Small Hive Beetle (SHB)

Description

Adult SHB are about 1/4 in. in length and are reddish brown to dark brown in color. They move very quickly throughout the hive and can often be found in tight, dark spaces throughout the hive equipment. Adult beetles have developed the ability simulate the mouth parts of worker bees and will beg for food. This trait allows them to survive in the hive for extended periods of time.

Photo credit: http://entnemdept.ufl.edu/creatures/misc/bees/small_hive_beetle.htm

Small hive beetle larvae are long, cream-colored grubs and can reach a maximum length of 1/2 in. during the final instar. They have three pairs of well-developed prolegs and a series of dorsal spines.

Photo credit: https://articles.extension.org/pages/60425/managing-small-hive-beetles

Symptoms

Economic damage from SHB occurs when the colony is unable to defend against the beetles. Damage from SHB includes:

Photo credit: http://www.ars.usda.gov/Research/docs.htm?

- Fermentation of honey from beetle feces (renders honey inedible)
- Predation of bee eggs and brood by both larvae and adult SHB
- Stored honey supers are extremely susceptible to damage because no bees are present to protect the honey
- Large numbers of SHB can result in the stoppage of egg laying by the queen and the colony absconding from the hive

Life Cycle

Adult small hive beetles become fertile about one week after emerging from the soil (where they pupate). When ready to reproduce, adult female SHB will oviposit directly into brood comb, pollen, or cracks and crevices within the hive. A single female SHB may lay as many as 1,000 eggs in her life time. Eggs will hatch within three to five days and newly emerged larvae will begin to feed on whatever food source is available.

The average time for larvae to fully mature is 10-16 days. Once the larvae are finished feeding, they will wander out of the hive and into nearby soil to complete their final immature molt. Larvae are capable of wandering great distances in search of suitable substrate, however, most settle in soil within 90 cm of the hive. The majority of SHB larvae will burrow into the ground in a depth between 10 and 20 cm.

Once the larvae is finished burrowing it will pupate. The pupation stage is extremely variable and relies heavily on soil temperature, moisture availability, and soil composition. If all conditions are favorable, a newly emerged adult will surface in three to four weeks and as many as six generations may occur in a 12-month period.

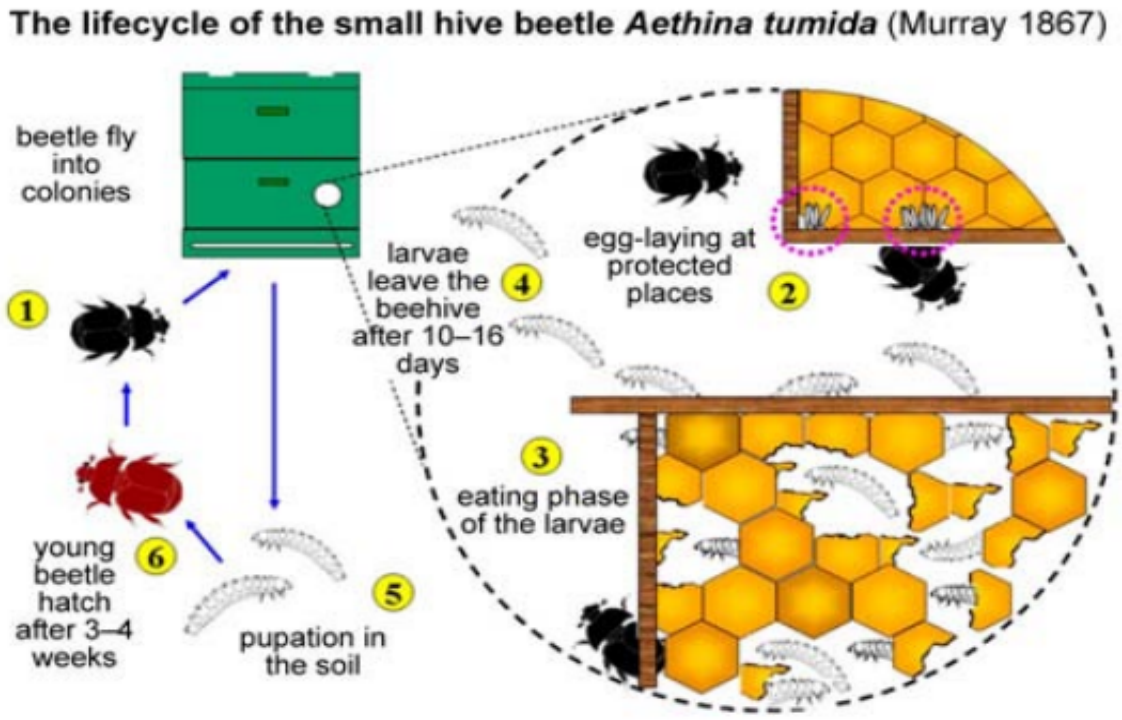

Photo credit: Dr. Otto Boecking

Detection

Small hive beetles are very responsive to light. When a hive is opened, adult SHB can bee seen running across hive equipment in search of a dark crevice. To detect beetles in the top hive body, place the outer lid on the ground in a full-sun location and place the hive body onto the cover. Leave the hive equipment in the sun for about 10 minutes. When the 10 minutes is up, lift the hive body from the cover. If beetles are present, you will see adult SHB.

