

The Bee Cause



Volume 7, Issue 8

November 2010

- Next general meeting is **8:00** Tuesday, November 9th at the **River Heights Community Centre, 1370 Grosvenor Ave., Winnipeg.**
- (in the room right of the main door)

Speaker:

- Phil Veldhuis
- "Beekeeping— Past, Present and Future"

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A new Honey Bee medicine, based on RNA interference

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Submitted to: PLoS Pathogens

Publication Type: Peer Reviewed Journal

Publication Acceptance Date: September 27, 2010

Interpretive Summary:

A new medicine, based on RNA interference, was developed which increased honey bee health under the constraints of colony collapse disorder, CCD. High rates of honey bee mortality continue to threaten food security and apicultural industries worldwide. At least some of these losses are likely the result of viral infections. The importance of honey bees as pollinators of crops to the global economy far surpasses their contributions in terms of honey production. In all, 52 of the world's 115 leading agricultural crops rely on honey bee pollination for food production to some extent. These crops represent approximately 35% of the human diet. Insect pollination, which is provided predominately by honey bees, is estimated to have a value of US\$ 212 billion. Application of RNAi technologies in the treatment and management of disease promises new solutions to disease problems through the naturally occurring biological processes of living organisms. We applied a novel dsRNA product developed specifically with the aim of improving honey bee health. The results demonstrate the successful application of RNAi strategies to improve disease tolerance. Honey bees were fed this natural product, a dsRNA called Remebee", in the presence of the Israeli Acute Paralysis Virus, IAPV. Treatment resulted in increased bee survival, thus larger colony popula-

tions, and subsequently resulted in a four-fold increase in honey production. We show that IAPV specific homologous dsRNA successfully curbed the negative effects of IAPV infection in 160 honey bee hives in two discrete climates, seasons and geographical locations (Florida and Pennsylvania). We provide the first successful demonstration of the use of RNAi as a preventative treatment for an insect disease under field conditions over a large, real-world scale.

Technical Abstract: We present the first successful use of RNAi under a large-scale real-world application for disease control. Israeli acute paralysis virus, IAPV, has been linked as a contributing factor in colony collapse, CCD, of honey bees. IAPV specific homologous dsRNA were designed to reduce impacts from IAPV infection across 160 honey bee hives in two discrete climates, seasons and geographical locations (Florida and Pennsylvania). These results demonstrate the first successful use of RNAi as a preventative treatment for an insect disease, thus improving the health of important pollinators such as the honey bee, *Apis mellifera* (Hymenoptera). The importance of honey bees as pollinators of crops to the global economy far surpasses their contributions in terms of honey production. In all, 52 of the world's 115 leading agricultural crops rely on honey bee pollination to some extent. These crops represent approximately 35% of the human diet. Insect pollination, which is provided predominately by honey bees, is estimated to have a value of US\$ 212 billion. Honey bee populations (continued on page 4)

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Presidents Comments- November 2010

The 2010 Honey Show is behind us, and many thanks to all those who helped make it a success. I have been receiving a variety of comments at St Norbert's Farmers market from people coming to shop for fresh produce and locally produced honey. One of the common questions is to whether the honey is natural, or pasteurized. The shoppers are quite happy to hear that the honey sold at the market is in its natural state, with only a wire screening after the spin by the extractor into a sump and then from the sump filtered thru a fine mesh nylon cloth.

An interesting comment was made by a lady at the market who was about 7 to 8 months pregnant. Her doctor told her to only eat pasteurized honey, at least a tablespoon a day. This statement provoked some discussion and questions from me. Is there any basis for this advice.??

The warm weather of October kept the bees foraging far from the hives, and I noticed actual weight loss of some large hives. Thus I did another syrup feeding to all of them, which was quickly taken down. My next step is to remove all the feeders, and then the Apivar strips and try to move them inside before we have a substantial snowfall. With double digit temperatures being forecast for the next several days, it becomes a guessing game when to wrap or move indoors.

