

# Treating Colonies for Tracheal Mite Infestation

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Tracheal mites, *Acarapis woodi*, are microscopic parasites that spend most of their lives inside the breathing tubes of adult honey bees. The mites feed through the wall of the tubes, raise their offspring in the tubes, and only leave the tubes to find new host bees. Therefore, tracheal mites are not very susceptible to contact poisons and are best treated with fumigants.

The first of two fumigants currently registered in California for use on tracheal mites is menthol. Crystalline menthol can be extracted from plants or synthesized. In either case, it is packaged as a nearly pure crystalline material that liberates fumes as it sublimates (similar to evaporation, but no liquid phase). Liberation of fumes is temperature dependent. In the case of beehive fumigation, the desired effects are not realized unless the outdoor temperature is going to be at least seventy degrees Fahrenheit every day. Fifty grams (1.8 oz.) of menthol is placed at the top of the hive for 20-25 days, where it will be warmed by the heat of the bees and by sunlight. When temperatures are going to be in the eighties, the menthol should be moved to the bottom board. At outdoor temperatures of above ninety degrees Fahrenheit, the fumes are liberated in great enough quantities to drive the bees and queen out of the hive. Queen and brood losses occur under those conditions.

The second product is called Mite-Away II<sup>®</sup>. The product is sold as a pad saturated with a formic acid solution for control of varroa mites, but it is highly effective on tracheal mites. A beekeeper opens the outer plastic wrapping and sets the second, perforated plastic bag on the top bars of the hive (perforations down). In order to obtain the best results, small wooden slats should be placed under the pad so that more holes are left unobstructed. Also, a 1.5" rim is required to form a "fumigation chamber" at the top of the hive and also to provide space so that the cover can be closed. The pad is left on the hive for 21 days. Formic acid fumigation is affected by temperature and relative

humidity. Be sure to read the label carefully. The law requires wearing a NIOSH approved organic vapor respirator whenever the beekeeper is working with the pads or visiting the apiary when the pads are in the hives. The respirator should be professionally fitted; checked for air leaks according to accepted guidelines; and have cartridges replaced frequently. To prevent individuals from entering the apiary, without respirators, during the 21 day treatment period, the apiary must be "posted" during treatment with appropriate warning signs.

A new (to the U.S.) formulation of thymol (thymol gel) may become registered in California by summer of 2006 for varroa mite control. Thymol acts as a fumigant against mites in beehives is effective against tracheal mites. Apiguard<sup>®</sup> is provided in small (50 g), covered foil "dosing trays" or as a pail of formulated material that is measured out, with the provided scoop and spatula, and placed on provided "delivery pads." Treatment is repeated after 14 days. Be sure to follow the label instructions to prevent contamination of your honey crop.

Although tracheal mite populations tend to increase throughout the year, to a peak in early winter, experiments have shown that menthol treatments (probably thymol, too) early in the year are more effective than treatments in the fall. This may be due to the fact that fall treatments may not penetrate very far into tubes that are filled with mites. More likely, bees that have been fed upon are already damaged. Even though the late treatment kills a lot of mites, the mites have had time to feed on the bees. Whether a virus is involved or just toxicity from the bites, bees that have been fed upon have greatly reduced life expectancies and are not capable of producing adequate supplies of "bee food" at brood rearing time.

Meanwhile, beekeepers are relying heavily on "grease patties" to help control tracheal mites. These patties, consisting of well-blended one part vegetable shortening to two or two and a half parts granulated sugar, apparently interfere with tracheal mite reproduction by confusing them in their choice of a new host. The extra lipid on the bees changes the mites' "questing" behavior.

The patties work best when really well mixed, like commercial cake frosting, and when pressed into very thin wafers (like crepes) with an edge to chew on. Like pollen

substitute patties, they have to be in direct contact with the bees to work properly. Usually, the patties can keep a subdued mite infestation level down around two percent, but they cannot knock down a high infestation. For reasons we cannot explain, mite population explosions occasionally occur in colonies with grease patties on them.

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