



Living with the small hive beetle: what we have learned after 15 years of continuous pest pressure in Hawaii

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Beekeeping in Hawai'i was idyllic. Pleasant temperatures year-round, calm and productive bees. Hawai'i was once a honey industry leader and later became a queen producing center for the United States of America. The geographical isolation of the islands and the import regulations protected the health of the local honey bee populations until 2007 when Varroa was detected for the first time, followed by the arrival of *Aethina tumida*, the Small Hive Beetle (SHB), a couple of years later.

Detection and Spread



The small hive beetle (SHB) was first detected on the island of Hawai'i. The beetle was widely distributed across the island and no eradication measures were taken.

Sadly, the SHB soon spread to all the major Hawaiian Islands within a few years.



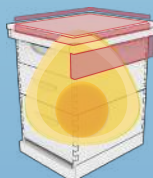
During the first months of the SHB invasion the combination of oil traps and visual inspection worked well as a detection tool. In Year 1 of the Oahu invasion, 86% of the beetles were detected in oil traps and 12% via visual screening (Ref: Villalobos et al. 2024). In Year 15, visual inspections of the top areas of the hive are sufficient to estimate beetle density.



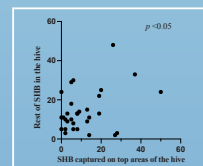
In spite of the constant SHB pressure to the hives, larvae are seldom observed. Hawaiian beekeepers have, for the most part, abandoned targeting SHB larvae or pupae, in favor of managing adult SHB populations. Mass larvae reproduction events, a.k.a "slime outs", are less likely to occur when bees are densely packed in the hive. Although, seldom reported as a management tool by beekeepers, they now adjust colony space to reflect bee population and this new awareness has greatly reduced losses.



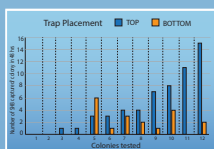
Worker bees chase the beetles away from valuable hive resources such as bee brood and pollen. Consequently, adult beetles are often found on the cover and side honey frames of the top box (red areas on the diagram at right). These areas of the hive can be easily screened by beekeepers during regular apiary visits facilitating monitoring. Similar results to Hawaii were obtained for Africanized bees in Latin America. (Ref: A Little Peek May Be Enough: How Small Hive Beetle Estimates Can Help Address Immediate Colony Management Needs. Villalobos et al. 2025.)



Inspection area	Percent of total SHB captured
Floor of the hive before inspection starts	2.6%
Cover	7.6%
Side frames of top box	36.8%
Center frame of top box	0.8%
Floor of the hive right after inspection	41.4%



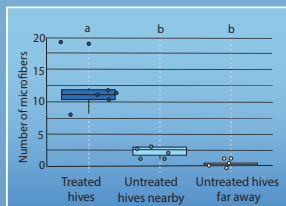
Corrugated plastic traps on the bottom board have been suggested as a sampling tool for SHB. In Hawaii, corrugated traps on top of the honey frames consistently captured more beetles compared to those placed on the floor of the hive. One third of the bottom board traps failed to capture SHB in infested colonies compared to 16% of top of the frame traps. This suggests floor of the hive placement may be less effective.



Although worker bees can rarely hold and remove a SHB adult, however, they often chase, corral, and confine adults within the hive. Hawai'i's bees frequently construct "beetle jails" and local beekeepers manually kill a large number of SHB when the beetles are released from these jails during regular colony management.



Microfiber sheets are one more tool suggested for SHB control. The sheets are introduced to hives where they are actively chewed on by bees in an attempt to remove them from inside their nest. It is that instinctive behavior that creates the "fuzziness" on the sheets that entraps beetles (see images of new and old sheets on the far right). The use of microfiber sheets resulted in an increase in density of plastic fibers on the cuticle and digestive tract of the worker bees, as well as in honey in the colonies under treatment. Untreated colonies in nearby apiaries had less fibers than treatment colonies. Fiber identity was confirmed via Raman analysis. The fibers were determined to be polyethylene (PET) and the blue dye was identified as PB15A (Ref: Management practice for small hive beetle as a source of microplastic contamination in honey and honeybee colonies, Buteler et al. 2024). Based on our results we would not recommend this practice.



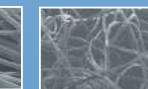
New sheet



Used sheet

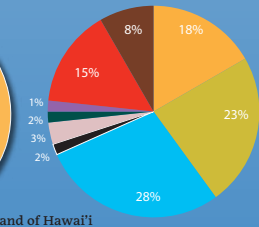
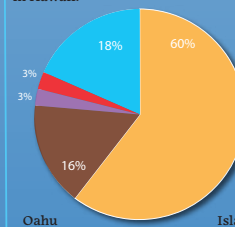


SEM images of microfiber sheets

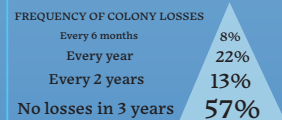


Recent Surveys Results

Most small-scale beekeepers in Hawai'i (>90%) actively manage SHB populations. Beekeepers often use more than one strategy and the methods utilized varied between islands. Pesticide use for SHB control is minimal in Hawai'i.



Colony losses due to SHB occur less frequently.



Over 50% of beekeepers have not had a "slime out" in the last three years.

Acknowledgments: Thanks to Dr. Micaela Buteler, Dr. Luis Medina, and Dr. Zhening Zhang for their research collaborations. Thanks to Kevin Sander, Tadd Rienstra, and Dennis Takata for their assistance in the field. Photo Credits: Tina Carvahlo SEM photos, Jasmine Joy photo of SHB jail, additional photos by E. Villalobos. Bee beetle illustration by Emma Shelly. A portion of this research was funded by WESTERN SARE.



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The small hive beetle (SHB; *Aethina tumida*) is an invasive bee parasite that continues to spread globally. The SHB arrived in Hawaii two years after *Varroa destructor* was detected, compounding an already difficult situation for beekeepers. Here we present a longitudinal perspective on the establishment of this pest, from initial densities to current levels, seasonal patterns, and management strategies of the local beekeepers. On Oahu, colony inspections during the dispersion phase included complete colony assessments (traps and visual screenings), although most “free beetles” were found on the cover and side honey frames. The 2010-2011 SHB prevalence was low, less than 3 beetles/hive/week. We sampled four additional sites on Oahu from 2011 to 2012 and found the average had increased to 7.24 beetles/colony/week. We sampled again in 2015 -2016 and in 2022- 2023 and found that colonies averaged 28.39 and 11.98 SHB per hive/week, respectively. Although we detected strong seasonal peaks in each study period, there was large inter and intra-colony variation in infestation and no congruent seasonality pattern from one year to the next. The first years of SHB invasion were linked to a decrease in swarm establishment success. Adult beetles were observed entering swarm boxes at a rate of 1 beetle/min and a swarm could attract over 100 beetles. Swarm losses to SHB are now rare. Similarly, the collapse of managed colonies to SHB (slime outs) are also less common now. The beekeepers have evolved in their SHB management practices. Initially, the preferred tools for beetle control included oil traps between the frames, oil pans below a screened bottom board, and floor of the hive traps filled with killing agents, some off label. Using soil pesticide drenches to kill beetle pupae was quickly abandoned. Recently, beekeepers have incorporated the use of microfiber sheets to entrap the beetles. However, we have shown that these sheets produce microplastic contamination inside the hive. While oil traps remain the most common SHB control method in Hawaii, a growing proportion of beekeepers are not using any traps and manage the beetle by keeping strong colonies and ensuring full bee coverage of the frames.