A very strange beekeeping situation has occurred in the SE area of Manitoba as a group of strong hives that were on their third round of feed completely disappeared while the owner was away for a week. I had a look at the bee yard, found only a few handfuls of bees and several frames of brood in most hives. An alcohol wash of a small population hive indicated a large number of varroa mites, close to 90 %. I wonder if the large mite populations caused the bees to abscond from that bee yard and go elsewhere, or just depart and die away from their home.. Queries in the local area indicated that nobody was doing any type of spraying at this time of the year. Samples were taken in to the Provincial Apia-ri-ists' office, and some examination/analysis is taking place. Is this a CCD situation, an object lesson of what high mite levels can cause, or is there a virus that swept thru this group of bees.????

The last RRAA meeting of the RRAA takes place on November 9th at River Heights Community Club in the downstairs meeting room. **BUT** the meeting won't start until **8 PM** as another group is using that room earlier in the evening. The featured speaker is Phil Veldhuis, a second generation beekeeper who operates 900 + hives in the Starbuck area. His topic is "Beekeeping - Past, Present and Future". Phil is one of the premier queen breeders in southern Manitoba, and says he doesn't ever buy queens from elsewhere.

A part of the Business meeting that evening is selecting an Executive Search Committee for filling possible places on the Executive for 2011. The RRAA by-laws require 4 members in total, 2 from the current Executive and 2 from the general membership. Here is a chance to be involved in helping fill the possible openings in the Executive for next year.

The yearly MBA meeting takes place on November 17 in Neepawa at the United Church. The meeting starts at 10 AM and there is a registration fee of \$40.00 which also includes a fine lunch catered by ladies from the church. A car-pool is always an interesting and economical way to attend.

My best wishes to all of you for a Merry and Healthy Christmas.

Yours in Beekeeping,

Charles Polcyn RRAA President

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Minutes of the RRAA General Meeting

River Heights Community Club – Oct. 12, 2010

7:35 PM: Charles Polcyn welcomed 23 members and guests to the October meeting.

Minutes of the September general meeting: No errors or omissions were noted. Moved by George Chwist and seconded by Chris Argeriou that the minutes be accepted as printed in the October issue of the Bee Cause. Carried.

Correspondence: From Bee Maid who sent RRAA a cheque in the amount of \$150 for expenses at the honey show.

Promoting the Honey Show: Shaw TV interviewed many of the people on the first day of the honey show and televised the video every morning for a week.

CITI TV interviewed Charles for their Big Breakfast show. For the members and guests who had not had a chance to view the Honey Show segment, Jim Campbell had set up his computer and projector at the meeting.

The radio interviews on CJOB and CBC were also aired several times.

Membership: John Speer reported that we presently have 6 more members signed up. The general account is now at \$4300.

MBA Report: Jim reported that beekeepers may use Apivar until June 30 of 2011 under the terms of Emergency Use Registration.

The use of formic acid has been extended for another year. CHC is working to see what could be done to extend the life of formic acid indefinitely. Although Mite Away II pads are no longer available Mite Gone and Mite Wipes are still in production.

Dr. Rob Currie is investigating whether Thymovar can be effective for use under Manitoba conditions.

Loonie Draw: Marni Dangerfield won the honey bear containing honey from Quebec. Brian Little won the bear containing honey packed in Prince George and Vera Mandryk's name was drawn for a jar of honey packed by Babe's Honey in BC. Sandra Smith won the jar of honey jam and Chris Argeriou won a jar of John Russel's Berry Blast honey spread. Marty McIlwain won the pair of skunk grates to place in front of his hives. Thanks again to Charles Polcyn and John Russel who donated draw items and everyone who purchased tickets.

Program: Gadget Night
Ron Rudiak, recorder – RRAA

Gadget Night

To begin, Ted Scheuneman demonstrated a useful tool that every beekeeper often wishes he had on hand. Simple in design it hangs onto the rim of a large (five gallon) pail or honey drum and allows the user to set a honey container or another pail onto it for draining. The container is held firmly in position while the last bits of honey slowly drain into the bottom pail.

