

Small Hive Beetle Monitoring in England and Wales



Head of an adult Small Hive Beetle showing distinct clubbed antennae. Photo courtesy of The Food and Environment Research Agency (Fera), Crown Copyright; images supplied by the National Bee Unit at Fera.

Introduction

The small hive beetle (SHB), *Aethina tumida*, is a major threat to the long-term sustainability of UK beekeeping and, as a consequence, to agriculture and the environment through disruption to pollination services, the value of which is estimated at hundreds of millions of pounds annually. The beetle is indigenous to Africa, where it is a minor scavenger pest of honey bee colonies causing comparatively little harm. However, outside its native range within colonies that lack African bees' defences, adult beetles enter hives unchecked causing devastating infestations. Until the late 1990s SHB was thought to be restricted to Africa but in 1998 it was detected in Florida and it is now very widespread throughout the United States including Hawaii, where it was first found in 2010.

The beetle can multiply to huge numbers within infested colonies where it eats brood, honey and pollen, destroys combs and causes fermentation and spoiling of the honey. If beetle infestations are uncontrolled they ultimately destroy the colony. Economic impact on the beekeeping industry in the USA has been severe. Within two years of its discovery, at least 20,000 colonies were destroyed by the beetle, costing many millions of dollars. It has also been found in Manitoba, Canada where it arrived with beeswax imported from the USA and has been reported in Quebec. In October 2002, it was found in New South Wales and Queensland, Australia. The economic consequences to the beekeeping industry in Australia have been serious, jeopardising bee exports, pollination services and honey production. Since 2002 the beetle has spread widely and is now considered endemic in New South Wales, Queensland and Victoria. It has been found in the north east of Western Australia close to Northern Territory and is present in Mexico and in Jamaica. This clearly shows the ability of the beetle to 'hitch a ride' right across the world.

It is not known how the beetle reached either the USA or Australia, although in the USA shipping into the east coast ports is considered the most likely route. By the time the beetle was detected in either country it was already well established, leaving little or no chance of eradication. The remaining options are to attempt to control it and slow down its spread. At the time of writing SHB is not thought to be present in the UK or elsewhere in Europe, but its potential implications for European apiculture are enormous. We must now assume that SHB could spread to Europe and that it is likely to prove as harmful here as it has been in Australia and the USA.

Entry pathways

A pest risk-analysis completed by scientists at the Food and Environment Research Agency (Fera) in 2010 identified the following pathways through which the beetle could be carried:

- Movement of honey bees: queens and package bees (workers) for the purposes of trade.
- Movement of alternative hosts e.g. bumble bees for pollination purposes.
- Trade in hive products e.g. raw beeswax and honey in drums.
- Soil or compost associated with the plant trade from within or outside the EU.
- Fruit imports, in particular avocado, bananas, grapes, grapefruit, kei apples, mango, melons and pineapples, as SHB may oviposit on fruit.
- Movement on beekeeping clothing/ equipment.
- Movement on the freight containers and transport vehicles themselves.
- Natural spread of the pest itself by flight, on its own or possibly in association with a host swarm.

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Should SHB enter the UK, then unless it is detected very soon after its arrival, it will rapidly spread into the surrounding honey bee population, making eradication very difficult. For this reason, the National Bee Unit (NBU) undertakes specific monitoring practices to maximise likelihood of early interception.

Statutory exotic pest surveillance

Since 2003, the NBU and its inspectors have increased statutory surveillance programmes to monitor for SHB and *Tropilaelaps spp.* mites. These 'exotic pests' inspections now comprise 13% of the annual apiary visits carried out by NBU Inspectors in England and Wales. The intensity of exotic pest surveillance (EPS) has doubled in the last two years, with 635 apiary visits for the purposes of EPS in 2010 versus 1,089 apiary visits in 2012. The NBU uses Geographical Information Systems to prioritise this programme and target apiaries identified as being 'at risk'. For instance, apiaries situated close to civilian and military airports; close to freight depots and ports of entry for fruit and other foodstuffs; apiaries belonging to bee importers and surrounding apiaries, and if SHB is found here, apiaries containing bees moved from declared infested areas. The only chance for eradication will be early interception of exotic pests, so by targeting inspections to these areas we have a better chance of succeeding.

Sentinel apiaries

The Sentinel Apiary programme was initiated in 2010 with the dual purpose of increasing the spread of honey bee exotic pest surveillance in England and Wales and improving beekeeper awareness of exotic pests and their ability to inspect their own colonies (see the article The Sentinel Apiary Programme for

Table 1. Regional distribution of Sentinel Apiary Holders – England and Wales June 2013

Region	No. Sentinel Apiaries
Northern England	22
Western England	13
North East England	16
Eastern England	27
South West England	19
Southern England	17
South East England	16
Wales	15

England and Wales, in *BBKA News*, July 2012). The aim was to have fifteen apiaries in each region designated as Sentinel Apiaries for the current year and to have the beekeepers managing these apiaries instructed on how to inspect colonies for exotic pests and submit samples to the NBU laboratory. At time of writing, in June 2013, we have 145 apiaries across England and Wales where the beekeepers had expressed their willingness to be involved in the programme and where most regions will have additional Sentinel Apiaries near recognised exotic risk points. Many of these apiaries are close to exotic pest risk points but some are purposely not, so providing additional surveillance in areas that would not normally be checked by the Inspectorate. Figure 1 (page 24) maps the current distribution of Sentinel Apiaries and shows how these coincide with risk points. During the 2012 season nearly 50% of Sentinel Apiary holders also took up an additional offer of adapted wasp traps to monitor for the Asian hornet.

