

## Exotic pests of honey bees

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### Introduction

Exotic pests are pests which are present in other countries but to date have not been identified present in Australia. The pests listed below would be expected to cause major economic losses within the beekeeping industry should they enter into Australia:

- varroa mite
- tropilaelaps mite (Asian mite)
- tracheal mite
- braula fly (bee louse)
- Asian bee
- Africanised honey bee
- Cape honey bee.

The Australian Government has programs in place to prevent the introduction of these pests. If one or more of the pests were to enter Australia, then quick detection before the pest became established would be the next line of defence. Once an exotic pest has been detected in Australia, then an eradication program may be implemented.

If you suspect that you have seen one of the following pests or their symptoms in beehives, it is **very important** that you contact your nearest NSW Department of Primary Industries (NSW DPI) office, or the Australian Quarantine Inspection Service (AQIS) on 1800 020 504.

**All beekeepers, from amateur to commercial, can play an important role by observing their hives closely and providing early detection of exotic pests.**

### Varroa mite

#### Characteristics

- The adult female varroa mite *Varroa destructor* is about 1.1 mm long and 1.5 mm wide, large, easily seen by the unaided eye, reddish-brown, flattened, oval-shaped, and has eight legs.
- Male adult varroa mites are smaller in size, pale-coloured and are usually present only in capped bee cells.
- Adult female mites cling between the body segments of adult bees where they pierce the intersegmental membrane and feed on the blood (haemolymph)—in this situation they are partly hidden and not easily seen.
- Mature female mites lay eggs on the bottom of cells or directly onto bee larvae shortly before the brood cell is capped—in this situation they are also not easily seen.
- Varroa is a parasite of brood and adult bees and will breed in hives when brood is present. The life cycle of varroa mites is spent inside sealed brood cells, with a preference for drone pupae at the edge of the brood nest. Adult varroa mites spread between bee colonies by transference between adult bees on contact.

#### Initial field signs

- Numerous newly emerged adult bees at the hive entrance displaying deformed wings, legs and abdomens.
- Patchy brood patterns may be evident in advanced infestations.

#### Identification method

Drone pupae removed from their cells with a pair of forceps and examined externally may show the presence of reddish-coloured mites—a minimum of 100 pupae per colony should be examined.



## Tropilaelaps mite (Asian mite)

### Characteristics

- The adult female tropilaelaps mite *Tropilaelaps clareae* is about 1 mm long and 0.6 mm wide, small, not easily seen by the unaided eye, long and narrow, brown in colour, fast moving and has eight legs.
- The adult male is slightly smaller in size.
- Tropilaelaps is a parasite of bee brood only, feeding on the blood of bee larvae and pupae, and not affecting adult bees. It is able to survive and breed in hives only when brood is present. The mite lays eggs on bee larvae just prior to the cell being capped, and development takes place in the capped cell where it is not seen by the beekeeper.
- The tropilaelaps mite spends most of its life cycle inside sealed brood cells.
- Transference between colonies is by adult mites attaching themselves to adult bees.

### Initial field signs

- An irregular pattern of sealed and unsealed brood.
- Numerous newly emerged adult bees at the hive entrance with deformed wings, legs and abdomens, and deformed pupal remains.

### Identification method

To examine colonies for the mite, a minimum of 100 sealed brood cells are opened and the brood removed with forceps for inspection. If mites are present, adult female mites will be seen walking rapidly out of the cells and on the comb surface.

## Tracheal mite

### Characteristics

- The tracheal mite *Acarapis woodi* is very small.
- It lives and reproduces in the trachea (breathing tubes) and air sacs inside adult bees—it cannot be seen by the beekeeper.
- Female mites enter the trachea of worker bees usually within 24 hours of the emergence of the bees from their cells.
- Adult worker, queen and drone bees may be infested—the susceptibility of bees to infestation decreases after 24 hours of age.

### Initial field signs

- Variable, with some bee colonies showing no obvious signs.
- In colonies showing signs, infested worker bees are not able to fly and are found around the apiary clinging to the stems of plants or crawling about with fluttering wings on the ground near the hive entrance.
- Infested bees' abdomens may be distended, and the wings often have a dislocated appearance with the hind wing held at an abnormal angle to the body in a 'K' configuration.
- Hive population numbers dwindle.

### Identification method

Detection of the mite is the only accurate means of identification and requires dissection of worker bees and examination of their trachea under a microscope.

## Parasitic mite syndrome

Parasitic mite syndrome (PMS) is a condition of honey bees identified in the USA. PMS has been identified in bee colonies infested with varroa mite and/or tracheal mite. It is thought to be caused by a secondary infection as a result of the mite infestation. No known pathogen has been found to be predominant.

### Characteristics

- Symptoms resembling American foulbrood, European foulbrood and/or sacbrood diseases may be present—often the symptoms observed are not exactly characteristic of the diseases mentioned.
- In all cases, varroa and/or tracheal mites are present.

### Initial field signs

- Adult bee symptoms: The varroa mite is present. Tracheal mites may or may not be present.
- A reduction in bee population numbers, crawling adult bees and queen bee supercedure.
- Bee brood symptoms: Varroa mite present. A patchy brood pattern. Affected brood are aged from 'C' shaped larvae through to the prepupal (capped) stage. Larvae may be twisted in their cells, light brown in colour and do not display ropiness. Scales are present and are easily removed from the cells. No odour is evident.

### Identification method

A sample of comb containing affected brood is required for laboratory analysis.