Another item Ted uses extensively are frame rests made

from stainless steel fastened on with nail also of stainless. Why stainless? Ted uses formic acid for control of varroa mites and he found that the strong vapours soon eat up the galvanized coating on the commercial frame rests. Water vapour condenses onto the damaged galvanized coating, becomes contaminated and is picked up by the bees to use in the hive. Stainless frame rests can be produced easily by a tin shop but each nail hole must be either punched or drilled by the beekeeper. Although Ted ordered his stainless nails from Germany they may also be available from a boat building shop.

Ted seasonally cleans his gummed up queen excluders with a hot solution of water and 4 – 5% caustic soda. Frames can be boiled to clean them as well in a 2.5 to 3% solution for five to ten minutes. This leaves the frames really clean and saves trees too.

Margaret Smith demonstrated her manual hive lifter. In use, this requires two people to first position the tool so that the lugs of the tool fall into the hand holds and then they may begin the lift and carry. It is a simple but effective means to move hives from a truck or trailer into position in the bee yard or to pick them up for loading onto the truck.

Lance Waldner brought an attractive honey gift pack from Hungary. This honey collection might be a great way for customers to sample a variety of honey from your operation. It would also make a fine presentation gift for businesses to give to their good customers or employees.

Charles Polcyn brought a pair of spiked metal plates that are an effective repellent for skunks. In use these are placed on the ground in front of a hive. Skunks are discouraged when they have to stand on them to scratch on the front of a hive. These large (approximately 8" by 20") chunks of galvanized metal are the gussets used to build wooden rafters.

Charles demonstrated how an ordinary plastic bag can be used to make a syrup feeder. A litre or two of syrup is put into a plastic bag and the bag opening is tied tightly. The bag with syrup is placed on top of the frames with the tied part on top. A spacer may be required between the hive body and lid. One or two pin holes are made on the underside of the bag which causes the syrup to drip out slowly. These bees pick up the drips.

Ron Rudiak demonstrated two very useful plastic scrapers for scraping up honey from pails and equipment. The first was thin and flexible, part of a set of three normally used to smooth auto-body filler. Those are available for a reasonable price at Canadian Tire. The second scraper was cut from a sheet of plastic (like a plastic cutting board). About three-eighths of an inch thick and twelve inches long with an edge like a windshield scraper. This type of scraper is handy for cleaning drums, extractor, tanks etc. without harming the finish.

Another handy item, a folding gardening seat gets a lot of use. This is a fine item for working hives from a seated position and should be available from a gardening supply or Lee Valley Tools.

Ron's last item for gadget night was his pocket sized refillable butane torch. These, too, are available from Canadian Tire. Regular price for these micro torches is around nine or ten dollars. On sale they can be purchased for around \$5.95. They are immune to the strongest summer breezes and burn hot enough to light up a smoker filled with damp material.

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“Some kinds of honey are quite colourless— light and transparent, like water. A.I. Root says ‘the best honeys are usually those water-white varieties. Others assert that since dark honeys contain more mineral salts (iron, copper, and manganese) they must be considered more valuable as foods than the light varieties. “

MBA Report November 2010

By Jim Campbell, MBA rep

Directors of the Manitoba Beekeepers' Association (MBA) continued to discuss issues affecting Manitoba's Honey Producers at their last meeting on October 14.

The adverse weather triggered a Canada-Manitoba funding program to help waterlogged prairie producers cope with this year's crop losses. The release on July 8 indicated the largest Agri Recovery relief package to date, and offered a \$30 per acre payment over and above that provided through the Manitoba Agricultural Services Corporation (MASC). The difficulty for honey producers was that their request for production insurance didn't get provincial funding and thus is still unavailable. MBA wrote to the province requesting some help, yet offered to conduct a survey to determine the extent of the adversity. The province responded indicating a multi-year impact would be needed. MBA continues to survey its' members, plus verify what is happening in Alberta and Saskatchewan before making further ministerial contact.

There is anticipation Dr. Steve Pernal, Beaverlodge (Alberta) will be completing the third year of a study on Fumagilin-B for use on *Nosema cerenae*. This past year he has been collecting efficacy and residue information to determine if additional applications of the treatment are possible (i.e. drench type application, dust, spring application, etc). Medivet Pharmaceuticals, of High River, Alberta, is prepared to have the label use expanded should the data support their applying to Pest Management Regulatory Agency.

