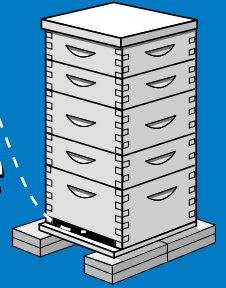




# Tracheal Mites in Tennessee

## – Parasites of the Honey Bee –



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**T**he Problem – Tracheal mites (*Acarapis woodi*) have spread throughout Tennessee since their introduction in 1987. In the past decade, this parasite is believed responsible for 20 to 50 percent of losses of bee colonies statewide, with local losses reaching 100 percent. The mite has become a severe problem, in part due to the difficulty in detecting the minute parasite and to the ease with which contaminated bees can spread the mites. The mites are spread among the colonies by drifting bees, or by any activities of beekeepers involved in moving adult bees. Honey bees contaminated with mites can be found in swarms and in packaged bees and queens.

Another parasite, the *Varroa* mite (*Varroa destructor*), has become a severe pest of honey bees in Tennessee. Detailed information about *Varroa* mites is available in another factsheet; however, the sampling method described here will allow a beekeeper to use a single sample to detect both species of mite.

**Biology** – The oblong mites are microscopic, averaging 160 microns long by 75 microns wide, about 1.5 times as long as the diameter of a human hair. They live, feed and breed inside the tracheae or breathing tubes of the adult bee. The mite penetrates the tracheal wall with its piercing mouthparts and feeds on bee blood. The effect of feeding, opening the surface to pathogens, and the reduced capacity of air flow to the wing muscles are the suspected damaging factors that kill bees. (Please see life-cycle on reverse for detail.)

**Symptoms** – The wings of infested bees are often unhooked, with the hind wing projecting 90 degrees from the axis of the body. These bees are unable to fly

and crawl about the hive entrance (crawlers). Infested bees have been observed to exit the colony and die.

Population levels of mites are usually highest in the early spring when bee populations are the lowest. If the wintering colony is weak due to food shortage or disease, the effect of mites is increased. Mite populations are lowest in the summer when bee populations are high.

**Detection and Diagnosis** – To diagnose tracheal mites, the bees must be dissected and examined using a “dissecting” microscope.

**“Fresh” Sample for Tracheal Mites** – Fifty adult bees are collected away from the brood cluster (below outer cover is a good place) by modified hand vacuum or by shaking and funneling them into a plastic bag. Then bees are frozen until dissections are made.

**“Wet” Sampling for *Varroa* and Tracheal Mites**

This method allows detection of both mites. For *Varroa* this method is also called an “ether roll.”

1. Select a frame from the brood area with bees on it.
2. Position the frame on end and scoop bees into the mouth of a quart Mason Jar until jar is one-quarter full. **Make sure the queen bee is NOT in the sample.**
3. Spray a rapid burst of ether starting fluid into the jar of bees, cap the jar quickly and roll and shake the mass of bees and liquid inside the jar for 30 seconds.
4. Observe the inside jar surface for dark brown, oval, pin-head size *Varroa* mites. If you have many mites, this technique will quickly reveal them.
5. Add enough rubbing alcohol to half fill

the jar, cap it tight and seal it with tape, if necessary.

6. Send the sample to your county Extension agent or to The University of Tennessee, 205 Plant Science Bldg., Knoxville, TN. 37996-4560. Include your name, address and phone number.

### Dissection Methods:

#### Tracheal “Pull” from Fast-frozen Bees –

Thirty-five bees are selected. Each bee is placed on its back and the head and first pair of legs are removed from the rest of the body by pulling with two pairs of forceps. One pair holds the bee while the other is used to remove head and legs. Then pair 2 is used to remove the thoracic collar. As the collar is removed, the tracheal tube trunks usually come with them. The mites, if present, can be observed inside the tubes from 10x-40x. This method requires more practice than the next method, but does not require soaking overnight to clear tissue.

