NORTHEAST Beekeeper

May 2005

Greetings from Dyce Laboratory for Honey Bee Studies at Cornell University

Welcome to the Northeast Beekeeper, our newsletter servicing beekeepers throughout the northeastern US. Despite our workshop schedule and frequent trips to local beekeeping associations, we know that we cannot visit all of the regions' beekeepers. We hope that this newsletter will help fill that gap and keep those of you we miss up to date on important issues affecting beekeeping.

Greetings from Dyce Lab

Spring is a busy time, so I will keep it brief. There are several topics that you should be aware of as another season rapidly approaches. The good news is that formic acid is now available for control of parasitic mites. Other good news is that drone comb traps have been shown to be highly effective in suppressing Varroa populations during the summer. This means no more fall collapse. Any beekeeper with fewer than 100 hives can use this method. That's more than 95% of all beekeepers. The bad news relates to an incident in the Midwest involving the illegal use of sodium cyanide by beekeepers. So, read on and be encouraged. The new formic acid product and the drone comb traps are major steps forward in IPM for parasitic mites and ones that I strongly urge you to take advantage of this year.

Formic Acid is Now Available

Mite-Away II™ was approved for control of *Varroa destructor* and tracheal mites in honey bee colonies by US-EPA on March 31, 2005. States must also approve pesticides, and NYS-DEC acted rapidly, approving Mite-Away II™ on April 14, 2005, just days after receiving the application package from the manufacturer, NOD Apiaries. Thanks to Sam Jackling and Jeanine Broughel at DEC for their efforts in this matter. The Section 3 registration (General Use) is the same as that for Apistan; and, unlike the Section 18 Emergency Exemptions for CheckMite+ and Api-Life VAR, it does not require annual renewal.

Formic acid pad used as fall treatment

The Mite-Away II™ pad contains 250 ml of 65% food grade formic acid soaked into a fiber board pad inside a perforated plastic pouch. Formic acid acts as an inhibitor of the mitochondrial cytochrome oxidase complex causing tissue suffocation and cell death (Keyhani & Keyhani, 1980, Biochem. Biophys. Res.Commun. 92:327-333). Independent studies using formic acid in formulations very similar to the Mite-Away II product have shown it to be highly effective in managing *Varroa*, especially as a fall treatment (Fig. 1). A single application is all that is required. There is no known resistance to formic acid at this time, making this new product especially attractive. However, there are special precautions that must be taken when using this product. These include significant respiratory protection:

Handler Personal Protective Equipment (PPE): Applicators or handlers must wear standard beekeeping equipment: beekeeping gloves, bee veil with goggles (or safety glasses). Applicators and other handlers must wear coveralls over a long-sleeved shirt, long pants, socks and shoes, acid resistant gloves (PVC, neoprene, or nitrile), and protective eyewear. Wear a respirator with an organic-vapor removing cartridge with a prefilter approved for pesticides (MSHA/NIOSH approval number prefix TC-23C), or a canister approved for pesticides (MSHA/NIOSH approval number prefix TC-14G), or a NIOSH approved respirator with an organic vapor (OV) cartridge or canister with any N, R, P or HE prefilter. Clean or replace PPE at end of each day's work period. Rinse off pesticides at rest breaks. Follow the manufacturer's instructions for cleaning/maintaining PPE. If no such instructions for washables, use detergent and hot water. Keep and wash PPE separately from other laundry.
– Mite-Away II™ label

Formic acid can cause sever burns, especially to your eyes, nasal passages and lungs. Please read the entire label that comes with the product and follow all of the instructions. You can find the complete label at masterbeekeeper.org.