MBA recently introduced some upgrades to their web site www.manitobabee.org, which should permit news items being added in a timelier manner. For example, the latest bulletin announces the upcoming Annual General Meeting on November 17 in Neepawa.

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have been decreasing globally in recent years. Since fall 2006, honey bees over wintering in the U.S.A. have faced unusually high rates of mortality, in part because of a phenomenon now known as Colony Collapse Disorder (CCD). Several hypotheses have been offered to explain CCD and existing and emerging pathogens have been implicated either directly or indirectly. Colonies affected by CCD are infected with larger numbers of pathogenic organisms than control colonies, yet no single pathogen was found associated with all affected colonies. However, researchers did find that single-stranded RNA viruses, specifically picorna-like viruses, occurred at elevated levels in CCD colonies. These elevated levels of viruses appear to interfere with gene transcription, thus reducing immune

response competence and pesticide detoxification capabilities, subsequently leading to premature death of infected bees. Honey bees are susceptible to a host of picorna-like viruses, including the closely related Acute Bee Paralysis Virus (ABPV), Kashmir Bee Virus (KBV), and Israeli Acute Paralysis Virus (IAPV). The latter of these three viruses, IAPV, was identified as a good marker for CCD occurrence, especially when found in association with the microsporidia *Nosema*. While IAPV is probably not the sole cause of CCD [7], its ability to cause increased mortality in honey bees has been established. The process of post-transcriptional gene silencing is thought to be an evolutionarily-conserved cellular defense mechanism used to prevent the expression of foreign genes and is commonly shared by diverse flora and phyla. The presence of long double-stranded RNAs in cells stimulates the activity of a ribonuclease III, Dicer, which is involved in the processing of the double stranded RNA (dsRNA) into short interfering RNAs (siRNAs). The RNAi response also features an endonuclease complex, commonly referred to as an RNA-induced silencing complex (RISC), which mediates cleavage of target ssRNA having sequence complementary to the antisense strand of the siRNA duplex. In a variety of organisms, exogenously applied dsRNA or their siRNA derivatives, can be used to arrest, retard or even prevent a variety of pathogens. In some of these organisms, such as plants and the nematode *C. elegans*, an amplification stage follows the initiation stage of gene silencing, involving an RNA dependent RNA Polymerase (RdRp), which may lead subsequently to degradation of RNAs outside the initial dsRNA region of homology. RNAi can spread from the initial site of dsRNA delivery, producing interference phenotypes throughout the treated animal. To serve as a preventive or curative strategy, amplification and systemic spread of the silencing signal are both paramount. In some invertebrates, including honey bees, a systemic interference defective (SID) gene encodes a transmembrane protein that is an important participator in the systemic RNAi pathway. IAPV specific dsRNA (Remebee"-IAPV or herein Remebee"-I) was used successfully to prevent bees from succumbing to infection from IAPV in small scale lab experiments whereas bees fed Green Fluorescent Protein (GFP) dsRNA and virus died in a manner similar to the IAPV fed control bees. Transferring RNAi from a well characterized and efficient tool in the lab and making it successful in preventing the adverse effects of virus infection in the field, was notoriously difficult. However, we present the first large-scale real world successful use of RNAi for disease control. IAPV specific homologous dsRNA can be used to reduce impacts from IAPV infection as shown across 160 honey bee hives in two discrete climates, seasons and geographical locations (Florida and Pennsylvania). This is the first successful demonstration of the use of RNAi as a preventative treatment for an insect disease on such a large scale.

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"The quickest way to double your money is to fold it and put it back in your pocket."



Editor's Note by Ken Rowes

Cold weather and snow have arrived and I am sure we are all getting our darlings ready for winter. Some may be waiting for the right moment to give an Oxalic acid treatment for mites. It is the time to put away summer equipment and make winter work lists. I have just completed washing down my feeders for storage, reduced indoor wintering hives and pulled out the outdoor wintering wraps. Temperatures are still too warm but wrapping will come on soon. Still can't believe the amount of water we have received lately.

