeper B has been trying several methods to control the beetles including applying broad spectrum insecticides around the hives, maintaining hygienic apiary conditions and physically removing the beetles. The extent of further spread of small hive beetle and

effect on honey bee colonies on Mauritius is unknown.

We provide the first report of a heavy small hive beetle infestation in *A. m. unicolor* on Mauritius to highlight the threat of this newly-introduced pest to beekeeping in the Mascarene Islands, where *A. m. unicolor* is native. We want to specially point out its potential interaction with parasites such as *Varroa* mites, pesticides, pathogens and nutritional stress.

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