**Slice and Soak from Bees Stored in Alcohol** – Thirty-five bees are selected. Each bee is placed on its back, the front legs and head are removed with an edge of a razor blade and a thin cross-section of the prothorax containing the major tracheal trunks is made with the razor blade. The section is soaked overnight in an 8 percent solution of potassium hydroxide in water to dissolve muscle tissue. The tracheae are observed at 20 to 40x under a dissecting microscope for mites. Infested tracheae are usually discolored and darkened in areas where mites have fed.

**Using “Resistant” Honey Bee Stock** – Queen breeders in Texas and Canada have made **Buckfast** stock available for purchase. The Buckfast bee was selected by Brother Adam of Buckfast Abbey to resist tracheal mites. Queens and packages are available from R Weaver Apiaries, Inc. (936) 825-2333 and B Weaver Apiaries

(936) 825-7312. Queens are available in Canada from Barry Davies, RR#1 Seeleys Bay, ON. Canada, KOH 2N0. (613) 387-3171.

**Treatments for Tracheal Mites:**

**Formic Acid – (Apicure™)** is a slow-release formulation of 65 percent formic acid in a gel form enclosed in a plastic pouch for control of tracheal mites and suppression of *Varroa* mites. Use when there is no surplus honey flow and when daytime temperatures are between 45 and 95 degrees F. **Safety Caution – Be careful with formic acid. Take care to limit exposure during application because fumes from this product may damage the lungs. Please apply according to label directions.**

**Applying Apicure™** – Do not remove the gel from the pouch. Wear acid-resistant gloves (e.g., “nitrile”). Immediately before applying gel pouch, make two slits in the upper surface in the form of an “X” from corner to corner using a utility knife with sharp blade. Then flex the pouch to expose gel and place one pouch on the top bars of the frames of one colony for 21 days. Remove the formic gel pack after 21 days and discard. The colony may be single or double story. If double story, place the pouch on the top bars of frames of the top story.

**Menthol** – Menthol is a crystal with fumigant action that kills tracheal mites. Temperatures must exceed 60 degrees F for proper fumigation.

**Application** – Menthol should be applied after honey has been removed because it gives the honey a menthol flavor. Menthol can be purchased in individual pre-packaged “tea bags” or 50 gms can be placed into a window screen bag secured by staples. If temperatures are below 80 degrees F, the bag is placed flat inside the colony above the frame top bars to one side of the brood area. If temperatures exceed 80 degrees, the bag should be placed on the bottom board below the brood chamber. The bag must fumigate for 15 days continuously to be effective. Do not leave menthol in place for more than six weeks or for all winter because it reduces brood rearing and may affect clustering behavior.

**Vegetable Shortening** – Vegetable oil/shortening has shown promise as a treatment against mites, probably by reducing the ability of the mite to detect

young bees as hosts. A patty containing three parts granulated sugar, one part shortening plus Terramycin will prevent American foulbrood and combat tracheal mites. This treatment (one patty per deep brood chamber) is applied after honey has been removed in the fall and again early in spring. Additional patties of sugar and shortening without Terramycin can be applied later for treatment of mites only.

A recipe for 12 patties follows: One 6.4 oz. packet of Terramycin is mixed with 2 lb. 1 oz. (4 3/4 cup) of granulated sugar. (Note: A 6.4 oz. packet with 10 gms active ingredient = 25 gms/lb. This dosage is commonly referred to as TM25) Eleven oz. (1 1/2 cup) all-vegetable shortening is added and blended. Individual patties are separated in 12

equal portions, rolled flat, placed between wax paper and frozen for use as needed. For one patty, mix four teaspoons Terramycin with 2/5 cup (2.7 oz.) sugar, add 1/8 cup (0.9oz.) 100 percent vegetable shortening, mix and roll flat.

**Precautionary Statement**

To protect people and the environment, pesticides should be used safely. Read and follow label directions carefully before you buy, mix, apply, store, or dispose of a pesticide. According to laws regulating pesticides they must be used only as directed by the label.

**Disclaimer Statement**

Pesticides recommended in this publication were registered for the prescribed uses when printed. Pesticide registrations are continuously being reviewed. Should registration of recommended pesticide be canceled, it would no longer be recommended by The University of Tennessee.

