ATTTA
Atlantic Tech Transfer Team for Apiculture

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Tropilaelaps mites

Tropilaelaps mites consists of four distinct species (*Tropilaelaps clareae*, *T. mercedesae*, *T. koenigerum* and *T. thaii*). All four species of mites are native to Asia and are known to parasitize the brood of the giant honey bee (*Apis dorsata*)[1,2]. Species of Tropilaelaps mites can be distinguished using morphological and molecular identification techniques. Two of the four species of Tropilaelaps (*T. clareae* and *T. mercedesae*) are also known to parasitize the western honey bee (*Apis mellifera*)[1,2]. *Tropilaelpas mercedesae* and *T. clareae* are the two Tropilaelaps spp. that are of most economic importance to honey bees[3] and are therefore the focus of this fact sheet. For this fact sheet, unless specified, "Tropilaelaps mites" is used as the common name for both species.

Mites of the genus Tropilaelaps are longer than wide. Mature adult mites are reddish-brown and nymphal stages are white[4]. Adult female mites are large (approximately 1 mm long and 0.5 mm wide) compared to male mites (approximately 0.9 mm long and 0.5 mm wide)[4].

Figure 1. Dorsal and ventral view of adult female *Tropilaelaps mercedesae* (Ramirez et al. 2025)[5].

Tropilaelaps mites damage honey bee colonies by feeding on developing brood[6], which reduces the weight of adult bees as well as their lifespan[7]. The mites also vector several viruses that can also negatively impact honey bee health (including deformed wing virus, black queen cell virus, sacbrood virus and acute bee paralysis virus)[6]. Overall, the full extent of the damage inflicted by Tropilaelaps mites at both the individual and colony levels has not been extensively researched. Compared to the current understanding of Varroa mite (*Varroa destructor*) biology, there is a significant gap in research regarding the full impact of Tropilaelaps mites on honey bee colonies.

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Tropilaelaps mite life cycle

The life cycle of Tropilaelaps mites starts when a mature female mite enters an open brood cell containing a late-stage honey bee larvae[8]. Multiple females may enter a single brood cell, although most cells are invaded by one mite only[8]. Similar to Varroa mites, research suggested that Tropilaelaps mites prefer drone brood over worker brood[8].

The female mite will lay eggs within two days of the brood cell being capped[9]. Tropilaelaps mites can lay eggs every 24 hours compared to Varroa mites which lay eggs approximately every 30 hours[10]. Once eggs hatch, the mite goes through three instars (larva, protonymph and deutonymph). The entire development time of this mite is six to nine days[10].

Tropilaelaps mites only spend an average of two days outside of brood cells before infesting new brood cells or attaching to adult bees to disperse[11]. Comparatively, Varroa mites spend an average of greater than seven days feeding on adult bees before infesting new brood cells[11]. This means that Tropilaelaps mites have a higher reproductive rate than Varroa mites and Tropilaelaps mites can grow their population at a faster rate than Varroa mites.

Unlike Varroa mites, Tropilaelaps mites can mate outside of brood cells and unmated females can reproduce via deuterotokous parthenogenesis, a form of asexual reproduction, producing both male and female offspring[12]. These reproductive differences mean that Tropilaelaps mites have a greater reproductive advantage compared to Varroa mites[12].

