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Oxalic Acid in Canada

The February 2004 issue of HiveLights, the quarterly publication of the Canadian Honey Council, reports that Canadian beekeepers are impressed enough with results of trials with oxalic acid for *Varroa* control that they are going to raise the $30,000 required for the registration process. Other corporate sponsors in the beekeeping industry will be sending donations, as well.

This project requires development of an information packet on oxalic acid, including its use in the hives and residues in honey and beeswax. Beekeepers can expect to save at least $4.00 per colony per year compared to using current plastic strip formulations.

The reasons listed for desiring use of oxalic acid are:

1. field trials look very promising,
2. oxalic acid is not a synthetic material and will not accumulate in the food chain
3. labeled use should be safe to the bees and beekeepers, as well as avoiding honey contamination
4. Europe currently has an MRL (maximum residue limit) and their data package can be purchased
5. the Canadian Pest Management Regulatory Agency is likely to accept the European data
6. as a non-profit corporation, the Canadian Honey Council should get a discount on registration fees.

It didn't take long for the entrepreneurs to enter the scene. There are two advertisements dealing with oxalic acid in the February HiveLights. One ad is for the Varrox® Vaporizer. It is a 12 volt, battery operated, portable heating cup for vaporizing the acid in a hive.

The other is the paraffin dipped Apinovar® Integrated Pest Management Bottom Board. This is a corner to corner, screened

bottom board with a tray that slides out the side. By placing a pad on the tray below the screen, one can put a dose of oxalic or formic on the pad for a "flash" treatment.

"Flash" Acid Treatments

Another article, in the February 2004 issue of Hive-Lights, reports on results of using quick, high intensity formic acid fumigation. Due to the appeal of having treatments that would cover a longer expanse of time, the Canadians already have two slow release formic acid products registered. Mite Wipe® is a small pad containing 35 ml of formic acid that evaporates in about four days. This necessitates up to six applications at four to seven day intervals for good control. Mite Away® holds 250 ml of acid solution that lasts nearly two weeks. Heat, relative humidity, colony population size and hive size give varying results with these products.

A flash treatment in mid-season reduced mite fall by 60% over natural levels. This might be enough to suppress mite levels until fall treatments can be made. Fall treatments, when most of the brood has emerged, appeared to have reduced the *Varroa* population by 95%.

[Editor's Note: Please remember that to have a strong, healthy colony that will winter well and will be highly populous the next spring, the colony needs to rear a large number of healthy "winter bees." This requires abundant food, abundant nurse bees, and no feeding attacks by parasitic mites while the developing bees are pupae. Thus, treatments for mites have to be administered from about mid-August to the end of September. Treatments later in the season will kill larger numbers, and a higher percentage, of *Varroa* but the parasitized winter bees will not be around next spring.]

Neonicotinoids and Bees

Chemists working for pesticide manufacturing companies try to stay at least one step ahead of targeted pests on what some have called, derogatorily, the "pesticide treadmill." New products developed for pest control must be novel enough to avoid established biochemistries of resistance in crop pests. New products must also be safe for use in the environment. A new class of insecticides, called "neonicotinoids," appeared to many to fit the bill.

Nicotine is an extremely toxic chemical that works at the nerve synapses and in nerve sheaths to speed up nerve impulses. At very low doses, this effect actually can enhance memory processes. I never understood why my non-smoking college roommate lit up only when he was studying for exams. He said that it helped him concentrate. I figured, at best, it was a placebo effect. However, reading the Consumer Report publication "Licit and Illicit Drugs" informed me that

titration of nicotine, in miniscule amounts directly into the blood stream of humans, did help with test performance. It turns out that extremely miniscule amounts of neonicotinoids actually increase memory development in honey bees, too.

However, larger doses of nicotine become toxic when they allow too many nerve impulses to shoot through the synapses. This over-activity of the nervous system can jangle the rest of an animal's physiology and even lead to death.

The concern about neonicotinoids and honey bees has received the most notoriety in France, and the Italians are working on it, also. An early neonicotinoid, imidacloprid (Gaucho®), was being used as a seed treatment on sunflowers in France. The beekeepers reported that when their bees were used for sunflower pollination, the bees acted strangely and the colonies went down hill. Some of the beekeepers called the condition, "Mad Bee Disease." Eventually, "tunnel" (long, narrow cage) tests demonstrated that relatively low concentrations of imidacloprid, added to the sugar syrup in the feeders at the far end of the tunnels, intoxicated the bees enough that they did not forage normally and had trouble getting back home. More recent laboratory studies on the neurophysiology (electro-antennagrams) of honey bees contacting imidacloprid showed that extremely small amounts (1 nanogram) of the chemical can cause major changes in nerve functioning. The beekeepers' greatest concern was that colonies used for sunflower pollination were likely to die off before the next season. Food was available in the hives, so the signs were similar to death due to *Varroa* infestation. The mites still are a major concern, but the Europeans have refined the art of using thymol and organic acids to the point that *Varroa* are not much of a problem. That is when the finger became directed toward imidacloprid.

