SUCCESSFUL BEEKEEPING

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APPLICATION OF FORMIC ACID:

How a commercially usable, low dose continuous release dispenser and method was created.

Abstract:
The writer immigrated to Canada from the Czech Republic. In 1968
When Varroa mites arrived in North America, he contacted the head of Beekeeping Pathology at the Czech Bee Research Institute to get advice around current treatments. After researching what was available, he designed and patented a low dose, continuous release, Formic acid treatment called MiteGone which makes the varroa sick. It is not necessary eliminate 100% of varroa mites from your hives. If you can make them sick and infertile, their population will slowly die. This method will keep your varroa levels and the damage that the varroa mites can do at a threshold that will not negatively impact your hives.

In the 1960's in Europe, formic acid was the only treatment that worked on both the varroa and trachea mites. Europeans had three general treatment methods and a vast body of research regarding when and how to effectively treat hives.

The first method, the prolonged blast or short flash method, could be applied either on top or the bottom of the hive. When applied on the bottom of the hive, 30cc of acid was sprayed on the bottom board. When applied to the top of the hive, acid was added to absorbent pads like butcher meat pads (Mite Wipes) or onto Kramer Plates (MITEAWAY I & II). The principle of this method is to overdose the hives with acid and rely on the bee's ability to ventilate, reducing concentration of fumes to the level which does not kill adult bees, but kills mites. Unfortunately, these methods have many negative side effects including killing emerging brood and old queens. In addition, these methods are weather dependent and labor intensive.

The second method involves brushing a penetrating a solution of 85 % formic acid onto capped brood. This method kills mites inside capped cells but it also kills the brood. The European practice was to brush it onto drone comb only. Quick Strips and Acid Pro are based on this method. If MiteGone pads are placed close to brood, they will work in a similar fashion. As long as you use this method in the early summer your hives should recover from the treatment. As Randy Oliver in his review wrote, "losing brood is a fair exchange for reasonable mite control and hives will recover." Unfortunately, this method is climate dependent. If used in California, hives will likely recover; however, if used at the wrong time of year in a climate with a cold winter and snow, hives will die. For example, if this method is used in August or September in North, you will kill the brood that will become your winter bees. When the summer bees die in October, there will be no bees to maintain the colony through the winter.

The third method is a low dose, continuous release treatment. This type of treatment does not harm the hives, kills only the mites, and is not weather dependent. This method uses the remarkable ability of the bees to maintain brood temperature and humidity inside the hive. If you place MiteGone pads in an environment with a constant temperature and humidity, the pads will evaporate at a steady rate and will properly treat the hives against Varroa and Trachea mites.

When developing the MiteGone treatment for my own commercial operation in 1992, I decided that I did not like the side effects of blast and penetrating methods. I liked how gentle the low dose continuous release methods were on the bees, but I could not use any of the existing dispensers in my 500-hive operation
My patentable discovery was that I replaced wick suction principle, of Nasenhider, with principle of capillary tube and gravity; I knew I have to put it away from brood so I measured temperature in strong colony ready to go to pollination between last frame and wall of super. Regardless temperature and humidity outside running from below freezing to 20 C 68 F and humidity from 100 to 20% Inside was

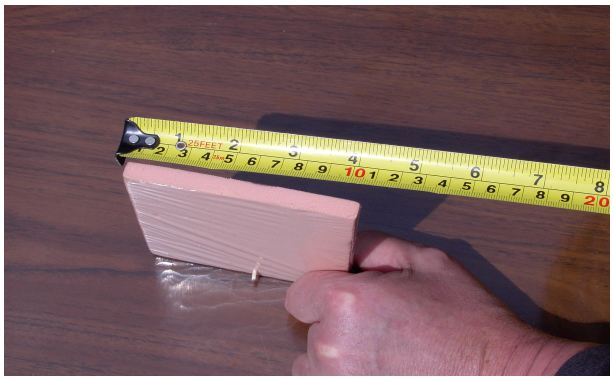
steady 24-26 C 75-78 F and 55% humidity. The challenge was how to create any apparatus into 3/8 of an inch, bee space.

USING LOW DOSE CONTINUOUSE RELEASE OF FORMIC ACID BY MITEGONE METHOD AND DISPENSER. US 6,837,700, B2 Patent.

Fact: Formic acid on its own is not enough to treat your hives for varroa. Depending on the concentration of formic acid, and the dispensing method used, you will get either beneficial or negative side effects from your treatment.

Concentration of Formic Acid - Europeans used 85% concentration of formic acid to treat their hives; however, Carry Clark at the Bee Research Center in Dawson Creek Canada studied what concentration of formic acid was most effective at killing mites and least harmful to honey bees. Here is abstract of what He found:

> Use 65% solution as it is a mixture of molecules of water and acid. At 72%, the molecules of water and acid evaporate at same rate. With higher concentrations, acid molecules have to evaporate first until the surface concentration reaches 72%. This high rate of acid evaporation causes harmful blasts of acid to the bees. At 65%, the molecules of water must evaporate first until the evaporating surface reaches 72%. This is gentler on the bees and does not cause harmful side effects. 85% 90% 95% acid are a common concentration to purchase. It needs to be diluted when treating honey bees to 65% **STRONGER IS NOT BETTER IN THIS CASE.**



MiteGone® pads are manufactured with millions of connected cells functioning as capillary tubes in the direction of the length of the pad. Both 4" ends are open with the tubes and evaporating surfaces exposed, so no one can put them in wrong. When soaked with acid, a four-gram 5"-pad will automatically absorb 120 grams of acid. Hung vertically, the capillaries will keep the liquid in the pad without dripping and gravity will pull down the acid to replace acid evaporated at the bottom of the pad. If placed on wall inside of box, in a hive's controlled average conditions of 24C/75F and 55% humidity, a four-inch-wide pad will emit a total of: **6g OF ACID IN CONTINUOUS LOW FLOW PER DAY.**
This method allows for variable dosage to treat colonies of different sizes by using multiple 5" pads or by restricting the evaporation surface of one pad for baby nukes.

COMERCIAL BEEKEPERS, BEEBREEDRS and BEE CLUBS group buy. Your out-of-pocket yearly cost for treating your hives twice can be as low as $ 5

Depending on how you buy your acid. I thin and prepare tote of acid for filing in 9 hours including clean up, and supervise 3 filers to fill 82 kits in 3.5 - 4 hours.