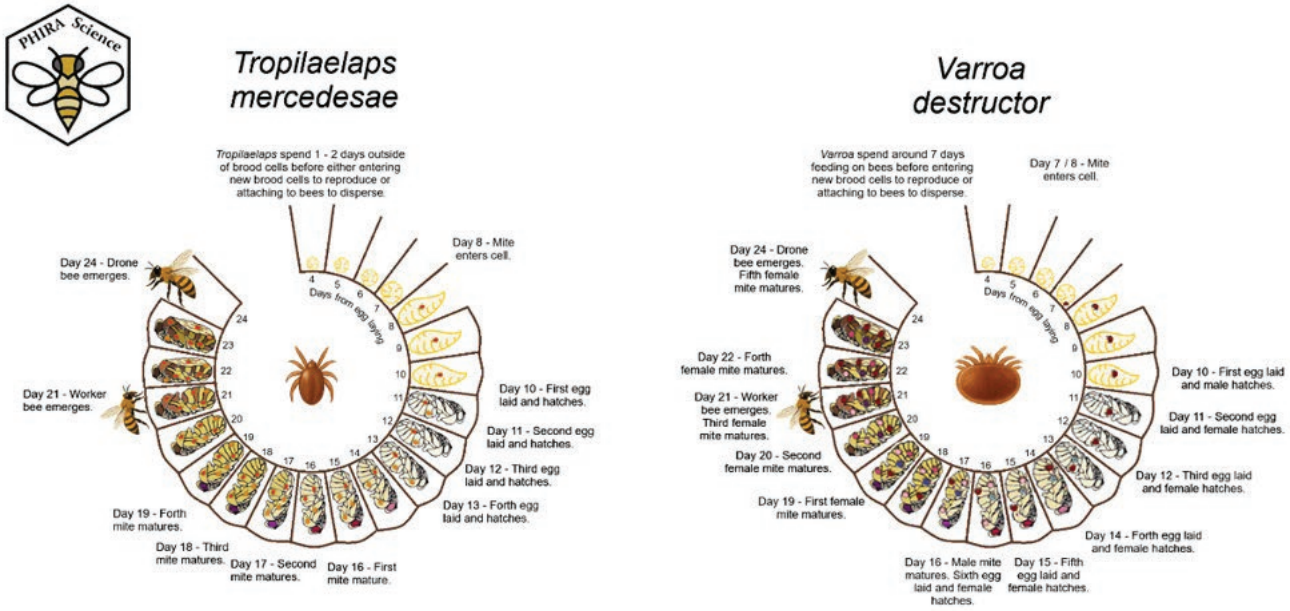

Figure 2. Life cycle of *Tropilaelaps mercedesae* and *Varroa destructor* (Gill et al. 2025)

Overall, Tropilaelaps mites can rapidly reproduce when brood is present. However, it is suggested that the survival of Tropilaelaps mites is limited to periods in the colony when brood is present[13-15].

Global distribution and threat to the beekeeping industry

Tropilaelaps mercedesae started parasitizing the western honey upon the introduction of *A. mellifera* to Asia, with the first recorded detection of this host-parasite interaction occurring in 1963[16]. Since then, *T. mercedesae* has become a significant parasite of the western honey bee and its geographical distribution has spread both westward and northward[2]. **Currently, Tropilaelaps mites have never been detected in North America.**

In recent years, *Tropilaelaps mercedesae* has been detected in new countries across Asia and Europe, making it increasingly important to clarify the mite's range as well as understand factors driving its expansion[2].

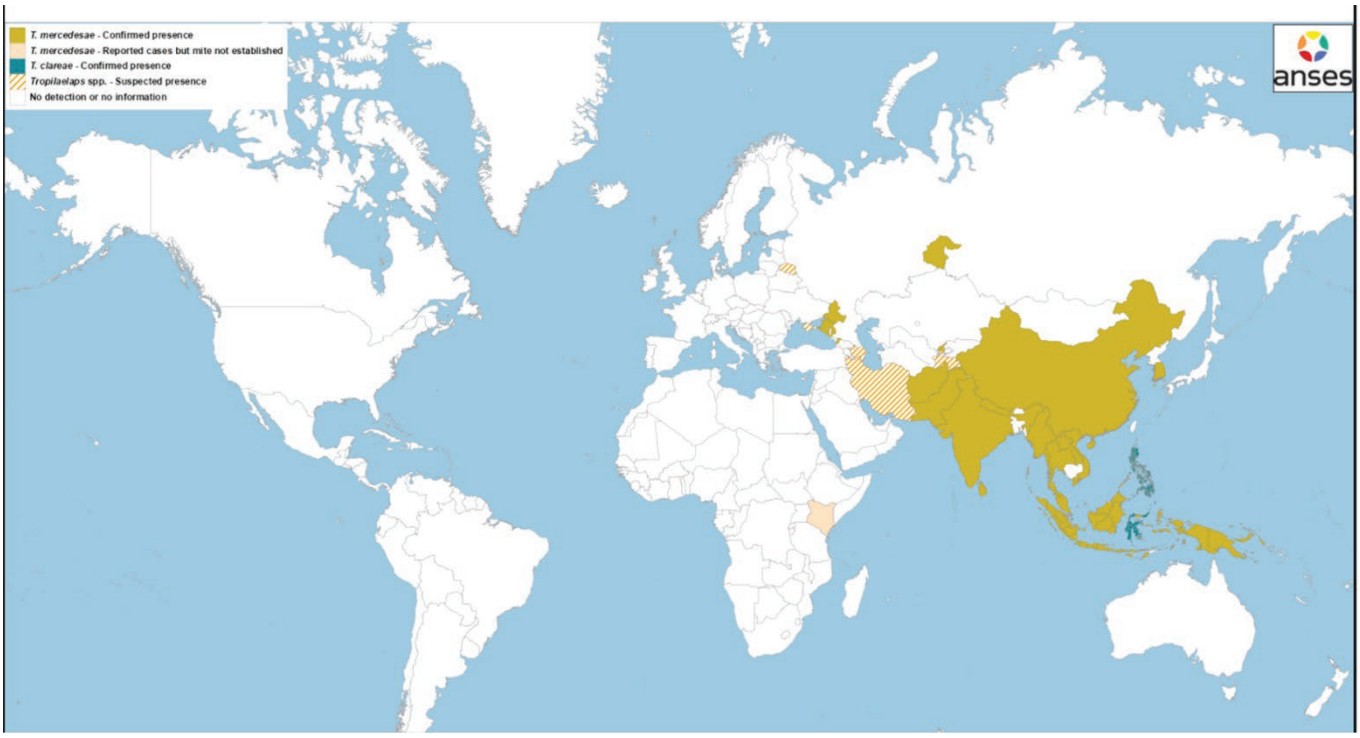

Figure 3. Global distribution of *T. mercedesae* and *T. clareae* (European Union Reference Laboratory for Bee Health – July 2025).

