

## Bee Diseases

### Small Hive Beetle

(This is a currently notifiable disease)

The Small Hive Beetle (SHB) *Aethina tumida* is native to Africa, and until recently was thought to be restricted to that region. It is a minor pest of weak honeybee colonies and stored honey supers in its homeland where native African bees have natural defenses. However, the SHB was confirmed for the first time outside Africa in Florida, USA, in May 1998, and since then has become widespread across the USA and more recently in Australia in October 2002. Of more concern is the fact that in October 2004 SHB larvae were identified in an unauthorised consignment of queen bees imported into Portugal (again from Texas, USA).

SHB can survive the colder climates and therefore it is highly likely that the beetle would survive and establish itself under UK conditions. In view of its destructive nature it is a major threat to UK beekeeping, agriculture and the environment through disruption of the pollination services of honeybees. It is estimated that those services could have a value of up to £200 million annually.

**Note:** As yet it has not been found in the UK although there is a serious risk of SHB importation through honeybee queen packages, swarms or feral colonies on freight, secondhand beekeeping equipment, imported fruit, and in soil material. Any suspected incidence should be reported without delay.

#### Recognition:



*Aethina tumida* is an oval shaped dark brown or black coloured beetle 5-7mm long and 3-4.5mm wide with club shaped antennae. Their bodies are broad and flattish and covered with fine hairs. There can be variations in size but are generally a third the size of a worker bee

SHB belongs to a family of scavenger beetles known as *Nitidulidae*, pests of fruit and stored food and have a close association with the social bees, wasps and ants. Due to their size they are fairly conspicuous in the hive and on combs.

#### Life Cycle

SHB adults can locate colonies at long distances and once inside lay large numbers of eggs (two - thirds the size of bee eggs) in crevices and on combs within the hive. SHB are also known to lay eggs in fruit. Laying adults (capable of laying 1000 eggs in its 4 - 6 month lifespan) often lay masses of eggs at the same time potentially producing tens of thousands of offspring.

The eggs will hatch 2 - 6 days later with up to 30 SHB larvae occupying a single comb cell, at which time both SHB larvae and adults will eat honeybee eggs, brood, pollen and honey. The 'maggot - like' larvae reach maturity at 10 - 14 days and measure 11mm. They should not be mistaken with waxmoth larvae due to the spines on the dorsum and 3 prolegs near the head, and the absence of webbing or frass associated with moth infestation. The larvae often clump together in comb cells and in the corners of frames. The mature larvae mass together in the bottom of the hive then crawl out of hive at night to begin pupation which normally takes place in soil outside hive.

SHB larvae show a distinct preference for warm sandy soils for this purpose. It takes around 3 - 4 weeks for the adult SHB to hatch out and emerge from the pupation, completing the life cycle. At this point they are a reddish - brown colour, which later darkens to brown / almost black.

The newly emerged adults will start to disperse in search of new colonies in which to lay their eggs after about a week. SHB adults can fly at least 5 miles to infest new colonies and are thought to be able to disperse rapidly over distances of 5 - 10 miles. It is known that adults can survive up to two weeks without food or water, 50 days on used honeycomb, and several months on fruit.

## **Vectors**

*Aethina tumida*, unlike *Varroa* and *Tropilaelaps*, is a wing born pest, and can travel under its own power covering great distances. Once established in an area it will be difficult to remove.

- Direct Importation - Importing with honey bees, especially package bees (e.g. queen plus 10.000 workers, in sealed and screened container) and complete colonies.
- Swarming - Importation of swarms from infested colonies (feral or otherwise) inadvertently carried on container or airfreight.
- Imported Goods - Importing used beekeeping equipment, comb and beeswax.
- Beekeepers - Careless manipulative management by the beekeeper can transfer eggs, larvae and beetles to other colonies in the apiary and to other apiaries.
- Migratory Beekeeping - Moving colonies around the countryside to exploit nectar flows such as heather moors and seasonal OSR has great potential to rapidly spread all diseases.
- Soil Material - Importing soil material (e.g. in plants or on heavy machinery) containing SHB larvae / pupae.
- Food Imports - Imported goods such as fruit .

**Note: Movement of infested colonies is the principal and most rapid means of spreading Small Hive Beetle.**

## **Effects on *Apis mellifera* colonies**

Colonies infested with SHB (*Aethina tumida*) will show clearly visible signs of their presence in the hive. Their ability to reproduce rapidly and in great numbers results in massive brood mortality, comb and cappings destroyed through tunneling, and stored honey eaten and ruined by larvae feces. Colonies infected with SHB will ultimately be destroyed at an alarming rate, and any remaining bees caused to abscond.

**Note: *Apis mellifera* has no natural defences against the SHB. They are a minor pest in their native country due to natural defenses but pose a major threat to *Apis Mellifera* in Europe and the UK. Infestations are extremely destructive and will spread quickly. Any suspected incidence of this pest should be reported without delay.**

## **How to Manage Small Hive Beetle**

*Apis mellifera* has no natural defences against the Small Hive Beetle which feed on larvae and honey stores. They are prolific breeders rapidly weakening and overcoming colonies, and may spread other harmful pathogens throughout the colonies. Left untreated, colonies of bees will eventually die.

Please obtain an up to date copy of the CSL 'The Small Hive Beetle' booklet by visiting the DEFRA website or downloading direct from the EMBA website.