Studies conducted in Europe and the U.S. have demonstrated that neonicotinoids bind to soils but do not break down for a long time. The amount of neonicotinoids reaching nectars and pollens of plants sprayed with the chemicals or from the soil varies. The chemical companies have yet to admit that the chemicals occur in amounts detrimental to beneficial organisms. However, if sucking insects, like aphids, can be killed by the doses occurring in plant saps, then it is not too hard to imagine that lady bird beetle (lady bug) larvae eating the aphids might get a toxic dose. Also, if bees collect honeydew (plant sap passed through sucking bugs) from the aphids, they should be getting the same lethal dose as the aphids. However, there could be differences in aphid and honey bee physiology, so perhaps their intoxicating or lethal doses differ. (cont. page 7)

W.A.S. Conference 2004

The WAS conference in Missoula is just a few weeks away and we plan on making this both the place and the meeting that will long be remembered as the 'Best'.

Make your hotel reservations early to get the $89 rates, dial 406-721-8550, and tell the hotel that you are attending the Western Apiculture Society conference.

Our keynote speaker is Dr. Gabe Patrick from EPA's Office of Pesticide Programs (OPP) in Washington, D.C. He has taken a leadership role in addressing how to better assess the risks that pesticides pose to pollinators.

Since this issue and others like mites, land-use, and habitat affect both bees and native pollinators, we will have speakers from the North American Pollinator Campaign, native plants, community gardens, and other related groups at our pre-conference workshop on Pollinators and Pesticides, a State of the Nation Review. We will also have the latest on mite control from Canada, chemical use in hives for mite control, and the latest on rules and regulations, including the new emphasis on food products, marketing, and safety.

The pre-conference workshops on Tuesday morning, include a beekeeping short course for general beekeepers, an advanced course for state inspectors and pollinators, and a short course on mite control (from Canada). You'll also see the latest in technology, from electronic hives, to radio-frequency tags for recovery of stolen beehives, to demonstrations of bees being used to detect strawberries going bad, and the effects of sublethal doses of certain pesticides on the ability of bees to navigate a simple maze (they forget which way to turn).

The main conference on Wednesday will cover issues as disparate as pheromones to attract pollinators to plants, whether Death Camas is toxic to bees, and how to distinguish fossil sponges from the marking etched in limestone by bee combs.

Thursday is a day of fun and education. Start with an optional walk through the public gardens at the University. Then, take the bus tour that includes stops at: 1) Montana Naturals, a global distributor of pollen, propolis, royal jelly, and other bee-based products, 2) the National Bison range, and 3) Western Bee, the largest manufacturer of beehives and frames in the world. End with banquet dinner on the shores of Flathead Lake, the largest lake west of the Mississippi.

Check the web pages for changes and additions to the program (http://beekeeper.dbs.umt.edu/WAS/). We anticipate having researchers from England and from Holland working with us in Montana in mid-July. If so, we'll twist their arms to tell us about beekeeping in their parts of the world.

WESTERN APICULTURE SOCIETY, 2004
July 13, 14, 15 – Holiday Parkside Inn
Missoula, Montana

Name (s) _____
As you wish it (them) to appear on your name badge (s)

Current Mailing Address _____
Street, Suite, Apartment #

City *State/Province* *Zip, P Code*

Phone Number *E-Mail*

Category:

☐	**Current WAS Member**	☐	**Exhibitor**	☐	**Speaker***
☐	**New WAS Member**	☐	**Student****	☐	**Guest**

*Conference Fees Waived for Speakers
**Students Pay $10/Day

Bus Tour and Banquet Fees Apply to All Who Participate

Conference

Cost per person:

Full: 3 day Pre-Conference and Conference Package (including Reception) **$99.00** x ___ = ___

Pre-Conference (Workshops plus Pesticide Forum) ***$50.00*** x ___ = ___

Options:

Pre-Conference (Morning Workshops) $20.00 x ___ = ___

Reception Only (Cash Bar) $10.00 x ___ = ___

Pre-Conference (Afternoon Pesticide Forum) $40.00 x ___ = ___

Flathead Lake Banquet (includes meal and complimentary beverage)* $45.00 x ___ = ___

Single Day (Tuesday, Wednesday, Thursday) $50.00 x ___ = ___

Two Day (Tuesday/Wednesday or Wednesday/Thursday) $75.00 x ___ = ___

*****Banquet Costs are Included in the Tour (below), price is for attendees who do not take the tour.

Beekeepers Tour of the Flathead Valley – July 15, 10:00 a.m. to 9:30 p.m.

