

SMALL HIVE BEETLE

(NOTES)

Bruce White
Technical Specialist (Apiculture)

New South Wales Agriculture
Locked Bag 11 Windsor NSW 2753 Australia.
Tel: 61 02 4577 0600 Fax 61 02 4577 0650
bruce.white@agric.nsw.gov.au

ABSTRACT

The small hive beetle (Aethina tumida) was first discovered in the State of New South Wales, Australia, in October 2002. Evidence has emerged that this pest was present in colonies for a least twelve months before being reported by beekeepers. Detection, even though the beetle is easy to see can be difficult because the beetles hide when exposed to light.

The paper will describe the best method to use to detect small numbers of beetles and surveying methods used to determine this pests spread.

been possible to determine how this beetle entered Australia, hosts are colonies of bees, fruit, wax capping, comb and soil.

Colonies of bees are not imported into Australia.

The greatest impact following the discovery of this pest is the export of live bees and queens, worth over 2 million US dollars.

To date, the beetles are not causing any major problems in commercial managed colonies or to fruit. Locating reproduction areas is proving difficult, as beetle numbers in colonies are very small. It is suspected ants may be having a very significant effect on reproduction, with the ants controlling the larval stage in the soil preventing pupation.

A comprehensive research program is to be implemented, the paper discusses the impact of the small hive beetle on marketing, control options without using chemicals, observation in the colonies and the field, and conclusions.

KEYWORDS: *AUSTRALIA, small hive beetle, NSW*

INTRODUCTION

The small hive beetle (*Aethina tumida*) was first identified in the State of New South Wales (NSW) Australia on 25th October 2002 and in the state of Queensland, as a beekeeper from NSW in the infected area had migrated hives to that state prior to its positive identification.

One can only speculate how long the beetle had been present prior to its identification or how it had entered an island country with very strict quarantine protocols in place. The only mode of introduction could have been bees, honey bees can only enter Australia in mailing cages that go straight into a quarantine facility and no adults are released only the grafted queen cells. Fruit, comb honey and soil are also subject to very strict quarantine inspections. Soil is suspected of being likely to be the prime mode of introduction. Soil can carry the immature pupae stages and emerging adult beetles. The only countries with recorded small hive beetles are Africa, The United States, parts of Canada, Egypt and now Australia.

Industry and government carried out tracing surveillance, and established quarantine areas when the pest was identified.

The feasibility of eradication depended on how long infestations had been present, how widespread the infestations were and whether it was feasible to eradicate the pests from all apiaries, feral nests, other hosts including the environment.

In Africa the small hive beetle is not considered a serious pest of African races of honey bees, whereas in America it is considered to be a serious pest of European races of honey bees in some states. When first identified, no one had seen any larval damage to honey bee colonies caused by small hive beetle, so it was not recognised by the beekeepers as a pest.

DETECTION

Normal inspection methods of hives for brood diseases or parasites, shaking bees from frames to check the brood and inspecting bees for external parasites are not likely to detect small numbers of small hive beetles.

To check apiaries for the presence of small hive beetles to give a 95% confidence of detecting beetles if 5% of hives are infected follow the following method.

Number of Hives	Number to Inspect
1-25	all
26-29	25
30-39	29
40-49	35
50-100	45
100-200	51
200-1000	60

Inspecting apiaries for the presence of small hive beetles.

- Start with the weakest colony as indicated by the flight activity.
- Remove the lid, turn it upside down on the ground next to the hive.
- Remove mat if present, check for beetles on and under it.
- Remove top super and place on the lid.
- Remove wall frames and inspect for beetles, do not shake the bees.
- Leave standing on the upturned lid for a couple of minutes.
- Lift the super off the lid and check for beetles running on the lid from the light.
- If none are seen remove all supers.
- If the bottom board is loose, remove the brood box.
- Check the rear corners of the bottom board for beetles.
- If bottom board is fixed remove all the frames and check the bottom board for beetles.
- In cold weather more beetles are likely to stay on the combs.

An excellent survey method is to:

- Place two tablespoons of powdered pollen on the top of the frames under a migrating lid. Check the pollen each day for beetles (until it is all gone).
- Place a square of course corrugated cardboard on the bottom board toward the rear and replace the brood box frames and supers.
- To check quickly lift up the cardboard and place it in a plastic bag then check the bag for beetles and the corrugations where the beetle if present maybe hiding from the light.
- Repeat each month to monitor for small hive beetles presence.

IMPACTS TO DATE

Observations

SHB can be confused with other beetles in beehives that are not pests of beehives. Adult beetles cause no significant damage.

Pick up beetles by wetting your finger and placing the wet finger on the beetles back. Larval stages only attack abnormal colonies failing queen, drone layers, diseased queenless, very weak colonies. Increasing humidity by frame feeding sugar can result in a larval attack in baby nucs.

Larval damage has been low eg. 8 hives out of 200 hives, where SHB may not have been the primary cause in the Richmond (NSW) area.

