

ESSENTIAL OILS AND THE BEEKEEPING INDUSTRY'S SURVIVAL

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The Reliance On Essential Oils By Beekeepers Experiencing Symptoms Of Colony Collapse Disorder First Came To My Attention From Michael Meyer, And Then A Whole bunch Of Others.

The honey bee's relationship with the plant kingdom through its critical role in pollination has established the bee as an indispensable partner in modern agriculture. This is a mixed blessing for beekeepers who are struggling these days to meet the pollination needs of growers. In recent years beekeepers have been able to offset massive yearly colony losses by making up plenty of nucleus colonies each season and breeding lots of queens. Unfortunately, such measures can not sustain the industry in the long run as the annually economic toll of hive losses combined with the costs of rebuilding colony numbers and strength eventually lead to the point of business failure.

In the face of potential disaster, some beekeepers seem to have found what they believe is an answer to keeping their business alive: Essential Oils (EOs). Many beekeepers are already familiar and comfortable using essential oils and their components in the hive. The use of menthol to control tracheal mites has been going on for decades and essential oil products that are designed to control *Varroa* mites utilizing the active ingredient thymol, a component of thyme oil, are now common place.

In recent years a number of beekeepers have turned to essential oils to control the ravages of Colony Collapse Disorder (CCD). The reliance on EOs by beekeepers experiencing CCD symptoms in their hives first came to my attention when I received a phone call from Michael Meyer of Springfield, Missouri. Michael manages about 700 hives and lost about 70% of them over the winter of 2008-2009 due to CCD-like symptoms. In

an act of desperation, Michael mixed up a batch of Honey-Bee-Healthy (a mixture of lemongrass and spearmint oils) with sugar syrup at four times the recommended feeding concentration. Since the bees would not eat such a strong mixture, he simply dumped about a cup in each hive wetting the bees and the combs. This forced the bees to take it up as they licked themselves and their combs clean. Michael observed that all work in the hive stopped for about a half hour as the bees dealt with the mess but otherwise, it didn't seem to hurt the bees and their state of health promptly turned around. Michael indicated that others were having similar results.

After speaking with Michael, I started to make some phone calls of my own. I spoke with Gary Mackrill of Cathay, North Dakota, who runs bees between North Dakota, Texas, and California. Gary's bees were going downhill fast. His bees were battling *Varroa*, and while many of his bee yards were dealing with Nosema, tests showed that all his yards had high virus loads as well. Gary mixed a gallon of Honey-B-Healthy into a 55 gallon drum of sugar syrup and drenched the bees and brood area of each colony with 8 oz. about 10 days apart for a total of two treatments. He reports that the health of his bees turned around dramatically and *Varroa* doesn't seem to be as much of a problem any more following the drenching. Gary has also replaced the use of the antibiotic drug Fumidil B with Honey-B-Healthy and reports that he is able to control Nosema effectively. He has since become a Honey-B-Healthy distributor.

David Webb has been keeping bees for about 30 years and manages about 700 hives out of Cocoa, Florida. He was having problems with bee health stemming from their exposure to pesticides from the local orange groves. He mixed up one pint of Honey-B-Healthy in a five-gallon bucket of sugar syrup and poured 10-12 ounces over the bees and the brood chamber in each of his hives. David credits H-B-H with preventing further decline and turning his bees around. He also uses H-B-H when treating his bees with formic acid to control *Varroa* in order to prevent the bees from balling the queen during the treatment.

Al Haarsma shuffles his bees between his headquarters in Grand Rapids, Michigan and Florida. In the Spring of 2008 his operation of about 850 hives dwindled down to around 300. Previous testing of his hives had indicated high virus loads stemming from parasitic mite syndrome (PMS). Using the concentrated dosage, Al drenched his bees with about a cup of H-B-H three times, each four to five days apart. He reports that his bees rebounded and his operation grew back up to 600 hives in 1½ months and all his bees have been looking great ever since.

Richard Adee the owner of Adee Honey Farms in South Dakota is the largest beekeeper in America. Richard consistently runs 80,000 or more colonies between South Dakota, California, Washington, Texas and Mississippi. When it comes to Honey-B-Healthy, Richard says "we wouldn't operate without it."

Adee Honey Farms suffered a 40% loss of bees in 2008 and testing

Using Food Grade Essential Oils To Mitigate Problems Like Nosema, *Varroa* And Viruses Is Becoming Common

indicated that numerous viruses were the primary cause. As Richard tells it, he sent the best of what was left of his bees to the almond orchards in California and shipped the rest to Texas. Then he bought a bunch of new bees in an effort to expand and improve the gene pool in his bees and he bred from the best and most resistant of his remaining stock. In the Summer of 2008 his bees were looking pretty good but were not making much honey. He drenched the bees with Honey-B-Honey and the bees seemed to take off, ending the year by producing a nice honey crop. Testing and sampling following the drenching indicated much lower virus levels as well as lower *Varroa* levels. Since then Richard reports that he has had no major health issues with his bees during the past year and a half and he now uses H-B-H regularly in his bee feed and is drenching them once each summer as preventive maintenance. Like his colleagues, he appreciates the fact that H-B-H is a food related natural product and that he does not have to rely on toxic chemistry and drugs to maintain his industrial size operation.