Of greatest concern to the North American and particularly the Canadian beekeeping industry is the establishment of Tropilaelaps mites in more Northern countries such as Russia. Since the absence of brood is believed to limit the survival of Tropilaelaps mites, it is also suspected that the mite would not be able to establish long term in climates that have long winter brood breaks. However, there is conflicting research regarding the duration Tropilaelaps mites can survive outside of the brood and if the mite can feed on adult bees[3,13-15]. Some research suggests that Tropilaelaps mites do not feed on adult honey bees and are therefore unable to survive for longer than three days without brood[14]. Other research reports that mites can feed on the soft membranes of the wing axillaries of honey bees[3].

The duration that Tropilaelaps mites can survive outside of brood and whether they can feed on adult bees will have a significant impact on if this mite could establish in cold beekeeping climates with extended broodless periods. What is anecdotally being reported from beekeepers across Asia and Europe is that for those who keep bees in more tropical regions, they note that Tropilaelaps mites are a larger management issue than Varroa mites, but the opposite is being reported for those who keep bees in colder climates.

There are several factors that contribute to the risk of Tropilaelaps mites being introduced to the North American beekeeping industry. The first is migratory beekeeping practices. Overall, migratory beekeeping practices that exist across the globe increase the risks of various pests and diseases spreading from one region to another. The Canadian Food Inspection Agency plays an important role in regulating Canadian imports of honey bees (packages and queens). Any country known to have Tropilaelaps mites or considered high risk for this pest would not likely be permitted as a source of imports.

Climate change is another factor that increases the risk of Tropilaelaps mites establishing in various regions of North America. This mite is known to be an increased problem in tropical climates and changes in climate could make different regions of North America more suitable for the survival and establishment of Tropilaelaps mites.

The two potential routes of introduction of Tropilaelaps mites to the North American beekeeping industry would be accidental importation of honey bees (ex. swarm on a cargo ship) or the intentional importation of bees unknowingly infested with the mite.

Comparison of the biology of Tropilaelaps mites and Varroa mites

There are multiple aspects of the Tropilaelaps mites' biology that make them a more damaging pest to the western honey bee compared to Varroa mites. Tropilaelaps mites have a faster reproduction rate, they are smaller and harder to detect, exhibit more aggressive feeding behaviour than Varroa mites and they move faster than Varroa mites, increasing their ability to disperse[17]. Since Tropilaelaps mites reproduce rapidly and have a shorter phoretic stage than Varroa mites, they may outcompete Varroa mites when both mites are present[18]. The unique body shape of Tropilaelaps mites (elongated) facilitates quick movement among bees and comb allowing the mite to disperse faster than Varroa mites[19].

Tropilaelaps mites have more harmful feeding mechanisms compared to Varroa mites. Varroa mites mainly feed on the metastoma, and it was found that Tropilaelaps mites mainly feeds on the antennae and they induce more feeding wounds compared to Varroa mites[20]. Infestation of Tropilaelaps mites can result in three to six-fold increases in the number of feeding wounds on larvae[20]. The increase in feeding wounds also results in a higher susceptibility and transmission of various viruses vectored by Tropilaelaps mites[20].

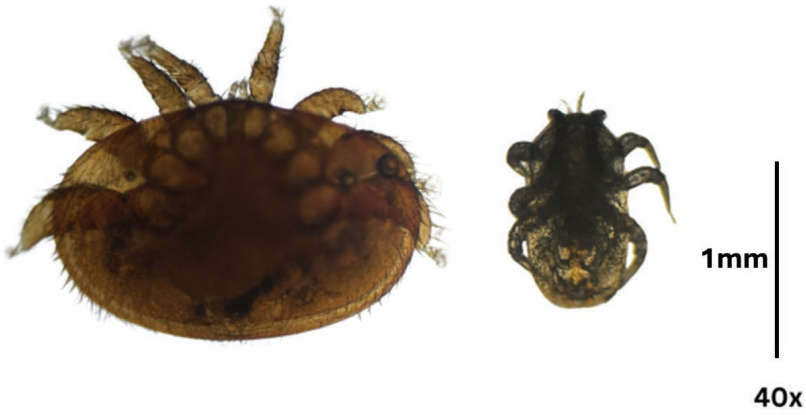

Figure 4. Preserved specimens of Varroa mite (left) and Tropilaelaps mite (right) pictured under a dissecting microscope at 40x magnification (ATTTA©2026).