Includes bus transportation, box lunch, and banquet, with visits to Montana Naturals in Arlee, the National Bison Range at Moise, and **Western Bee** at Polson. The Conference Banquet will be on the shore of **Flathead Lake**! $ 70 x ___ = ____

Tour Options*

a) Box lunch, guided tours, banquet (without bus transportation) $60 x ____ = ____

b) Banquet only, skip tour, provide own transportation to Flathead $45.00 (check Flathead Lake Banquet option under Conference fees, above)

- Due to the narrow highway and safety concerns, we do not encourage car caravans. However, some of you may wish to travel to Polson on the way to Glacier Park for a post-conference visit.

DEALS

1) **20% discount if register before June 20th**
2) 50% discount to new WAS members who pay dues before conference

Exhibitors

Two-day exhibit space (s) at Holiday Inn Parkside $ 50 x ___=___

One-day exhibit space (s) at Holiday Inn Parkside $ 36 x ___=___

Outdoor demonstrations at UM Beeyard (Tuesday) $ 10 x ___=___

Special Assistance (set-up, bees, equipment, special assistance – negotiable, contact Jerry Bromenshenk at Beeresearch@aol.com)

W.A.S. Registration and Payments must be made in U.S. currency.

Checks payable to **Western Apicultural Society**, ***received* by *June 20**, *by*:

George Steffensen
1634 Fish Hatchery Rd.
Grants Pass, OR 97527
Tel: 541-474-4305

Qualify for the discount

Payment at the conference will be at full rate. Credit Cards will not be accepted. *Do not send checks to The University of Montana or to the Holiday Inn Parkside for Conference Fees.*

Because of their low mammalian toxicities, the small quantities required to control pests, and their relative absence from the environment (bottled up in the vegetation and/or soil), the neonicotinoids are being registered for more and more crops. Interestingly, they are being sold under many different trade names, even though the active ingredients are the same.

While more are coming on line all the time, some currently used trade name neonicotinoids are:

1. imidacloprid – Admire, Confidor, Condor, Gaucho, Genesis, Merit, Premier, Premise, Prescribe, Provado, and Trimax.

2. thiamethoxam – Actara, Centric, Cruiser, Flagship, Meridian, and Platinum.

3. clothianidin – Clutch, Dantotsu, and Poncho.

Because the European literature suggests that very little residue of these materials can have very large consequences to honey bee colonies in which the residues have been brought back to the hive, it might be a good idea to avoid areas where these chemicals are being used. In California, one crop that is likely to be hazardous to honey bees is cotton, one of our largest sources of honey. Beekeepers are complaining of colonies dwindling throughout the fall and winter to nothing by almond pollination time (or sooner). Food stores in the hives are adequate, *Varroa* mites are below detectable levels, and the die-offs suggest that no winter bees were produced. Or if they were produced, they were not healthy enough to persist to the next spring. The same beekeepers reported no such problems with their other colonies that were not taken to cotton. Coincidence?

Similar Insecticidal Effects

For decades beekeepers have been quantifying insecticide-induced damage to honey bees as numbers of dead bees observed on the ground near the hives. With frequent inspections, beekeepers also noticed when colony populations took a big dip. They assumed, probably correctly, that the field force had been eliminated by contact with toxic chemicals. Apparently, it did not occur to beekeepers or researchers that sublethal effects might be occurring that could be measured with the appropriate experiment. In this case "appropriate" meant studies on behavior, not on the amount of brood and bees that we frequently measure.

Following the work by the Europeans on the neonicotinoids, researchers at the University of Montana devised an experiment that could have been conducted decades ago, but wasn't. They built a maze at the entrance of the beehive and forced the bees to learn how to get back into the hive without much delay. Then they collected the trained foragers and exposed them to extremely small doses of insecticide vapors from an "old," non-neonicotinoid insecticide product.

It is inappropriate to give all the details before the paper is published, but here are a few interesting findings. Higher doses knocked the bees down forever. Moderate doses knocked the bees down, but they get up, again, if they were taken away from the source. When they got back to the hive, the guards wouldn't let them in. At really low doses, the treated bees seemed to be normal, the guards didn't bother them, but could they figure out the maze. Nope!

So, it is not necessarily that neonicotinoids are that much worse than the insecticides that have caused problems for many decades. However, neonicotinoids are more persistent in the environment and very few of the older insecticides went systemic and contaminated the bees' food for prolonged periods of time.

Sincerely,

Eric Mussen

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