## **Detection**

Hive Examination - Due to the conspicuous nature of the Small Hive Beetle, examination of hive parts especially frames and combs will reveal their presence. When SHB is present adult beetles can be seen crawling over comb surfaces and grubs within or on comb cells feeding on honeybee larvae and honey stores.

## **Monitoring**

As with all honeybee related diseases vigilance is important. The Central Science Laboratory National Bee Unit (CSL NBU) identifies certain 'At Risk' situations where extra vigilance is necessary:

- Warmer parts of the country i.e. southern and coastal areas.
- Colonies within short distances of up to 10 miles from sea and air ports (civilian and military)
- Areas with sandy soils suitable for SHB development
- Colonies within close distance of freight depots where goods such as foodstuffs are imported
- Proximity to apiaries containing bees imported from areas known to have SHB present

## **Controls**

Once well established SHB is impossible to eradicate. As yet it is not known to exist in the UK but experience in the USA illustrates the ability of SHB to establish itself quickly in new situations. There are no recommended products as yet in the UK for treating hives infested with SHB. It can be assumed that should SHB arrive emergency measures will be taken to aid disease control. The following are methods used in the USA to manage and control SHB and are offered as guidance only.

**Pesticides:** - Coumaphos bee strips (Bayer Corporation) have been approved for use in hives for the control of small hive beetles in some US states under an emergency registration. The strips were originally called Bayer Bee Strips and are now being advertised as CheckMite+® Strips. The strips are similar to Apistan® strips and can be used in the hive for up to 45 days to control varroa mites. The coumaphos will kill any varroa mites that are resistant to fluvalinate (Apistan®). The strips can also be used to control the small hive beetle, they are 99% effective against it. For small hive beetle control, the strip is cut in half and stapled to a 4 inch by 4 inch piece of cardboard with one side removed (the small hive beetle likes to hide under the cardboard and will come in contact with the miticide). The cardboard is placed in the middle of the bottom board of a honeybee colony for up to 7 days. Any beetles coming into the hive and going under the cardboard will be killed.

**Air Flow:** - Early observations by USDA-ARS Bee Research Lab in Beltsville suggest air flow may have a bearing on the presence of SHB. Good air circulation around stored honey and within the hive may deter SHB. Open Mesh Floors are now a common part of hive construction and disease control methodology and may well help with SHB.

**Note:** While Open Mesh Floors are an integral part of disease management they are not sufficient on their own and must be used with other methods of control.

### Apiary Houskeeping:

- Be clean around the honey house. Do not leave filled supers standing long before extraction. Do not leave cappings exposed for long periods. Beetles can build up rapidly in stored honey, especially away from protective bees.
- Do not stack or store infested supers onto strong colonies.
- Be aware that supering colonies, making splits, exchanging combs, or use of Porter bee escapes can spread the beetles or provide room for beetles to become established away from the cluster of protective bees.
- Monitor colonies for hygienic behavior; ie, the ability to actively rid themselves of both larval and adult *A. tumida*. Propagate those queen lines found to be beetle-resistant.
- Experiment with trapping or cultural control measures. It may be possible to trap beetle larvae as they attempt to reach soil and pupate. Moving colonies may be advisable to keep a beetle population from building up in any particular apiary. The ability of beetles to complete development may vary according to different soil conditions and beekeepers may find some locations naturally less prone to beetle infestation. Fire ants may be a beneficial insect in this context if they are found to prey on pupating beetles.
- Bees will normally not clean up equipment or supers full of beetle-fermented honey. However, bees may finish the job if the beekeeper first washes out as much honey as possible with a high-pressure water hose.
- Treat soil in front of affected hives with GardStar soil insecticide or similar approved product.
- Treat colonies with CheckMite+ bee hive pest control strip according to label instructions.

Note: In the USA use of coumaphos was classified as a "non-food" use (used in brood chambers where honey not produced) in 1999 and 2000 and no tolerance levels of the compound were established in either honey or bees wax. In 2000 the EPA required a 14 day period before honey supers could be placed on brood chambers that had been treated with coumaphos strips, and prohibited the sale of comb honey from treated hives. Later in July of 2000 the EPA established that coumaphos residues are not to exceed 0.1 part per million (p.m.) in honey and 100 p.m. in beeswax. The restriction on the sale of comb honey from treated hives was also lifted.

### Resistance

Resistance is when the disease will not respond to the treatment and is the beekeepers worst nightmare! To reduce the risk: Always follow the manufacturers guidelines:

- Apply treatments only when needed
- Always use the full recommended dose
- Always remove control products at the end of prescribed treatment
- Do not re-use products (except as a diagnostic aid)
- Alternate treatments using unrelated authorised products whenever possible

Note: If you use a product which is not licenced (or is used inappropriately) you could damage your bees and contaminate your honey and wax. Honey samples are regularly taken from beekeepers to test for residues and if found could lead to a hefty fine.

### **Integrated pest Management**

This is a well tried, tested and recommended practice throughout agriculture and uses a variety of controls applied throughout the season. The benefits are:

- Control at several points makes it harder for the mites to reach harmful levels.
- Including a biotechnical method can slow mite reproduction and reduce the need for chemical treatments
- Using 2 or more unrelated treatments will delay the development of resistance
- Control strategy can readily be adjusted to reflect changing infestation levels

**Remember – SHB is a notifiable disease, any suspected incidence should be reported without delay.**