

TREATMENT RECOMMENDATIONS



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Varroa mite levels have profound negative effects on colony health and survival. Heavily infested colonies will display a number of symptoms, including an increase in viral diseases, such as deformed wing virus, a reduction in brood production, and a decline in productivity and overall strength possibly due to weakened adult bees. Although it is obvious that high levels of Varroa can have very serious consequences for the colony, and that beekeepers should apply control methods to keep the mite population at low levels, it is somewhat more difficult to determine what can be considered a tolerable level of infestation in an apiary.

The economic threshold for Varroa mites (or the level of infestation that can be tolerated before economic losses occur) is variable. It depends on a combination of climatic and biological factors including: bee races, seasonality, colony growth cycles, brood availability, viral loads, and re-infestation pressure from the feral bee population and untreated colonies.

In the US mainland economic threshold levels for Varroa mites have been developed after many years of data collection, and are applicable for those particular regions only. The suggested upper mite levels across the US usually range from 2000 to 4000 mites/colony. In the UK the suggested upper levels are 1000 mites/colony.

The University of Hawaii Honeybee Varroa Mite Program has been monitoring the mite infestation levels since 2008 and collecting information on the control of Varroa mite through formic acid treatments. The comments below derive from our observations on Oahu and the Big Island, and are an educated best guess to help beekeepers adapt to the Varroa invasion.

FREQUENTLY ASKED QUESTIONS

1 - Is there a threshold level of mites/day or a set treatment schedule for Varroa that applies to all Hawaii locations?

Unfortunately, the answer is NO. There seem to be large differences in the intensity of impact when Varroa destructor first appears, compared to once the parasite is fully established. Goodwin and Taylor (2007) call this beginning infestation period, where the mite levels vary greatly, the “**acute**” stage. Over the course of several years however, a more predictable cycle is established, called the “**chronic**” infestation stage. Once the mite has become established in an area, beekeepers will be more likely to successfully implement treatment schedules that follow a set pattern across the years. Threshold levels are also more reliable once the re-invasion from dying colonies is reduced. Consequently, Oahu and especially Big Island beekeepers need to monitor frequently and be aware of changes in the mite levels **due to re-invasion**.

2 - How often should I sample?

It is logical to expect that mite levels will be reduced following control treatments and our preliminary observations indicate that the formic acid treatments (MAQS) can keep mites levels relatively low for at least 3 months. After three months some apiaries may show signs of mite resurgence, while some other apiaries seem to have low mite levels for up to 4 ½ months. This variation between apiaries might be related regional differences in re-infestation from

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dying feral colonies and/or untreated managed hives. Alternatively such variation could be due to differences in the genetics of the bee stock.

Because of the newness of the varroa arrival to the islands re-infestation events are likely to occur frequently. During this “acute stage” we would advise you to **sample the mite levels in 10% of your colonies if 3 months have passed** since the last varroa control treatment. The period of time between treatments will lengthen as the varroa presence enters the “chronic” stage.

3 - How to interpret Varroa sample results.

a - What do the mite counts from sticky boards (mites/day) mean?

Many beekeepers in Hawaii rely on sticky boards as a sampling tool; therefore we will use mites/day on a sticky board count as a local “convention unit”. The total number of mites observed on sticky boards is correlated to the total number of mites in the colony. However, the mite levels that are recorded via sticky boards can be influenced by the size of the colony, locality, seasonality, and the number of mites that are on phoretic phase during the sampling period. Interpreting passive mite fall counts should be done cautiously.

Based on our experience on Oahu, mite levels **below 20 mites/day** can be considered relatively low. When the mite levels reach **30 mites/day**, beekeepers should consider sampling routinely every two weeks to track the mite infestation. If the colonies have recently been infested by varroa, as is the case for many colonies on the **Big Island**, beekeepers should consider sampling weekly once the mite levels reach **30 mites/day**. Beekeepers should also be on the lookout for sudden increases in mite levels and associated colony weakness.

Mite levels above 50-60 mites/day are a cause for immediate concern, especially during the summer months when lots of brood is available, or if the previous varroa treatment occurred over 3 months ago.

b - How to interpret mites counts from adult bee samples?

It is possible to keep track of varroa infestation levels by taking adult bees (min 200 bees) and euthanizing them in alcohol or detergent soap, shaking the sample until the dead mites fall off the bees. Mite counts are then expressed as mites/100 adult bees. We recommend that you consider treatment if your colonies have over **12-15 mites/ 100 adult bees**.

4 - What to expect when sampling.

Although the absolute number of mites is important, one of the more obvious and reliable clues that a colony will need treatment is a **sudden and dramatic increase in mite fall rate from week to week**. Based on our experience passive mite fall rates can double from one week to another and such changes are indicative of a explosion of the mite population within the colony. It is precisely because the potential for population growth of the mite in tropical climates is so great, that a sharp step-like increase in the mite levels is a warning flag to increase monitoring and to be ready to treat if needed.

5 - Can I modify the treatment dosage to suit my needs?

The companies that produce miticides have conducted extensive research to provide you with the most effective dosage and treatment procedure, so please use the products according to the instructions on the label. Reducing or altering the dosage and the recommended length of application may have negative long term consequences including reduced efficacy and the development of mite resistance (especially when dealing with synthetic chemical treatments).

In the case of the new formic acid product, the Mite Away Quick Strips, the University of Hawaii along with NOD Apiary products have tested lower doses and found them to be significantly less effective at controlling mites under the capped cells. This reduction in the mite mortality can lead to a more rapid buildup of mites within the colonies which in turn will shorten the interval between treatments.

Sampling Sites (Jan - Apr 2010)	Average Passive Mite Fall Pre-treatment Mites / Day (range)	Passive mite fall 1 week post-treatment (total mites / week)	Estimated total mite fall post-treatment (4 weeks)
Oahu, Waimanalo	60 (13-132)	1407	1954
Big Island, Hilo	32 (14-50)	1105	1534
Oahu, Kahalu'u	29 (3-114)	458	636
Big Island, Cpt. Cook	11 (0.3-29)	452	629
Big Island, Pahala (1)	8 (1-27)	524	727
Big island, Pahala (2)	4 (0.2-13)	258	358

The table above shows the latest mite levels across Oahu and the Big Island of Hawaii. The highest passive mite fall records come from Oahu and the Hilo area (2nd column), while the rest of the island of Hawaii has lower but highly variable levels of varroa possibly due to the newness of the infestation.

The colonies included in this table were all treated with MAQS and the 1 week post treatment mite fall (3rd column) represents approximately 70% of the total mite fall over the first 4 weeks post treatment (4th column).

HIVE SET UP AND MAQS APPLICATION

Please note that adequate ventilation is needed to avoid excessive brood damage:

- If your bottom board is less than 3/4 of an inch high you may need additional ventilation. You can provide additional air flow by setting back the supers or the hive cover enough to allow bee access.
- No entrance reducers, front feeders, or pollen traps during treatments.
- Adult bees help distribute the chemical within the hive. For best results your colony should have at least 5 frames of brood and adequate numbers of adult bees.
- Do not disturb the hive for 7 days after treatment.

MAQS pads should be placed, slightly off set, on top of the brood box

Entrance must be kept open - No entrance reducers during treatment

1

Place queen excluder on top of MAQS then place the honey supers on top as usual

2

For two brood chamber hives, place the MAQS between the brood chambers as shown here

3

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