Illegal Use of Sodium Cyanide

Last fall, a number of beekeepers in the Midwest were found to have been illegally using sodium cyanide for control of wax moths. Cyanide is the substance formerly used in gas chambers to execute criminals convicted of capital crimes. The issue came to light when a trucker called the Ramsey County Sheriff's Office in North Dakota on or about September 30th, 2004 to report that two, 30-gallon kegs of sodium cyanide that he had been transporting for a beekeeper were missing from his truck. The kegs of cyanide were picked up by passing motorists and turned over to state authorities. Subsequent investigations revealed that a total of 18 kegs had been sold to a North Dakota beekeeper and several of those kegs had been re-distributed to beekeepers in other states. Numerous regulatory and law enforcement agencies, including Homeland Security, quickly became involved; however, it was soon determined that this was a case of an illegal use of a substance as a pesticide and not a terrorist threat. EPA, state regulatory agencies and various law enforcement agencies continued the investigation. The incident concluded on February 23, 2005 when North Dakota State Agriculture Commissioner Roger Johnson announced that eleven North Dakota businesses and individuals had been fined a total of $189,500.00 for their alleged involvement in the illegal sale, transport and use of sodium cyanide. Clearly, this was a potentially catastrophic situation that generated exactly the type of publicity that the bee industry can do without. There are no legal uses for sodium cyanide related to beekeeping in the US. I have attached a statement from the American Association of Pesticide Safety Educators summarizing some of these issues. These types of fines could also be applied to off-label uses of other pesticides used for control of parasitic mites.

Illegal use of sodium cyanide

The United States Environmental Protection Agency (EPA) and state departments of agriculture have recently been alerted that some beekeepers have been using **sodium cyanide compound** to control pests in their honey bee colonies/hives. Specifically, apiarists have been purchasing and using a **sodium cyanide compound** as a fumigant in beehives to destroy or mitigate wax moths including the caterpillar and larvae, as well as to cull out weaker hives. These practices are illegal and have the potential for serious harm to human health and the environment.

All pesticides distributed in the United States must be registered by the EPA. The Federal pesticide law [the Federal Insecticide, Fungicide, and Rodenticide Act (FIFRA)] defines "pesticide" to include any substance intended for controlling, mitigating or destroying pests. A substance is a pesticide and requires registration as such if the person distributing the substance (1) makes claims, either expressed or implied, that the substance can be used as a pesticide or (2) distributes the substance with the knowledge that the substance will be used to control pests. **Any individual selling or distributing sodium cyanide compound for mitigating any pest, including the wax moth, caterpillar and larvae, or any other pest for use in bee hives or colonies is selling and distributing an unregistered pesticide and subject to penalties of up to $6,500 per violation under FIFRA.**

Currently, there are no sodium cyanide or similar cyanide compound products registered by the EPA for pest control in honey bee colonies/hives. Also, there are no established residue tolerances for any cyanide compound in honey or beeswax. Honey analyzed and found to contain any cyanide compound residue would be considered adulterated under the Federal Food, Drug and Cosmetic Act, and could be seized. The seizure of honey due to

adulteration with a highly toxic chemical would be detrimental to the entire apiary industry.

Further, use of sodium cyanide in an apiary setting can be extremely dangerous. The compound is highly toxic to humans and other warm-blooded animals, and it is a Toxicity Category I compound - EPA's highest toxicity level for pesticides. This rating indicates the greatest degree of acute toxicity for oral, dermal, and inhalation effects. It is highly corrosive to the skin and eyes. Cyanide can be absorbed through the skin and its vapor is absorbed extremely rapidly via the respiratory tract.

Beekeepers who are currently in possession of the highly toxic, unregistered sodium cyanide compound or related products should contact their state agricultural agency for instructions on proper storage and disposal of the product. The state agricultural agency can also provide information on registered pesticides, such as paradichlorobenzene and aluminum phosphide products, that are legal to use to mitigate pests in honey bee colonies/hives.

[1] Wax moth includes both the Greater Wax Moth, *Galleria mellonella*, and the Lesser Wax Moth, *Achroia grissella*, both of which are sometimes referred to the wax wing moth.

Drone Comb Traps for Managing *Varroa*

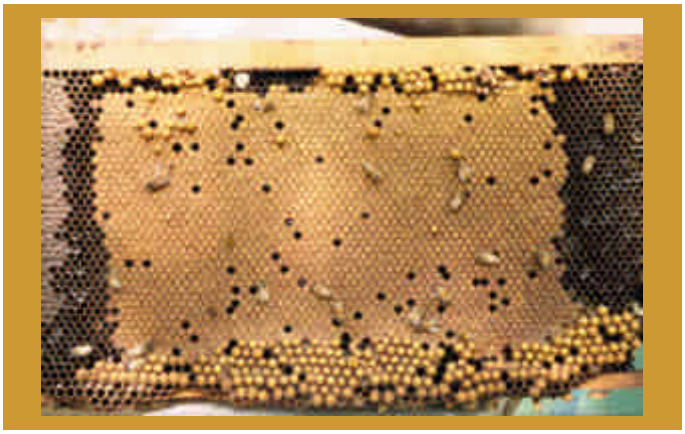
Female *Varroa* mites (Fig. 2) invading drone cells produce about twice as many offspring as those invading worker cells. Not surprisingly, mites are found 8 - 15 times as often on drone brood as on worker brood. You can exploit this difference as part of an IPM program for control of *V. destructor*. By removing drone brood from your colonies, you remove a disproportionately large number of mites without affecting the size of the worker population. The drone brood removal method has been found to reduce mite levels up to 10-fold and to maintain strong populations during the summer and early fall. This is the time when many colonies succumb to mites, a phenomenon known as 'fall collapse'. Try this method and you will prevent fall collapse and be treating healthy bees in the fall.

