Honeybee Pests & Diseases – Tropilaelaps

Tropilaelaps - a mite, *Tropilaelaps clareae* & *T. mercedesae*, is a serious external parasite of the honeybee affecting both brood and adults. Its natural host is the Asian honeybee *Apis dorsata* which has evolved with the mite to develop a natural resistance. At the time of writing it has spread from its normal tropical / sub tropical regions in Asia and its exact geographical range is not known. It is entirely possible for Tropilaelaps to establish and survive in the UK, although the main limiting factor for the Tropilaelaps mite is its dependency on available brood on which to feed. Warmer areas in the south and east that may have brood throughout the year have the potential to become infected. Predicted changes in weather patterns and climate could increase the potential for spread and impact.

As yet it has not been found in the UK although it is likely that it may find its way to our shores in a similar manner to the Varroa mite. Any suspected incidence should be reported without delay.

Note: This is a notifiable disease. *Any suspected incidence of Tropilaelaps must be reported without delay to your local Bee Inspector. Inform your local beekeeping association / community to alert them of its presence. Download the latest Tropilaelaps Advisory Leaflet from the National Bee Unit.*

Recognition

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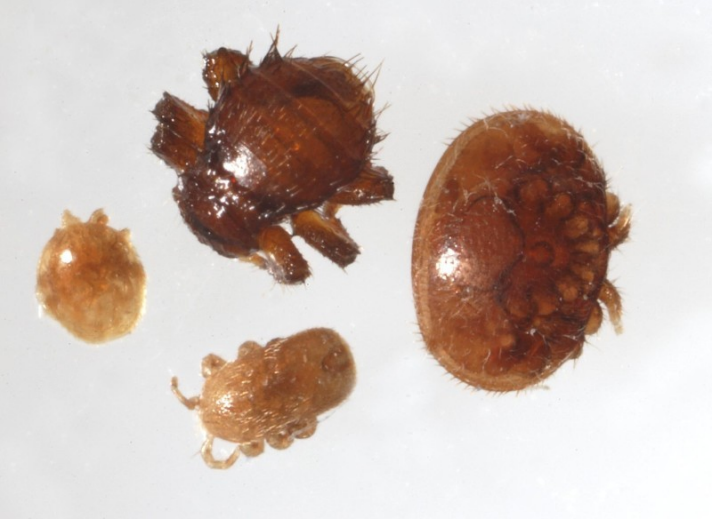

Tropilaelaps clareae is a large (almost 1 mm in length), red-brown, elongated mite found on the combs or on adult bees. As shown in the image the body of the Varroa mite (right) is wider than it is long and it moves slowly, whereas the body of Tropilaelaps (centre bottom) is elongated, with a heavily sclerotised holoventral or similar shield, and it is a fast - running mite. Both species of Tropilaelaps can easily be recognised and separated from the Varroa mite using a magnifying glass.

Tropilaelaps (centre bottom) compared to Braula coeca (top), Varroa destructor (right), and Melittiphis alvearius (left).

Colonies infested with Tropilaelaps mites will show similar damage to that of Varroa. High levels of brood mortality, irregular or poor brood patterns, patches of neglected brood, perforated cappings, reduction in adult bee lifespan are all characteristic. In severe infestations there can be so much dead brood as to cause noticeable smells. Surviving bees show signs of physical and physiological abnormalities such as shorter lifespans, shrunken or deformed wings and legs, and may be seen crawling at hive entrances - often a first sign of trouble.

Life Cycle -The colonising Tropilaelaps female (or females; as many as a dozen may occur within individual a single cells) places from one to four eggs on mature bee larvae shortly before the brood cell is capped. The drone brood is preferred by Tropilaelaps and may be almost 100% parasitised although both drone and worker brood can be affected. The mite

progeny, usually one male and several females feed on and seriously damage the bee brood, however unlike the Varroa mite their mouth parts can not pierce the membranes of adult bees. Development of the mite requires about 1 week. The adults, including the original female, emerge with the adult bee and search for new hosts. The short life-cycle, as well as a very brief stay on adult bees, explains why populations of *Tropilaelaps clareae* increase faster than those of Varroa mites (by a factor of 25:1). When both *T. clareae* and *Varroa destructor* infest the same colony, the former may out-compete the Varroa mite. It has been reported that when both mite species are in the same cell, the reproduction of both mites declines.

Phoretic survival on bees is quite short (only 1-2 days) because Tropilaelaps cannot pierce the integument of adult bees. The phoretic time for *Tropilaelaps spp*. is important in understanding the life cycle, and recent research suggests the period can be as long as 5-10 days. Gravid female mites will die within 2 days unless they deposit their eggs. Infestation by Tropilaelaps causes the death of many bee larvae (up to 50%), resulting in an irregular brood pattern and of which the cadavers that may partially protrude from the cells. Many malformed bees occur, with distorted abdomens, stubby wings and deformed or missing legs. Some of the affected bees crawl at the hive entrance. In addition, perforated cappings are seen, the result of sanitation activities by the worker bees, which evict the infested bee pupae or young adults. Some infested colonies abscond, carrying the mites to a new location.

Detection

Use the same methods and procedures as testing for Varroa.

- Examination of the floorboard / hive debris - This method is not the most reliable particularly when infestation is light. The small number of mites which drop are easily missed.
- Uncapping Brood - This is done on the drone brood during a normal colony inspection. Note - that if the mites are very young they will not be as dark as the adults and easily missed. A frame of drone foundation can be used in the brood chamber to make examination easier and can also be used as a method of control.
- Mite Drop Test - This is a reliable means of estimating mite levels - with a sticky paper insert on the floor use a proprietary miticide in the brood chamber and leave for 24 - 48 hours. Examine the insert carefully for the presence of the mites. This is an ideal method for testing swarms and if positive can be used as a treatment.