- Some larval damage has occurred to comb honey prior to extraction. Beetles stay in comb honey when escape boards are used. Comb honey with pollen present is the most attractive. Extract within two days.
- Low numbers of beetles are present in colonies in infected apiaries 4 to 10 beetles. One or two colonies in the same apiary often attract over 50 beetles on a regular basis. The same occurs with feral colonies.
- Smoke will flush out adult beetles and larvae from combs and cracks.
- Larvae need protein in the form of pollen brood or old brood cells to develop in the colony, the quality and or quantity will determine the larvae and adult mature size.
- In some apiaries where beetles were found during the surveillance they are now not present or visa versa.
- Feral colonies pose a risk as all stages of reproduction were observed in some feral colonies inspected. They breed adults to infest managed colonies.
- Ants and birds have been observed attacking larval stages outside the colonies where larval activity has occurred.
- Stored honey and pollen combs attract flying adult beetles as does powdered pollen and pollen supplements.
- Beetles come and go during the day from colonies, it is unclear what they do or where they go.
- No significant reproduction areas have been located near colonies or on rotting fruit.
- SHB spread is increasing due to migration of hives and vehicle movements.
- Wax moth causes more damage to combs than SHB larval stages where honey pollen and brood is not present.
- Comb structure is often still in place when combs have larval activity. Thus allowing the identification of American Foul Brood if present.
- Regular inspections of colonies with beetles present is not leading to egg laying as is reported overseas.
- Beetles are not attracted to honey.

Traditional inspection methods, super on an upside down lid and examining the lid after a few minutes for beetles and the bottom board is less reliable in autumn and winter as the beetles prefer to stay on the combs near the brood nest, so inspect combs. Beetles are easy to shake out of combs if present even when hidden in the cells.

- SHB are not easy to detect in small numbers in colonies.
- Mature adults and larval stages vary in size related to nutrition.
Normal size adult 5-7mm long.
Normal size larvae 10-11mm long.
- A swarm has entered a colony with larval activity and cleaned up the larval activity.
- Adults are not attracted to bug catching light traps.
- Adult beetles can walk on glass, plastic or sticky surfaces.
- Some adults can live over night in a fridge.
- Adults live without food for at least 10 days sealed in a dish.
- Soil type is not important, in sandy soil the larvae dig deeper to pupae than in clay soils.
- Reducing the entrance size gives the beetles the impression the hive is stronger so it may attract less beetles.
- Gauze in bottom boards is a major problem as adult beetles can enter the unguarded bees' entrance and larval stages can easily enter the soil area under the hive.

MARKETING

- SHB has not at this stage impacted on honey production.
- Comb honey must be frozen to -12°C for 24 hours prior to marketing.
- Sections removed from an apiary with SHB were incorrectly frozen. Some were attacked by wax moth, no SHB activity was reported.
- Honey in combs or in cappings attacked by larval activity must not be marketed. Problem Mould and Fungus present.
- Hand catching and caging of queens in new cages does not pose a marketing risk.
- The total queen breeding industry has lost export markets due to the SHB and has to comply with areas of freedom requirements to export to some countries.
- Package bee markets have been lost.

CONTROL

- It is very important that all extracting areas must be kept clean to prevent the adult beetles breeding in cappings, pollen and dead brood, they love such areas to reproduce. Stored material must also be protected.

- Kill all beetles observed keep hives strong queen right and remove excess supers and dead hives.
- The storage area and extracting area if beetles are present will breakdown any barrier system as the beetles can fly in and out of stored material and can lay eggs.
- Diet very different to Africa and USA may be influencing fertility of males as they depend on foraging for a significant part of the adult diet.
- Larval stages can be killed by spraying with bleach, drowning in water, or placing infested combs on strong colonies if water or bleach is not available.
- Phostoxin ® is not registered for the control of SHB in Australia but appears to be a useful control fumigant for stored material.
- Research funding has been approved to investigate traps, chemicals and may be pheromone controls, and an overseas study trip.
- A permit has been issued to allow soil treatment with Farnoz Permex EC residual Insecticide plus all other registered products containing 500g/L Pemethrim.
- Wax cappings are very attractive for larval activity. Clean sumps and tanks.
- Slum glum is also attractive.
- Melt cappings within two days.
- SHB is a notifiable pest in all Australian States.
- Bee space must be correct at all times so the adult bees can get to all parts of the hive. This enables them to control eggs and larval activity in normal colonies.
- Queen introduction cages must be removed to prevent larval activity in the non bee space area.
- Pollen supplements must be fed in the bee space between the cluster of bees. Otherwise the supplement will be covered in SHB larvae within one week.

CONCLUSION

- There is no justification for in hive chemical treatment at this stage in NSW.
- Destruction reported overseas is not being reflected in the SHB behaviour in NSW at this stage. It has probably been present for at least twelve months before being identified.
- Because no damage was being done it was not reported when first observed by beekeepers.

- Overseas reports claim that the epicentre of the SHB outbreak in NSW has ideal conditions for reproduction, that is, sandy soils, humidity, plenty of pollen, feral colonies, small non-migrating apiaries close to each other and neglected apiaries.
- No significant losses have been attributed to the small hive beetle of colonies. Market losses on the overseas and domestic package and queen bee markets has been the major impact at this stage.
- The small hive beetle is a pest we could do without at this stage, it appears to attack colonies that would die out, and small nucleus colonies. Hives suffering from European Foul Brood are attractive to larval attack.
- If honey extracting and storage areas are not kept clean it will pose a significant problem and break down barrier systems.
- It is unclear what the impact will be when the beetle spreads and numbers increase. Beetles have only been identified in New South Wales and Queensland.
- A number of species of ants are very effective at controlling larval and pupal stages in the soil. Species are being identified.

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RESEARCH

Research to be implemented is concentrating on temperature controls, chemicals, traps and pheromones.