Potential monitoring methods

Given the small size of Tropilaelaps mites (approximately one-third the size of Varroa mites), detection of this pest is challenging. Multiple monitoring techniques have been explored by researchers and some are now being recommended. The two traditional monitoring techniques used for Varroa mites are washes and sticky boards; however, because of the small size of Tropilaelaps mites and their short phoretic stage, neither of these methods are recommended, as false negatives (concluding that no mites are present in a sample when a mite is actually present) are highly likely. This has made researchers explore other less traditional monitoring options.

One of the early methods explored by researchers to detect and monitor for Tropilaelaps mites was the bump method[21]. The bump method involves manually uncapping a frame of brood and banging the contents of the frame onto a collection surface. Then beekeepers or researchers must inspect the extracted contents for mites. Although more accurate than washes or sticky boards to identify if mites are present, this method is damaging to brood and long-term could impact colony strength.

Currently, uncapping brood is being recommended for monitoring for Tropilaelaps mites. Uncapping infested brood with an uncapping fork has been proven to be effective at detecting Tropilaelaps mites[22]. Once a cell is uncapped, if mites are present, mites will quickly move around the brood cell. To get a count for how many mites are present within a brood cell, the honey bee pupae needs to be removed with forceps[22]. Although accurate, uncapping hundreds of brood cells is time consuming and now researchers are exploring a technique known as rapid uncapping[23]. The main advantage of rapid uncapping compared to slow uncapping is that it quickly assesses hundreds of brood cells. Rapid uncapping uses wax strips to quickly open many brood cells and inspect for the presence of Tropilaelaps mites. When considering cost, accuracy and efficiency, rapid uncapping is currently one of the more promising monitoring techniques available[23].

One other method being explored by researchers is environmental DNA (eDNA) or eRNA. Researchers can swab colonies and run molecular tests to determine the presence of Tropilaelaps within a colony[23]. The use of eDNA or eRNA is the most sensitive detection method available and as these test are further developed, reducing cost and availability, they have the potential for regular use by beekeepers[23].

Potential treatment methods

In addition to monitoring, researchers have been investigating suitable treatment options for managing Tropilaelaps mites. Compared to the extensive literature on Varroa mites, there is a significant gap in research on effective chemical treatments for managing Tropilaelaps mites. Current research indicates that amitraz and oxalic acid (both commonly used active ingredients to manage Varroa mites) have low efficacy against Tropilaelaps mites when brood is present[17,24]. This is likely the result of the short phoretic stage of Tropilaelaps mites, as neither amitraz nor oxalic acid kill reproductive mites.

Research does indicate that formic acid (another registered active ingredient to manage Varroa mites) has promising efficacy for the management of Tropilaelaps mites[17]. Formic acid is a unique active ingredient as it penetrates the brood capping and targets the reproductive mites, which is beneficial for managing Tropilaelaps mites.

So far, another promising method of managing Tropilaelaps mites is the use of brood breaks[17,24]. As the research suggests, Tropilaelaps mites may only survive a short period of time outside of brood and overall their population is highly dependent on the presence of brood. Therefore, creating brood breaks through beekeeper practices, such as splitting colonies, may significantly help keep Tropilaelaps mite levels low. This also may mean that northern beekeeping regions have an advantage to managing Tropilaelaps mites, as extended brood breaks during the winter months could help suppress mite populations. It is yet to be determined if this will prove effective, but it is nonetheless an encouraging possibility.

Canada's action plans

Canada has a Tropilaelaps mite response plan which consists of the support and knowledge of the Canadian Honey Council, Canadian Food Inspection Agency, Pesticides Regulatory Directorate, provincial governments, Canadian Border Service Agency, bee health suppliers and researchers. Overall, there is still a lot of unknowns around the risk and management of Tropilaelaps mites to the North American beekeeping industry, but there is a collaborative effort across Canada to be prepared for the possible introduction of this pest.

Beekeepers role

Beekeepers play a vital role in preventing the spread and establishment of the potential introduction of Tropilaelaps mite. Beekeepers should have an awareness of the pest and stay informed on the geographic distribution and emerging research regarding the biology and management of the pest. A great way for beekeepers to receive updates on Tropilaelaps mite research is to attend local, national and international beekeeping training and education events. Beekeepers should also monitor for the pest throughout the beekeeping season. **Additionally, beekeepers must report a suspected Tropilaelaps mite to their provincial apiculturist.**

Resources and Research Institutes

Project Apis m.

Auburn University

PHIRA-Science

- Uncapping methods

Apiary Inspectors of America

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