Monitoring - Vigilance is important with all honeybee diseases. Check all apiaries and colonies regularly for health and suspect any colonies that are not thriving where there is no already known reason. Colonies that are not performing well or die out should be examined thoroughly and sealed to prevent robbing and spread of any diseases present.

Once the mites have been detected the use of an open mesh Varroa floor can be used to determine natural mite drop. Regular examination of brood can also be used. Monitor more than 1 colony in the apiary to make sure you have a representative result. The benefits of monitoring are to show if your control methods are working. Bio-technical Controls Tropilaelaps can not feed on adult bees and more importantly can not survive without access to live brood, this is their weakness. Exploitation of brood-less periods, simulated or otherwise, will play a significant role in reducing mite population.

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Open Mesh Floors - Mites cannot survive long without contact with their hosts. Mites falling or rubbed off comb fall through the mesh floors and out of the hive. Use of an Open Mesh Floor serves to stop these fallen mites re-entering the hive and reduces the overall mite population while also reducing debris on the hive floor, improving hive ventilation, and discouraging other pests such as wax moth. Note: While Open Mesh Floors are an integral part of Tropilaelaps management and can be used with a tray to measure mite drop, they are not sufficient on their own and must be used with other methods of mite control.

Comb Trapping - The queen is caged for 9 days on three combs in succession. These are left in the hive for a further 9 days to allow the mites to enter. The combs with the mites trapped in the sealed brood are removed and destroyed. To reuse the combs place them in a deep freeze for a couple of days to kill the brood and mites. Then un-cap and wash the contents out of the cells.

Drone Brood Removal - Using sheets of drone foundation in the brood chamber or a super frame to allow drone comb to be drawn underneath it causing the queen to lay drone brood. This is more attractive to the mite and once capped can be removed and the contents disposed of. Like the method above there is a danger that if you are unable to remove the sealed comb and it hatches you will have increased the mite population rather than reduced it.

Treatment

Hard Chemical Controls - Acaracides used for Varroa are likely to be as effective against Tropilaelaps. Currently there are no products specifically approved for the control of Tropilaelaps, should the mite appear in the UK emergency approval would be sought to approve the use of varroacides against Tropilaelaps. Check with your local beekeeping suppliers for up to date approved products.

Soft Chemical Controls - Check with your local beekeeping supplier for up to date approved products. Organic Acids - Formic Acid, Oxalic Acid and Lactic Acid have shown efficiencies of up to 90% but are best used in brood-less conditions as they can cause brood loss and even the loss of the queen. Essential Oils Controls (Not authorised in the UK) The effective chemical here is a terpene but is unreliable as a sole treatment and can be irritant.

Combination Therapy - Many of the methods described above can be used in conjunction with one another. Particularly using a bio-technical and chemical combination. Note: Great care must be taken if chemical treatments are combined as the combined effect may well be toxic.

Resistance - Resistance is when the mite 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 varroacide strips at the end of prescribed treatment.
- Do not re-use strips (except as a diagnostic aid).
- Alternate treatments using unrelated authorised products whenever possible

Note: If you use a product which is not licensed (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.

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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 bio-technical method can slow mite reproduction and reduce the need for varroacides.
- Using 2 or more unrelated varroacides will delay the development of resistance.
- Control strategy can readily be adjusted to reflect changing infestation levels.

Disease Prevention - is best practice, maintain good apiary housekeeping and bee husbandry:

- Always maintain strong and vigorous colonies that show good hygienic tendencies, re-queen from known healthy colonies.
- Always maintain a high level of hygiene in all your beekeeping practices.
- Carry out methodical health inspections on a regular basis, checking for brood disease particularly in spring and autumn.
- Never transfer combs between colonies without checking for brood diseases.
- Systematically replace old brood combs in your hives melting down the old comb to maintain clean and healthy brood.
- Never bring colonies or equipment into your apiary without establishing their origin, condition, and disease status.
- Sterilise any second-hand equipment or hive components before introducing them into your apiary,
- Discourage drifting and robbing in the apiary,
- Suspect stray swarm health until you know otherwise,
- Report any incidence of disease or suspicious conditions immediately to your local association.

Vectors

Tropilaelaps mites are extremely mobile and will readily move from hive to hive through natural processes:

- Robbing - When a colony is severely affected it becomes a target for robbers. Not only do they take any stores but also pick up large numbers of mites.
- Drifting - Poor apiary design and location will allow young bees to drift into neighbouring colonies. This is particularly important with drones as are they are accepted into any colony.

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- Bee Migration - Bees from collapsing colonies abscond from their own hive with the robbers and increase the mite load in the robbers hive.
- 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. Colony health should be checked before deciding if it is safe to move them.
- Swarming - A swarm from an infested colony will always carry mites with it. It is essential to test any swarm for the mite and treat it before introducing it to the apiary.
- Feral Swarms - Swarms from feral colonies are no more likely to be free than those from managed colonies but can spread the mite naturally by 3-5km per year.
- Beekeepers - Careless manipulative management by the beekeeper can transfer affected bees to other colonies in the apiary and to other apiaries. Migratory beekeeping can cause a rapid spread throughout a country.

Note: Movement of infested colonies is the principal and most rapid means of spreading Tropilaelaps and Varroa.