Tropilaelaps

(This is a notifiable disease)

The Trolilaelaps mite, *Tropilaelaps clareae* & *T. koeningerum* , 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.

Note: 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.

Recognition:

T. clareae is a large (almost 1 mm in length), red-brown, elongated mites found on the combs or on adult bees. Tropilaelaps koenigerum is slightly smaller, only about 0.7 mm in length.

As shown in the image above the body of the Varroa mite (left) is wider than it is long and it moves slowly, whereas the body of *Tropilaelaps* (right) 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. 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 *T. 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.

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.
- 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*.

Effects on Apis mellifera colonies

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 physiologocal 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.

Note: *Apis mellifera* has no natural defences against the *Tropilaelaps* mite which feed on larvae severely weakening them and any adult bees that survive. Infestations will spread other harmful pathogens throughout the colonies. Left untreated, colonies of bees will eventually die.

How to Manage Tropilaelaps

Please obtain an up to date copy of the CSL *'Tropilaelaps: parasitic mites of honey bees'* booklet by visiting the DEFRA website or downloading direct from the EMBA website.

Detection

(Same methods as for Varroa) Examination of the floorboard / hive debris - This method is not very 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 - With a sticky paper insert on the floor one strip of Bayvarol/Apistan is placed in the brood chamber and left for 24 - 48 hours. The strip can then be used on other colonies being aware that it could spread other diseases. Examine the insert for the presence of the mites. This is an ideal method for testing swarms and if positive can be used as a treatment.

Monitoring

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. Biotechnical 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 broodless periods, simulated or otherwise, will play a significant role in reducing mite population.

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 uncap 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.

Hard Chemical Controls

Accaracides 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.*

Bayvarol (flumethrin) and Apistan (fluvalinate) are synthetic pyrethroids which act as a nerve poison. When used according to the manufacturers instructions they are more toxic to the mites than the bees. Both chemicals act on the same metabolic pathway so that resistance to one will mean resistance to the other.

Note: It is very important to remove the strips exactly as per manufacturer's instructions to reduce the risk of resistance developing.

Soft Chemical Controls

The only licensed soft chemical is 'Apiguard' which contains thymol. Used as per manufacturers instructions can obtain a 90-95% efficiency. It would be particularly useful used alternatively with the hard chemicals.

Organic Acids (Not authorised in the UK)
Formic Acid, Oxalic Acid and Lactic Acid have shown efficiencies of up to 90% but are best used in broodless 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 biotechnical 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.

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 biotechnical 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

Tropilaelaps Suspected? Beekeepers must immediately contact their Local Bee Inspector

Bee Inspector	Address	Telephone	Area Office
Angus Cameron	161 Brooms Road, Dumfries, Dumfries & Galloway, DG1 3ES angus.cameron@scotland.gsi.gov.uk	01387274400	Dumfries
Clem Cuthbert	Longman House, 28 LongmanRoad, Inverness, Highland, IV1 1SF clem.cuthbert@scotland.gsi.gov.uk	01463253053	Inverness
Sandy Lister	Strathearn House, Broxden Business Park, Lamberkine Drive, Perth, Perth & Kinross, PH1 1RZ sandy.lister@scotland.gsi.gov.uk	01738602000	Perth
Angus MacAskill	Cotgreen Road, Tweedbank, Galashiels, Scottish Borders, TD1 3SG angus.mackaskill@scotland.gsi.gov.uk	01896892400	Galashiels
John Smith	Russell House, King Street, Ayr, South Ayrshire, KA8 0BG john.smith@scotland.gsi.gov.uk	01292291300	Ayr
Steve Sunderland	Cameron House, Albany Street, Oban. PA34 4AE steve.sunderland@ scotland.gsi.gov.uk	01631 563071	Oban
Kirsteen Sutherland	Thainstone Court, Inverurie, Grampian, Aberdeenshire, AB51 5YA kirsteen.sutherland@scotland.gsi.gov.uk	01467626247	Inverurie
Paul Svenson	Strathearn House, Broxden Business Park, Lamberkine Drive, Perth, Perth & Kinross, PH1 1RZ paul.svenson@scotland.gsi.gov.uk	01312446599	Perth

Remember - you are required by law to report Tropilaelaps.