## Braula fly (bee louse)

### Characteristics

- The braula fly *Braula coeca* is a small wingless fly, round in shape, reddish-brown in colour, visible to the unaided eye, and found externally on adult bees.
- Its size and colour are similar to the varroa mite, but braula is easily distinguishable as it is an insect with six legs.
- Adult braula feed on nectar, pollen and materials secreted by the bee at the bee's mouth.
- Braula is found in Tasmania but not on the Australian mainland.

### Initial field signs

- Adult braula clustered in the head region of adult worker, queen and occasionally drone bees.
- Larval stages tunnel through the honey cappings, damaging their appearance.

## Asian bees

There are about ten species of Asian honey bees (*Apis* spp.) occurring in South-East Asia. They are tropical and subtropical species related to the races of the European honey bee *Apis mellifera*, which is used commercially in Australian beekeeping.

### Characteristics

- The Asian species exhibit behavioural traits that make them unsuitable for commercial management; for example, their swarming and absconding behaviour is greater than in the European honey bee.
- It is possible for swarms of Asian bees entering Australia to carry with them one or more of the exotic mites described above.
- Asian species of honey bees are able to be infected with bacterial diseases, such as American foulbrood and European foulbrood, and some viral diseases which affect European races of honey bees used commercially in Australia.
- In the Solomon Islands, there is evidence that *Apis cerana* bees are outcompeting and replacing colonies of European races of bees since *A. cerana* were introduced there.

### Colony identification

Feral nests of Asian bees can be identified by the following characteristics:

1. ***Apis cerana* and its close relatives, *A. nigrocincta*, *A. nuluensis* and *A. koschevnikovi*:**

The nest comprises a small number of parallel combs. Natural nesting sites are hollow trees, caves and small enclosed areas around buildings. Nests are located inside cavities similar to the nests of European honey bees.

2. ***Apis dorsata* and its close relatives, *A. dorsata dorsata*, *A. dorsata binghami*, *A. laboriosa*, and a possible species from the Philippines:**

The nest comprises a single, large comb suspended underneath a branch of a tree or on a cliff face. Nests are located in open, exposed areas.

3. ***Apis florea* and its close relative *A. andreniformis*:**

The nest is a single, small comb suspended underneath a branch or a twig; often low shrubs are used. Nests are located in open, exposed areas.

### Field identification

1. ***A. cerana* and relatives:**

Similar in appearance to the European bee *A. mellifera*, but with a smaller body size. Cell diameter of worker cells is smaller than for *A. mellifera* and range in size from 4.2 mm to 4.8 mm. *A. mellifera* worker cell diameter ranges from 5.2 to 5.5 mm.

2. ***A. dorsata* and relatives:**

Similar in appearance to *A. mellifera* but with a larger body size. Cell diameter of worker cells is large, ranging from 5.3 to 5.6 mm. The construction of a single, large exposed comb nest distinguishes it from *A. mellifera* and *A. cerana*. These bees exhibit efficient colony defence and become extremely aggressive when approached.

3. ***A. florea* and relatives:**

Similar in appearance to *A. mellifera* but smaller than *A. cerana* in body size. The single-comb exposed nest has a worker cell diameter of about 2.9 mm.

## Africanised honey bees

The Africanised honey bee is a hybrid strain developed from European races of *Apis mellifera*, present in Brazil in the 1950s, hybridised with an African race of honey bee *Apis mellifera scutellata*, which is smaller in size than European bees.

### Characteristics

- Africanised honey bees are similar in appearance to the European races present in Australia but they are slightly smaller in size.
- The hybrids tend to retain traits of the African bee race making them unsuitable for domestic and commercial beekeeping. Undesirable characteristics include being highly defensive in protecting their hive, with a large protected area around it; the ability to pursue and attack perceived threats in far greater numbers and over much longer distances than European races; and frequent swarming and absconding.
- Their severe aggressiveness makes them unsuitable for management near human habitation and where livestock are kept.

### Initial field signs

- Colonies that are nervous, have a high propensity to sting, or have an exposed nest are suspect; however, a colony of Africanised bees can appear normal under some environmental conditions.
- As a guide, Africanised worker bees returning from foraging tend to fly directly into the hive entrance without alighting at the hive entrance. (European races tend to alight at the hive entrance and walk into the hive.)

### Cape honey bee

The Cape honey bee *Apis mellifera capensis* is native to the Eastern and Western Cape provinces of South Africa. The Cape bee exhibits traits that make it unsuitable for commercial production in Australia. If introduced by swarms or by queen bees brought into Australia, it could be expected to have a major damaging impact on the Australian beekeeping industry at both commercial and amateur levels.

### Characteristics

- The adult worker Cape bee is dark in colour and slightly smaller in size than worker European races of bees.
- Worker cell diameter is 4.9 mm.
- The damage the Cape bee causes to European races of honey bees results from the ability of unmated worker Cape bees to lay eggs that can develop into either worker or queen bees.

- Worker Cape bees invade colonies of European honey bees and kill the European race queen. The Cape workers then develop their ovaries and become 'false' queens, laying eggs which develop into worker and drone Cape bees. Cape worker bees from those colonies then invade other European race colonies and take over the colony. Invaded colonies eventually die out, resulting in large economic losses for commercial beekeepers.

### Initial field signs

- European race colonies gradually having their worker bees replaced by the slightly smaller and darker coloured Cape worker bees.
- Weakening of colony population numbers, with eventual death of the colony.

### Further information

This Primefact should be read in conjunction with the brochure *Pests and diseases of honey bees—a field diagnosis guide*, which is available from NSW Department of Primary Industries offices.

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