Market gardens are running their last weekend market in St Norbert. Although honey flows this summer have been low in many areas honey sales are still high. I have also found in this wet year a wider range of honey types managing 6 extractions. The last September fall extraction provided a amber honey which I attribute to the Curled dock 'wild buckwheat' we see in many fields. The first June honey was extremely powerful and mainly of dandelion and wild fruit trees.

The last day of October is here and I love to bake my pumpkin pies using a tablespoon of honey. What a surprise, especially with the seasonal honey varieties we have. A tablespoon of old honey goes into my sauces as well with Soya sauce.

CLASSIFIED

1. Wanted: S.S Bottling Tanks Single wall or double wall with water jacket, good condition or repairable. Also needed—Belt Barrel Heater for drums: **call Brian Rich 204 739-5481**

2. FOR SALE: Clearance of a variety of Beekeeping Equipment- Honey Supers, Brood Boxes, Wax Dipped Feeder Boxes, Queen Excluders, Bottom Boards, Lids, Empty Shells, Bare Frames, etc. Reasonable Prices on all items. Call Charles Polcyn at 284-7064 or email at: charles_polcyn@ymail.com

3. For Sale: **1-Wood Burning Stove ideal for workshop— used one season \$350.00; 2- 10 kg plastic containers and lids \$2.65 each; 3 Plastic drum 200 L with tap \$100.00 . Ph Ted Scheuneman 338-6066, West St Paul**

4. Wanted granulated white honey and/or wildflower honey contact **Tom Dixon 475-5059**

5. Wanted - radial extractor, decapper and bottling

The Bee Cause is the official publication of the Red River Apiarists' Association for distribution to its members and their colleagues in the beekeeping industry. It is published eight times a year on a monthly basis except December and the summer months of June, July, and August when membership meetings do not occur.

Articles can be best submitted in word documents as email attachments. Though they may be edited for spelling and basic grammar, no changes will be made to their contents, message and opinions. They are those of their originator and not of the Red River Apiarist Association.

Deadline for any submission to this newsletter is the second Saturday preceding the membership meeting to allow for publishing and mailing delays. Regular membership meetings are normally scheduled 7:30 PM on the second Tuesday of every month at the River Heights Community Centre located at 1370 Grosvenor Avenue in Winnipeg except the months as noted above.

The Red River Apiarists' Association, formed in 1963, represents the beekeepers of the Red River Valley and environs in southern Manitoba. The association provides a forum for the promotion of sound beekeeping practices through education, networking opportunities, meetings, field days, workshops, presentations by local apicultural experts, as well as the dissemination of this monthly newsletter.

We are on the web!
www.beekeepingmanitoba.com

tank contact Clayton or Diana Brinkman at 807-548-5044

6. Wanted - extractor please contact Marty McIlwain 226-3437

7 Wanted: Candle moulds, tapered and pillar various sizes.
Contact: **Lance Waldner** Phone or Text 712-6783, lancewld@gmail.com

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Alfalfa (*Medicago sativa*) honey comes in different shades colourless to amber containing generally 36.8% glucose and 40.24% levulose.

Sweet wild clover (*Melilotus officinalis*) contains in general 36.78% glucose 39.50% fructose.

Linden (*Tillia*) honey is transparent of yellowish or pale green with 36.05% glucose and 39.27 % levulose.

RRAA Web links people

By Jim Campbell, web administrator

Those visiting the beekeepingmanitoba.com web have noticed our RRAA activities are described, giving thanks to the many volunteers helping out at our events.

Things like the Honey Show report, for example, have a number of our members named, as being appreciated for their help in responding to visitor questions. In addition, several have helped in setting up the display, and so on. These reports provide information on the types of displays, the different display stations, and details of the live bee interactive station, for anyone wanting to set up their own promotion events.

In another page of the web site, we identify upcoming speakers, and then follow this up with the RRAA meeting results. Over the past two years, we have had a variety of speakers and topics. Similarly, another page identifies your executive team.

Part of the reason for the web is to make information available and accessible to those wishing more information on our club and the beekeeping hobby in general. Access can be from various search engine sources such as Yahoo and Google, etc.

