



Small Hive Beetle



The small hive beetle (SHB) is of sub-saharan African origin of little significance and is regarded as a minor pest in its native environment. However, since its discovery in the United States in 1998, and Australia in October 2002, it has had a devastating impact on European honeybee colonies both feral and managed. By the time the beetle was identified there was no opportunity to eradicate it as it had already spread and was well established in feral and managed bee colonies. Our climate of high humidity and high temperatures, and short cool seasons, are ideal for this pest.

SHB are considered to be a **secondary or opportunistic pest**, and only cause excessive damage after bee colonies have already become **stressed or weakened by other factors**.

The hive and site

- Ensure all components of the hive are sound, clean, well painted (particularly inside) with no cracks. It has been suggested smoothing all internal corners with gap filler, forming a concave bead to reduce hiding places. Ensure it has time to harden before using the hive.
- Position hives in full sun facing north / north- east.
- Hives in shade are more vulnerable.
- Shelter the hive from the wind.
- Position the hives on dry hard soil, with vegetation cleared for one metre around stands.
- Minimise hive manipulations.
- Keep a high bee-to-comb ratio. If there is too much comb, remove excess supers. Avoid over-supering hives.
- Unite weak colonies together or combine them to strong colonies.
- Boost weaker colonies by adding a frame of capped brood (check for American Foul Brood).

Inspecting hives for adult SHB and larvae

- Remove the lid and check the underside for beetles.
- Lift hive mat (if present) and watch for quickly escaping beetles down the face of the comb as they try to hide from the light in the cells.
- Remove super and place on the upturned hive lid. Wait two minutes and then remove super and look for beetles.

- Lift the bottom box and look for beetles on the bottom board. Lift the combs from the box and check the bottom board for beetles.
- If the bottom box is fixed to the bottom board remove all combs and quickly inspect them. However, larvae may develop under cell caps and may not be seen until the caps are removed.
- Kill as many beetles as you can during the inspection and try not to let any escape. They can fly.

In the honey house

- Extract honey promptly.
- Ensure honey, comb and cappings are never exposed (always sealed).
- Return stickies (recently extracted frames) promptly to the hive.
- Store combs in a sealed cool place.

The development of the SHB throughout its lifecycle depends primarily on humidity, temperature and food availability. As such the SHB has its greatest impact in the warm humid coastal strip between Victoria and North Queensland especially during the warmer months.

Many of the strategies to minimise SHB damage may only need to be utilised during the summer period when temperature are reaching 30°C plus and humidity is 70% or higher. Under these conditions SHB activity increases and climatic conditions suit reproduction.

Life stages of small hive beetle

Eggs



1. Description and behaviour

Pearly white in colour, 1.4mm long by 0.26mm wide, half the size of a honeybee egg.

Eggs are laid in clusters in cracks and crevices in bee colonies close to the larvae's food source.

Hatch in 1-6 days, usually 2-3 days.

2. Management and control in the hive

Remove any burr comb and excess comb from the top and sides of the frames.

Discard all dark overworked comb.

Ensure boxes and frames are in good condition.

3. Management outside the hive

Eggs can be laid in rotting fruit or vegetation.

Eggs may also be present in any excess comb which is removed – always place in a bucket and place in a wax melter or burn it.

Larvae - cause the most damage to the hive



1. Description and behaviour

Creamy white in colour growing to 10mm long and 1.6mm wide with 6 prolegs at the front.

They do not produce webbing, unlike the wax moth larvae.

They eat combs, Honey, pollen and brood.

It is estimated that 6000 SHB larvae can be reared from a single frame of brood.

The yeast in their excrement causes honey to ferment, which results in slime.

2. Management and control in the hive

During inspection as outlined above move the larvae towards the baseboard or lid.

Larvae, like adult beetles, try to escape the light.

3. Management outside the hive

Place a sheet on the ground before you open your hive to stop larvae escaping.

Wandering larvae

1. Description and behaviour

This stage usually lasts 3-4 days.

Wandering larvae leave the hive to pupate within close proximity to the hive.

May live up to 61 days without food.

Larvae have been observed to stay in the hive for more than 20 days before moving to soil.

2. Management outside the hive

Wandering larvae are at risk of predation from toads, ants and chickens.

Position hive on dry hard soil to give greater chance to larvae predators.

Clear vegetation for one metre around the hive.

Pupae



1. Description and behaviour

The larvae burrow into moist soil to a depth of 5-20cm close to the hive, but they can crawl large distances (>100m) to find suitable

conditions to pupate.

Development 10-60 days depending on conditions.

Are able to stop development for some time if conditions are not suitable.

2. Management outside the hive

Place hive on dry hard soil.

Clear vegetation for one metre around the hive.

Drench the soil with Permethrin – see below for directions.

Beetle

1. Description and behaviour

Take seven days to reach maturity and mate within the hive.

Their life span can be up to 6 months.

Usually 4-7mm long and 2.5-3.5 mm wide. Size can vary according to diet.

Round clubbed antennae which they can tuck under their carapace, black to dark brown in colour, abdomen protruding from wing cases.

The beetles avoid light and can be seen scurrying when the hive is opened.

They are strong fliers and can fly 15kms to a new hive and will follow a swarm.