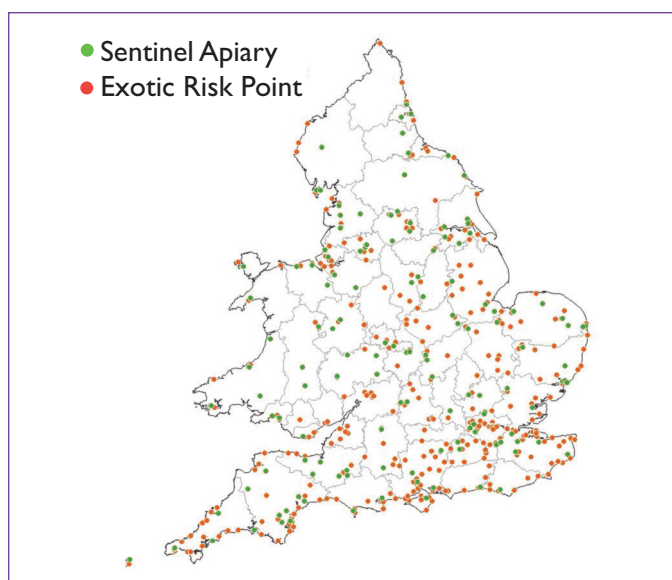


Figure 1. Distribution of sentinel apiaries in relation to exotic risk points 2012–2013.

Results for 2012

The objective was to encourage beekeepers to monitor their colonies for SHB (and also for *Tropilaelaps* mites) during the season using traps and uncapping forks provided by the NBU and to send two floor debris samples for examination to the NBU laboratory. An inspection log-sheet was provided at the beginning of the season with the request that these be returned to the NBU by the end of October to enable an assessment to be made of the efficacy of the programme. The results may be summarised as follows (2011 figures in brackets):

Samples received	141	(115)
SHB traps checked	162	(101)
Log sheets returned	52	(25)

While the low return of log-sheets means that the usage of SHB traps will most likely have been considerably under-reported it is, however, encouraging to see the increase in participation overall despite the very poor season where beekeeper inspections were limited. The Sentinel Apiary Programme is regularly re-evaluated with a view to further increasing participation. Additional beekeeper volunteers are sought in each region to replace those who have not responded in any given season or who have dropped out.

Import controls and screening

SHB is a statutory notifiable pest under both EU and UK legislation. It is permitted to import honey bees from only a very limited number of countries outside the EU. Import regulations are our main defence against the introduction of SHB and other very serious bee pests and diseases from overseas, and it is absolutely essential that all beekeepers abide by them. Contact the NBU, or your appropriate government agriculture department for details of the import regulations. This information is also available on the NBU website www.nationalbeeunit.com. In 2012, just fewer than six-hundred honey bee queens were imported into the UK from outside the EU (New Zealand or Argentina) and many more from within the EU. The NBU laboratory receives all of the attendant workers and cages from such non-EU 'third country' imports for adult bee diagnostic health checks. Once the samples arrive, each cage is carefully examined for any signs of SHB including well hidden eggs. Apart from these checks for SHB the attendant workers are also washed to remove any mites, especially *Tropilaelaps* spp, on the bees' surfaces for subsequent identification via floatation in alcohol.

An adult bee disease diagnosis is also performed on a sub-sample of the attendant workers, typically looking for Acarine, *Amoeba* and *Nosema*.

Beekeeper vigilance

The monitoring regimes described above comprise our first-line defences in terms of catching SHB early should it arrive in the UK. However, even with these safeguards in place we cannot be certain that we will intercept beetles or their immature stages on arrival. It is therefore vital that beekeepers are aware of the huge contribution that they can continue to make in terms of national bee health security. Key responsibilities are summarised as follows:



It is extremely important that all beekeepers register on BeeBase, the NBU's data base. If we do not know where at risk colonies are located, then our chances of effectively monitoring for the arrival of SHB, or achieving control in the event of an invasion are seriously jeopardised. Make sure your details are recorded on BeeBase. This is the responsibility of the beekeeper. To register as a beekeeper, please visit www.nationalbeeunit.com



Make sure you only import bees through the proper channels and with appropriate health certification. Do not be tempted to import bees illegally. See Bees and the Law on BeeBase at <https://secure.fera.defra.gov.uk/beebase/index.cfm?sectionid=79>



Make sure you understand the essential details of the SHB lifecycle, and how to recognise larvae and adult beetles.



Be vigilant. You should keep an eye out for the SHB when you examine your bees. This should be part of routine colony management. If the beetle does enter the UK, early detection will allow control action to be targeted promptly where it is most needed and help reduce the spread of this pest throughout the country.



Aim to stay informed and up-to-date on the spread and emerging biology of SHB and the methods used to control it overseas. If it does enter the UK, you will need to be ready to start to deal with it.



You can read much more about the biology of SHB, how to check your own hives for this pest, how to report suspect sightings and where to find further information in our leaflet *The Small Hive Beetle – A Serious Threat to European Apiculture* (updated 2013). You can download this at no cost from the BeeBase website www.nationalbeeunit.com

Further information

The NBU and Bee Health Policy colleagues have developed a Contingency Plan, which has recently been updated (January 2013). The Plan is an operational document which details the response to an exotic pest and disease outbreak in the UK. Further details of proposed actions are available in the plan, which can be found in full on the NBU's BeeBase website (<https://secure.fera.defra.gov.uk/beebase/index.cfm?pageid=206>). You can also access a number of bee press articles about the biology of the beetle and related Fera information from the publications pages of BeeBase <https://secure.fera.defra.gov.uk/beebase/index.cfm?pageid=166>.

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