The other day, while a friend and I were talking, he started to grin and told me the Internet was an amazing thing. He said a cousin from Germany was trying to reach him, yet wasn't sure exactly where he was located. The cousin "Googled" his name, and up popped our RRAA site. What a surprise! Who knew that helping out would lead to a family reunion of sorts!

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"Good judgment comes from experience, and a lot of that comes from bad judgment." so take the risk and learn,

Bee Outfitter name introduced

by Jim Campbell

Bee Maid hosted an open house to showcase its' newly renovated bee supply outlet earlier this month.

At a special celebration on 4 October, beekeepers, staff, retired employees, and family members were invited to visit the recent upgrades at the bee store. Guests were welcomed to walk about to see the new shelving material, stocked with a variety of items producers need for their operations. The dark wood grain shelving was complimented by freshly painted walls.

For the celebration, a creatively designed cake drew many compliments from guests. The cake display featured an old time straw skep, a smoker, a bee helmet, and several other decorative pieces. Thanks to Karen Miles for carefully making the first slice as several onlookers pretended to hold their breath creating a tense moment for her. Signage depicted celebration of the opening of "Bee Outfitters" (the new name for the Supply outlet), as well as the retirement of a Saskatchewan sales employee.



You can tour the Bee Supply e-store browsing photos and descriptions of store products at:
www.beemaidbestore.com

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Just a F.Y.I. By John Russell

Sam Barlin from the C.F.I.A. has informed me that the word Unpasteurized is no longer permissible to be on a honey label.

The reasoning given is that they wish to train the consumer to accept that unpasteurized honey is the standard, and the label will indicate whether it is or not only by the presence of the word Pasteurized.

Hello John:

The change comes from a CHC stakeholder workshop I attended in Calgary several years ago. Basically honey is tested and packed with no higher than 17.8% moisture - which everyone is already doing. So there is no need to pasteurize to meet No 1 Canadian grade requirements. Why then would we maintain wording on the pack for something that we do not do (e.g. non-pasteurized)?

Pasteurization is a process whereby the yeast in honey is destroyed and therefore processing has to meet strict requirements and requires specialized equipment (very expensive). The only reason honey needs to be pasteurization is when a buyer such as a brewery or bakery requires the assurance that there are no viable yeast cells in the bulk honey which they purchase. They have their own specialized yeasts which they use and do not want foreign yeasts to spoil their product.

Hope that this helps.

All the best, Ron R.

So if your honey has a moisture content up over 17.8% you have the potential of selling honey that will ferment in the customer's cupboard and you will need to drop the moisture in your honey. How— we will discuss at our next meeting.

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The Learning Curve, Part III The Natural Miticides
Randy Oliver

Oxalic Acid

Varroa mites have been found to be far more susceptible to acids than are honey bees. Of the organic acids, formic, lactic, and oxalic can be used as "natural" treatments in the hive, as they are all naturally found in honey. Lactic acid is used to some extent in Europe, but oxalic acid, due to its greater "activity" (dissociation constant) is used extensively worldwide (reviewed by Rademacher 2006, Nanetti 2003, Oliver 2006).

Oxalic acid is a two-edged sword, and can cut both the mites and the bees. The trick is to apply just enough to kill an adequate percentage of mites, while doing minimal damage to the bees. Don't use oxalic if following directions accurately is not your forte!

The positive side of oxalic is that it is extremely cheap (pennies per treatment), easy and safe to apply, very effective against mites, and leaves no appreciable residue in the honey. A number of small-scale beekeepers use a single oxalic treatment each fall as their sole mite control measure, since it can essentially give the bees a "clean start" each season.

The down side is that oxalic dribble in syrup is absorbed through the bees' chitin exoskeleton and also ingested to some extent—both routes

may cause some degree of temporary or permanent tissue damage. Some brood may be killed (Gregorc 2006) and brood development may be retarded for a couple of months (Hatjina 2005; Higes 1999). Some adult bee mortality may also take place, with foragers being more susceptible than nurse bees, with more mortality in cooler weather (Martín- Hernández 2004).