Small hive beetle larvae can be also be detected by light sources. The larvae are attracted to florescent light, and a light trap combined with soapy water can attract and drown the unwanted larvae. Small hive beetle larvae can also be found in clusters throughout the hive. This differentiates them from wax moth larvae because wax moth larvae behave in a more scattered demeanor. Larval damage to honey is also easy to identify. If you see surfaces of comb that appear slimy or fermented with honey bubbling from the combs, it is likely that there are active SHB in the hive.

Photo credit: Ministry of Agriculture, Food and Rural Affairs, Ontario, Canada

Small hive beetle larvae are often considered to be the most damaging stage of SHB to beekeepers.

Left: SHB larvae destroying honey comb in hive.

Right: SHB larvae feeding on a pollen patty. Pollen patties are extremely attractive to SHB and can often be used as a trapping mechanism.

Photo credit: Montana Department of Agriculture

Management

PREVENTION IS THE MOST EFFECTIVE FORM OF CONTROL.

A combination of cultural and mechanical controls typically can help with keeping SHB out of your hive or minimizing their impact. Good beekeeping practices such as keeping colonies healthy and strong, using caution when obtaining used equipment or using old equipment, maintaining a clean apiary, and regular cleaning of bottom boards will all aid in keeping SHB out of your apiary. If you do experience unsatisfactory numbers of adult SHB within your hive, there are several options for mechanical traps:

Mechanical Traps for SHB

Numerous mechanical trap designs are available for use in the hive to control the adult SHB population. By maintaining a manageable adult beetle population in the hive, beekeepers can usually prevent a major infestation of beetle larvae, which cause the most destruction.

The **Hood Trap** attaches to a standard bee hive frame. It has a compartment filled with apple cider vinegar as an attractant and compartments filled with mineral oil, which drown the beetles as they enter. A drawback of this design is the empty space around the trap, which bees will often fill with drone comb, potentially increasing a problem with varroa if left unattended. This area of drone comb, however, can be regularly removed and disposed of when approximately 50 percent of the drone cells are capped, to effectively trap and remove a portion of reproducing varroa mites before they can emerge.

The **West Trap** is placed on the bottom board and requires a wooden shim to maintain proper space beneath the frames. It contains a shallow pool of mineral or cooking oil and is covered by a slatted screen that excludes bees. Adult beetles enter the trap from above to escape from bees and will fall into the oil and drown. Hives must be kept extremely level for these traps to be effective. These traps are not for use with screen bottom boards.

The **Freeman Beetle Trap** is similar to the West Trap in function. It replaces the bottom board with a 3 mm (⅛") screen mesh, as used for varroa control. An oil-filled tray is inserted into a compartment below the screen. Adult beetles enter the trap to escape from bees and fall into the oil and drown. Wandering beetle larvae may also fall into the trap as they attempt to exit the hive to pupate. These traps can passively eliminate some varroa mites as well. Hives must be kept level for these traps to work.

AJ's Beetle Eater traps consist of shallow oil-filled troughs with grooved lids. Traps are suspended between frames of brood or honey. Adult beetles enter the traps to hide from bees and are drowned in the oil. These traps are inexpensive and easy to use but must be emptied and refilled regularly. Also, the bees tend to propolize over some of the grooves. The manufacturer suggests placing a small sheet of vinyl across the top of the trap to prevent propolizing, but this may provide the beetles with sufficient cover without entering the trap. Similar in design and function, **Cutt's Beetle Blasters** are disposable and can be discarded when full of beetles.

Sonny-Mel traps are homemade, consisting of a small plastic sandwich box with 3 mm (⅛") holes. The bottom of the trap is filled with a layer of mineral oil and contains a smaller container (usually a small plastic lid) of liquid bait. To make a bait, combine 1 cup water, ½ cup apple cider vinegar, ¼ cup sugar and the peel of 1 ripe banana, chopped in small pieces; allow to ferment for 1-2 days. These traps are placed on the top bars of the upper super and require the addition of a wooden frame to provide space for the trap.

The **USDA** beetle trap design utilizes a bait of fermented pollen and a one-way exit in the bottom board, similar to a triangular bee escape, through which the beetles may pass and become trapped in an oil-filled chamber on the other side. These traps cannot be used with screen bottom boards for varroa control or ventilation.

*The summary listed above is extracted from the University of Arkansas Division of Agriculture. This is not meant to be an exhaustive list, but rather a reference to the reader. The Montana Department of Agriculture does not discriminate against other similar products that are not mentioned in this article.

Management

Mechanical control outside of the hive can also be effective against SHB. Small hive beetle pupae are the most vulnerable life stage of the pest. Pupae prefer loose, sandy soil and moderately moist environments. Placing colonies in hard clay or rocky soil types will help minimize the efficacy of SHB pupae eclosing.

GardStar® 40% EC (permethrin) has also been approved to effectively treat SHB pupae. It is available for purchase at several locations, including Murdoch's and Dadant. Please make sure that all applications of insecticides are used according to the label.

There have been several reports of nematodes working to control SHB pupae, but this type of control lacks scientific data and should be used with caution.

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Small hive beetle has been recorded in Montana. It is not considered to be prolific in Montana, but it is a major issue for beekeepers that keep their colonies in the southern US. Small hive beetle has the potential to become established in Montana as well. There are strict quarantine requirements in place to protect the honey beekeeping industry in Montana. If you think you have found SHB in your hive, please report it to the State Entomologist immediately upon detection. Recording the number of cases is important to bee health in Montana and can aid in tracking the movement of SHB.