

Research on the Small Hive Beetle, *Aethina tumida* at the Central Science Laboratory

Introduction

The small hive beetle (SHB), *Aethina tumida*, is a serious pest of honeybee hives in the USA and Australia (Figure 1). This is an invasive species originating from Africa where, although it is a scavenger in bee colonies, it does not pose the same threat and is reported as only a minor pest. The variation in pest status is due to differences in the aggressiveness and the behaviour between African and European bees. The SHB has recently been made notifiable within the European Community (Commission Decision 2003/881/EC) and in the UK a contingency plan for exotic pests and diseases of honey bees has been developed. A recent Defra funded project has established a culture of the SHB within the quarantine facility at the Central Science Laboratory. This culture has been used to investigate the development of a lure as a means to providing a system for monitoring of the SHB. In addition novel control methods for this species are also being investigated in laboratory trials.

Project objectives

Traps with attractant lures have proven to be an effective means of monitoring for the presence and population levels of insects in a wide variety of situations. Attractant lures may be:

- 1) based on pheromones produced naturally by the insect
- 2) derived from food sources
- 3) in the case of parasitoids and predators based on volatile cues from the host/ prey of the insect.

Preliminary investigations by others in the USA have suggested that SHB adults are attracted to certain natural cues comprising mixtures of hive material and honeybees. These odour sources contain many volatile compounds only some of which will be attractive to the SHB (Figure 2). Our studies are using behavioural bioassays and electrophysiological techniques to examine which of the many volatile compounds released from hive components, or from the beetles themselves, are attractive to the SHB (Figure 3). These will be formulated into a lure and field tests will be carried out in the USA and South Africa. The responses of both sexes of the beetle have been investigated and beetles from different geographic locations are being examined. In addition factors that may influence trap catch such as the minimum temperature required for flight have been established. Information on the reproduction of the SHB is also being obtained through the maintenance of the cultures.

Control measures for the SHB also require further research, particularly the use of novel, environmentally sustainable methods. Novel compounds for control of both the adult and larval stages that can be used independently or in conjunction with the attractant lure in a lure-and-kill



Figure 1. Adult and larvae of the small hive beetle, *Aethina tumida*

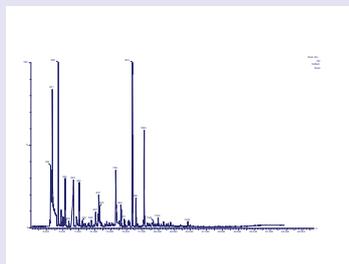


Figure 2. Typical trace illustrating number of compounds found in a hive-associated odour source. Only a few of these compounds may act as attractants for the SHB

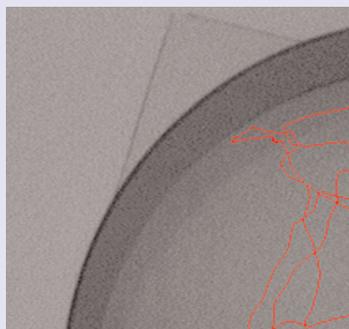


Figure 3. Movement of an adult SHB (red line) in an arena with an attractive odour source positioned in upper left hand quadrant



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