The brood and adult bee mortality are not always noticeable. Any adult bee mortality is generally low (~20 bees per day in Martín- Hernández' study), and I have personally only observed dead bees in front of the occasional colony. Several researchers, including myself and Dr. Marion Ellis, have not noticed any substantial negative effects in the colonies, even after repeated late-summer or fall dribbles. Bacandritos (2007) did not observe any depressed colony growth even after four successive fall applications.

Anecdotally, most beekeepers who have reported problems with oxalic to me simply did not measure the dose accurately. I've noticed that the tendency is to over apply if one uses a garden sprayer.

However, those who can accurately apply the proper dose can obtain good mite control with oxalic dribble either with a single dribble when the colony is broodless (either due to season, or shook swarm, or in mating nucs), or by three multiple treatments a week apart when the colony contains brood (Sammataro 2008). Martín-Hernández (2007) got good varroa control with two dribbles 23 days apart in fall. Treatment is generally in fall or winter, but I'm going to try it next season prior to swarm season.

Apply oxalic acid dribble accurately! Use 5 ml per "seam" of bees, generally 50 ml maximum per colony. I haven't been able to find a livestock drench gun that does the job without hand fatigue, but a 60 ml syringe (available at any feed store) will work fine for those with a few colonies.

Concentration of Solution

O.K., there's a lot of confusion as to how one defines the solution strength. Some use weight to weight (w:w), some weight to volume (w:v), some calculate based upon the weight of the oxalic dihydrate crystals found at the hardware store as wood bleach, whereas others determine the percentage of pure oxalic acid. And then some use a simple ratio of ingredients (e.g., 1:10:10). So I made up the following table, so that we're all speaking the same language.

Update: "OA crystals" refers to regular wood bleach (oxalic acid dihydrate). Sucrose is table sugar. Distilled water is only necessary if you have "hard" water—you can tell if a cloudy white insoluble precipitate of calcium oxalate forms. Note that a liter of dry table sugar weighs about 1000g so you can measure the sugar by either weight or volume (600 ml would be about 600 g). You should not need to adjust the formulas! It works best to dissolve the acid first into hot water. If you are mixing in a jar with a lid, stir, rather than shake to dissolve the crystals, since shaking the hot water will cause the acid solution to build up pressure, which can squirt into your eyes.

The following is a formulation table for making up oxalic acid concentrations.:

(Continued on page 8)

Oxalic Strength	Hot 4.2% w:v	Medium 3.2% w:v	Weak 2.5% w:v	
O A Crystals	1	0.75	0.6	Oxalic crystals must be measured by weight. Sugar and water are about the same by weight or volume (1 pint of either granulated sugar or water weigh 1 lbs)
Sucrose	10	10	10	
Dist. Water	10	10	10	
OA Crystals	60g	45g	35g	
Sucrose	600g	600g	600g	Makes 1 liter Treats about 20 colonies
Dist. Water	600 ml	600 ml	600 ml	
OA Crystals	100g	75g	60g	
Sucrose	1 kg	1 kg	1 kg	Makes 1 liter Treats about 33 colonies
Dist. Water	1 Liter	1 Liter	1 Liter	
OA Crystals	232g	174g	139g	
Sucrose	5 lbs	5 lbs	5 lbs	Makes 1 + gallon Treats about 75 colonies
Dist. Water	2,5 qt	2,5 qt	2,5 qt	

Table of oxalic acid concentrations.

OA crystals (common oxalic acid dihydrate, sold as wood bleach) $\frac{1}{3}$ must be measured by weight. Sucrose is table sugar, which may be measured by either weight or volume. The concentrations in the first row are of actual oxalic acid content, not the dihydrate (note that 35g OA crystals in a liter of syrup would give a 3.5% w:w solution, but a 2.5% w:v). You do not need to adjust the formulas if you are using regular wood bleach (oxalic acid dihydrate).

Update 11/09

Dr. Nanetti recommends not applying more than 50ml total solution per colony. However, that works out to only 10 seams of bees worth, and some colonies have far more bees.