Dirk Heinen from Edmonton in Alberta, Canada, manages about 800 hives. He began using H-B-H prophylactically after his queen supplier, Olivarez Honey Bees, began using a similar product, *Pro-Health* distributed by Mann Lake, and the quality of the queens he was receiving seemed to improve. Dirk uses H-B-H to control Nosema and chalk brood and says that by using it when feeding, the essential oils have a preservative effect and helps prevent mold growth in syrup and on protein patties that do not get eaten up quickly. His bees are overwintered outside and he says his winter losses tend to run much lower than the beekeepers all round him. He also reports a reduction in the amount of mold that grows on the combs of hives that do die over the Winter.

It seems that Dirk is also a dealer of Honey-B-Healthy and the fact that a number of these beekeepers who are reporting such good results with

essential oils are also selling it was making me rather skeptical. After all, these anecdotal reports are all well and good but where is the science-based evidence for the efficacy of using essential oils to kill viruses, molds, and fungi, help prevent queen rejection, control Nosema, and aid in reducing *Varroa* issues in the hive?

Well it turns out I was able to find enough studies to suggest that these varied reports are more than just old wive's tales (or old beekeeper's tales as the case may be). Being highly concentrated, plant essential oils have proven antimicrobial, antifungal, and antiviral properties. Lemongrass oil in particular has been shown to have significant antifungal activity (Tzortzakis, 2007, Bona da Silva, 2008) and strong antiviral properties (Minami, et. al., 2003).

Lemongrass oil also contains two honey bee pheromone components, *Geranial* a major component of the Nasonov pheromone, and *Citral* a minor component of the Nasonov pheromone (Shearer 1966). This would help explain successful reports of using lemongrass oil as a lure in baited swarm traps. As it turns out, *Geranial* is one of the Nasonov pheromone components that have been shown to cause *Varroa* mites to become confused and disoriented (Pernal, et. al., 2005). This could account for the reports of H-B-H having a detrimental effect on *Varroa* levels in hives.

Then I contacted David Wick of BVS, inc. David's company screens and detects all types of viruses using an Integrated Virus Detection System (IVDS). The IVDS is an expensive detection device engineered by the U.S. Army that can detect virus particles by their distinct size. Originally built for virus screening of humans, it is proving to have tremendous value in assisting with furthering our knowledge of Colony Collapse Disorder (CCD) since one of the consistent factors in CCD is the presence of a plethora of honey bee viruses and fungi. As David reports, honey bee viruses can live on the surface of combs. Some of the viruses

are quite hardy and can survive on combs for a long time waiting for the right moment to replicate themselves. According to David, the viruses can even live entombed within the bees wax and not just on the surface of the comb.

So far David's work has resulted in observational data that sampled the virus loads of 20 hives over a period of 10 months. The number of the viruses in the hives skyrocketed after being used for Almond pollination and then dropped dramatically following a treatment that utilized LaFore's Essential Oil Patties, a product manufactured by Jeff LaFore of Milton-Freewater, Oregon that contains a mixture of 9 different EOs. At this point the data is only observational and David does not know for sure if the EOs may be effecting the bees, the virus vectors (such as *Varroa*) or just the viruses exposed on the combs.

David has obtained grants to run experimental trials on essential oils and as a part of these trials he is scheduled to collect data specifically on the Honey-B-Healthy and LeFore essential oil products for most of this year and should have empirical data on their effectiveness against viruses in the hive by the beginning of 2011. When I mentioned that beekeepers reporting that their hives were crashing with CCD-like symptoms were able to totally turn them around with H-B-H drenches, he noted that such reports are consistent with what he has observed. So far however, he has no data that can refute or confirm such claims.

Then I had a chat with Dr. Frank Eischen of the USDA Agricultural Research Service out of Weslaco, Texas. Dr. Eischen has used H-B-H in some trials and has found it to have some value against *Nosema ceranae* though not as effective as Fumidil B. During the trials he conducted H-B-H was only used at the regular feeding strength and he indicated an interest in evaluating the product at the higher drench concentration levels in the future.

At this point it would seem that EOs are what is keeping a large part of our industry healthy in the face of CCD. It should be no surprise to readers that as one who has championed the use of natural approaches over toxic chemicals and drugs, I consider these recent developments welcome news. However, we must remem-

Eventually, We Need To Figure Out The Underlying Problems So We Can Quit Treating Symptoms

ber that by using EOs, we are only dealing with the symptoms of our problems and not the cause. Even if further testing of EOs prove they are effective in killing off viruses, fungal infections, molds, and diseases while confounding *Varroa* all at the same time, relying on these products is not ultimately the solution. While it's a move in the right direction, eventually we will need to figure out what is stressing the bees immune systems to the point where viruses and diseases threaten to gain the upper hand and resolve the underlying issue. Meanwhile, essential oils seem to be buying the industry time.

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