(Fig. 2) Adult, female *Varroa* mites on bees

You will need four drone combs per colony to use this method. Drone foundation can be purchased from several supply houses. The foundation is wired into frames and drawn out by colonies. One piece plastic drone combs are also available. Use two deep hive bodies for brood chambers, and separate them from the honey supers with a queen excluder. Cull worker combs in the brood nest with more than 1-2 square inches of drone cells (Fig. 3). Remember! The goal is to get the colony to consolidate all of its drone production in the removable drone combs.

Place two drone combs in the upper brood chamber, one or two combs in from each side. Visit your colony every 26-28 days, remove the drone combs (Fig. 4), and replace them with the drone combs that you removed on the previous replacement date. Place the combs of capped drone brood in a freezer, and keep them there until you are ready for your next exchange. Allow drone combs to come to ambient temperature before placing them back in a colony. Be sure to visit your bees at least every 28 days to exchange combs because you don't want too many drones actually emerging in your hive. If a drone comb becomes filled with honey, you will need to substitute an empty drone comb and extract the honey before reusing it. In the north, you can exchange combs up to six times a season using a 26-28 day interval between exchanges. The more often you exchange combs, the more you will suppress the mite population. At Dyce Lab we exchange drone combs from apple blossom until we remove the fall crop just before the end of the goldenrod flow. The drone brood removal method has no known deleterious effects on colonies, and honey production may be marginally increased.

[Note! Yes, it only takes 24 days to rear a drone, but it takes the bees a couple of days to clean out the combs, and it takes the queen a couple of days to fill them up. So, the 26-28 day interval works. However, if you are ambitious and want to exchange combs more frequently, go right ahead.].



(Fig. 3) Worker comb with excessive drone cells

(Fig. 4) Full comb of capped drone brood

Why should I reduce the use of chemicals in the hive?

- Ensure purity of hive products and health of consumers
- Maintain honey's reputation as a pure and natural product
- Open new markets
- Limit negative impacts on environment
- Limit exposure of applicator to pesticides
- Reduce liability
- Reduce cost of production
- Slow the rate at which pest populations develop pesticide resistance

Minimizing Chemical Residues in Honey and Wax

Since beekeepers have been using pesticides, the demand for US beeswax has dropped. Companies fear that pesticide residues in the wax will compromise the products they make. Honey from other countries has been denied entry into the US because of chemical contamination. In the US, honey with levels of pesticides or antibiotics that exceed established tolerances is subject to seizure and destruction. Legal action against the offending beekeeper is always a possibility.

There are steps you can take to minimize chemical residues in both honey and wax and to improve the overall quality of the honey you produce. First, use dedicated hive bodies and combs for brood chambers and honey supers. This is best done by using a queen excluder to prevent the colony from rearing brood in your honey supers. You can make this a bit easier if you identify your brood chambers and honey supers. You can paint your brood chambers and honey supers different colors. Alternatively, you can use deeps for your brood chambers and mediums for your honey supers. This makes it impossible to exchange brood combs for honey combs. Second, apply pesticides only in your brood chambers. This will minimize residues in your honey and cappings wax. Never move a comb from the brood chamber into a honey super. This will result in slightly darker honey and defeat the purpose of segregating the hive into functional areas. Third, cull brood chamber combs on a regular basis, at least every 5 years, and more often if they develop large patches of drone cells. Follow these recommendations and you will reduce pesticide residues in honey and cappings wax, decrease the incidence of brood diseases, and increase the effectiveness of the drone trap method.

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