Well-developed pheromone receptors which attracts them to the hive.

Prefer strong hives in winter to keep warm and weak hives in spring and summer.

Can live outside the hive on pollen or rotting fruit

Prefers hives in full shade.

2. Management and control in the hive

Use traps and beetle buster baseboards to control beetles in the hive. Service them regularly – every 3-4 weeks.

Using Beetle bullets

- Agents are vegetable oil (but not peanut) or diatomaceous earth.

- Fill the traps to half full away from the hive and cover with tape.
- Never spill oil or DE on frames or bees.

Baseboards with DE trays

- Flohive, Beetle Buster base trays or equivalent- use DE dusted on the board.
- Check to ensure the rows of holes are open and not blocked.
- Check and replace DE on trays every 3-4 weeks.

Flat baseboards

- If using a baseboard, keep the bottom board free of debris.
- Apithors use insecticide Fipronil.
- Ensure they lie flat on the bottom board with no residue and with the sides of the logo facing up.
- The hive must slope forwards so NO water enters and pools in the base of the hive.
- Replace traps on expiry (3-6 months).

3. Management outside the hive

During every hive inspection, place the super on the lid so that as beetles escape from the light they are caught on the lid and killed.

A spare baseboard with a beetle trap is even better as the beetles can fall onto the DE in the beetle trap.

Ensure that the baseboard using DE has been refreshed first before opening the hive so that it is maximally effective.

Management of a slime out

Bees can swarm because they have been overrun by beetles (a slime out) OR because they have no room left in the brood box and or the super.

Hive management strategies are designed to keep both the workers and queen happy and productive, reduce beetle attack, and to check for other diseases. However, when a hive swarms the supers are left undefended by

bees and are therefore vulnerable to attack by beetles

Check the honey super to ensure that it has not been affected by slime out.

Check brood frames for larvae and beetles and slime out.

1. If the brood box has slimed out it is time to act fast

Harvest the honey from the super if there is no evidence of slime out without hesitation.

If the frames are not fully capped spin the frames before de-capping to harvest the immature honey. This must be kept separate from the mature honey as it will have a higher moisture content. If it has not started to ferment it can be used within a couple of weeks, but cannot be sold.

Uncap all capped frames and collect mature honey separately. Check to ensure that there is no fermentation and also check the water content.

Treat all frames once honey has been extracted to kill all stages of the hive beetle do not place in another hive as there is a possibility of SHB eggs on these frames. Put the frames either in a freezer at -12 °C for 24 hours, or in a cold room at 1-4°C for 12 days. Alternatively, you can treat with phosphene gas by sealing the frames in a sealed box and leaving them for one week.

Once the frames have been treated, place them in a sealed plastic bag.

2. Destroy as many beetles, eggs and larvae as possible

Place affected frames in a well-sealed black plastic bag and place in the hot sun.

Pour boiling water over the frames and hive box.

Place frames in a solar wax melter to remove wax to recycle the wax for future use.

Burn the affected frames if old and damaged.

Soak frames which are in good condition in bleach which also kills larvae fast and cleans the frames for reuse.

3. Save as many hive components as possible

The hive box and components will not be accepted by bees because of the smell of the slime out caused by the yeast.

Hive components must be thoroughly cleaned with bleach, sugar soap, boiling water or a pressure cleaner. Hive tools, beetle traps, queen excluder, baseboard, lid and boxes all must be decontaminated.

This is a good opportunity to scrub the major hive components such as the box, lid and baseboard and get all timber components ready for painting.

You can smooth all internal corners with gap filler, forming a concave bead which will reduce hiding places for beetles. Ensure it has time to harden before using the hive.

Do not miss the opportunity to discard and replace old hive boxes and frames.

4. Drenching the soil around the hive and any future hive placement

The National Registration Authority has approved off-label use of Permethrin on the ground surrounding beehives or ground intended for hive placement. Permethrin is the only chemical registered for use in the bee industry for the control of SHB. The permit applies to products containing 500g/L Permethrin as their only active ingredient.

Applications are only to be used when beetles or larvae have been observed in or around hive.

Apply in late evening after bees become inactive.

Apply prepared solution to thoroughly wet ground in area 45–60cm wide in front of each hive.

Repeat applications at 30-day intervals.

5. Health warnings

When using diatomaceous earth take care not to breathe in or ingest dust. Always wear a mask.

When handling slime from SHB be aware that it contains a yeast *Kodamaea ohmeri* which has made some people sick and can be very

toxic to lungs. When cleaning wear a P2 or N95 face mask and gloves and apply a waterproof dressing to any exposed broken skin.

Anyone with a weakened immune system should not clean hives affected by small hive beetle.

When cleaning is complete, shower immediately and put on clean clothes.

References

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Yeast *Kodamaea ohmeri* found in all stages – an important symbiont providing nutritional support.

https://en.wikipedia.org/wiki/diatomaceous_earth

Diatomaceous earth has a high crystalline silica content, mostly amorphous silica, which can cause silicosis if inhaled. It causes abrasion and has physico-sorptive properties. This means that it absorbs lipids from the waxy outer layer of the exoskeleton of insects. Damage to this layer causes water loss and kills the insect from dehydration.