So what I do is to focus on treating the box with the most bees (top or bottom). If there are a lot of frames with bees, I simply move the wand faster to try to distribute the solution over more frames. I often apply more than 50ml total, with no apparent ill effect. Nick Aliano's research indicates that the bees will distribute the acid throughout the colony (at least in the nucs that he tested), but beekeeper anecdotes suggest that hitting all the seams works best.

If you use water with a high calcium content (hard water), the calcium will react with the oxalic acid, and create a white precipitate of calcium oxalate. If this occurs (test in a clear jar), then use distilled water. For easiest mixing, dissolve the oxalic crystals (common oxalic acid dihydrate) into warm water first, and then add the sugar.

The solution is safe to handle (rinse spills off your skin with water), but you should wear nitrile gloves and eye protection when measuring the crystals (don't get 'em in your eyes!) and a glove on your trigger hand. Caution: the mixed sugar/acid solution will undergo a chemical reaction in warm weather that produces bee-toxic hydroxymethylfurfural (HMF)—use it within a day unless it can be kept cool. However, it will safely store for at least a month when refrigerated.

Dr. Antonio Nanetti in Italy is a leading researcher on oxalic dribble, and feels that in Italy, a 4.2% w:v solution gives the best mite control (pers comm). This is stronger than that found to be effective by Dr. Marion Ellis in Nebraska, or than Canadian or North European recommendations. I asked Dr. Medhat Nasr about the differences. It appears that it has to do with winter temperatures and the duration of the winter cluster period. In colder climates, such as Canada or northern Europe, the "weak" solution in the table above should be used, or the colony may suffer from bee mortality during the long winter. In moderate climates, use the "medium" strength, and in warm climates, use the "hot" mix.

In California, I tried the "medium" strength this winter (for January 1st treatment), as opposed to the "weak" mixture that I've used the past few years, and got good mite control, with no apparent bee toxicity. However, I need to do a trial with more control groups next year, since some colonies that I treated for comparison with Mitawayll formic pads, later looked stronger than oxalic treated colonies in the same yard. I don't know if it was due to a positive effect of formic, or a negative effect of oxalic, or something else.

(continued on page 9)

Update 12/12/09 A number of beekeepers have used a cattle drench gun to apply the 5 ml dose per frame. These guns are available from any livestock supply. They have a hand trigger like a caulking gun, and a vinyl tube that goes to the solution. The advantage is that they can be set to accurately apply 5 ml per squirt. The disadvantage is that if you have many colonies, that your hand will cramp up from squeezing the trigger. In cold weather, it may be difficult to squirt 50% sugar syrup. Dr. Medhat Nasr tried 30% sugar syrup, and got good results.

Pros of oxalic dribble:

- Good to very good mite kill.
- Safe to mix and handle.
- Extremely inexpensive.
- No residues in honey.
- Quick to apply. No follow up trip to the yard to remove strips or rims.
- Good for accelerated sticky board mite monitoring.

Cons:

- Requires broodless colonies for best mite control; efficacy less when brood is present.
- Must be applied accurately!
- May cause brood rearing suppression; and some adult bee stress or minor mortality.
- Shouldn't be used more than once in fall or winter.

Oxalic Acid Vaporization

Oxalic acid can also be applied by vaporization. Vaporization has the advantages of not needing to open the hive, and the ability to apply during very cold weather. It also appears to be less toxic to the bees, since they may ingest less due to the lack of sugar syrup. However, the vapours are extremely irritating to human eyes and lungs, which is a legitimate safety concern.

I recently had the pleasure to visit Alberta, Canada, where I spent time with Dr. Medhat Nasr, who has done extensive and excellent research on varroa control. In Canada, winter can come on quickly following the honey flow, and beekeepers may not have time to use oxalic dribble. In such cold climates in Canada and Europe, beekeepers may use heat vaporizers to apply the acid to broodless clusters. Several vaporizers are on the European market, and in the U.S., Cowen Manufacturing has a new stainless steel vaporizer [2]. Dr. Nasr has developed an innovative oxalic vaporizer that uses pressed, accurately measured pellets of OA and a fan to disperse the vapour in the hive. He found that efficacy is greatly increased by the stream of heated air, which helps to allow the acid vapour to penetrate the cluster of bees.

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