Red River Apiarists' Association

The Bee Cause

Volume 13, Issue 7 October 2016

Next general meeting is 7:30 Tuesday, 11 October 2016 at the **The Elmwood Legion 920 Nairn avenue , Winnipeg.**

Speaker:
Urban beekeeping, with Chris Kirouac;

Executive support;

Honey show participation;

New elections committee

Inside this issue:

Killing Them with Kindness? In-Hive Medications May Inhibit Xenobiotic Efflux Transporters and Endanger Honey Bees David J. Hawthorne, Galen P. Dively
Published: November 2, 2011

Abstract

Background

Honey bees (*Apis mellifera*) have recently experienced higher than normal overwintering colony losses. Many factors have been evoked to explain the losses, among which are the presence of residues of pesticides and veterinary products in hives. Multiple residues are present at the same time, though most often in low concentrations so that no single product has yet been associated with losses. Involvement of a combination of residues to losses may however not be excluded. To understand the impact of an exposure to combined residues on honey bees, we propose a mechanism-based strategy, focusing here on Multi-Drug Resistance (MDR) transporters as mediators of those interactions.

Methodology/Principal Findings

Using whole-animal bioassays, we demonstrate through inhibition by verapamil that the widely used organophosphate and pyrethroid acaricides coumaphos and τ-fluvalinate, and three neonicotinoid insecticides: imidacloprid, acetamiprid and thiacloprid are substrates of one or more MDR transporters. Among the candidate inhibitors of honey bee MDR transporters is the in-hive antibiotic oxytetracycline. Bees prefed oxytetracycline were significantly sensitized to the acaricides coumaphos and τ-fluvalinate, suggesting that the antibiotic may interfere with the normal excretion or metabolism of these pesticides.

Conclusions/Significance

Many bee hives receive regular treatments of oxytetracycline and acaricides for prevention and treatment of disease and parasites. Our results suggest that seasonal co-application of these medicines to bee hives could increase the adverse effects of these and perhaps other pesticides. Our results also demonstrate the utility of a mechanism-based strategy. By identifying pesticides and apicultural medicines that are substrates and inhibitors of xenobiotic transporters we prioritize the testing of those chemical combinations most likely to result in adverse interactions.

Introduction

Honey bees are in trouble. Widespread depopulation of colonies often characterized by high overwintering losses has occurred since at least 2006 in the United States, threatening the sustainability of North American apiculture. Despite considerable effort, no single cause of the phenomenon called colony collapse disorder (CCD) has been identified, though associations of several pathogens and parasites appear to increase the risk of colony collapse [1], [2]. Pesticides are also among the suspected contributing factors of colony collapse both because bees encounter a diverse array of pesticides when foraging and because more than 120 different

(Continued on page 4)

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Presidents Comments for May, 2016

Greetings to all the Beekeepers.

Hope you all had a good honey summer. The reports don't reflect a good crop. No surprise there, with the amount of rain we had in June and July it did slow down the honey flow. Lots of fields were water logged and when the bees needed more suppers the beekeepers were not able to access the yards by truck to add more. Some had to wait till it dried up to take the honey off.

Most Beekeepers had between 110-140l b per hive. The market price is low and stagnant. Argentina crop started moving to the EUR market. After residue of Round Up was discovered in the honey, the buying stopped. The shelf price for the consumer did not change. It is not a good situation for the commercial beekeepers. I believe, if it will continue this way, many beekeeper will not survive.

The summer was good for the bees. There was lots of swarms which means there were lots of bees in the hives. I hope you have checked your hives if they are queen right and the queen is laying properly. (No drones) September weather was good for treatment and feeding. Some hives had a higher mite count, well visible after most of the capped brood hatchet and the screen bottom inserts were littered with mites. Mack sure you have your mite count under 1% going into the winter.

Our annual honey show-competition was well attended. The rainy weather kept people inside lots of busy activates around the tables and the display hive. The volunteers were busy giving advice from how to extract honey to how long a queen bee lives.

The honey competition had a low number of participants that entered. It did not reflect the amount of honey producers that are members of RRAA . Hope for a better outcome next year.

Looking forward to see you all at the October 11th meeting.

Waldemar

Red River Apiarist's Association
Minutes of the Regular Meeting
September 13, 2016

Chairman: Waldemar Damert
Recording Secretary: Art Quanbury

Approval of the Minutes of the previous general meeting
Motion: That the minutes of the general meeting held on May 10, 2016 be accepted
Moved: George Chwist
Seconded: John Speers
Carried

President's comments
Waldemar reported on the two bee rearing projects at Stonewall and at Tyndall. They were both successful activities. He asked John Badiuk to report on his experience with a flow hive. The flow hive kit costs $700.00 and the honey super alone is $280.00. The first pull yielded 27 lbs of honey and worked quite well. The second pull yielded 25 lb. There were a lot of swarm cells that had to be removed frequently. Two other club members reported on their experiences with flow hives and they were similar to that reported by John.

Honey Show
The Honey Show will be held on September 24 and 25. It must be an educational show in order to have the Forks waive the $200.00 fee for the space. The show will be held in the atrium that is a separate room near the elevators. Volunteers are needed for morning and afternoon of both days. The honey contest will be part of the show. Ken Rowes explained the contest details and encouraged everyone to participate.

Fall Management Details
Fall management can be summed up with 3 letters; PTF (pest, treat, feed). Treatment is not necessary if tests indicate few parasites. To minimize nosema proper insulation and ventilation is needed to prevent moisture from building up. The icing sugar shake test can be done to determine concentrations. (Treat if >10 mites per 0.5 cup sample of bees). Treatment can be formic acid or Apistan strips.
Feed sugar syrup of proper concentration; (1.4 kg sugar for 1L of water). Bees should take a 12 L pail in 7 to 10 days. Total feed should be 20 – 24 L of syrup/hive.
Brood should be checked for open brood or eggs. The queen should stop laying after a heavy feeding. There should be 2 frames of brood and 8 frames of honey going into winter.
A minimum of six frames are needed to winter. Robbing will not take place if there is a queen and the entrance reducer is in place.
Formic acid should be placed above the frames if temperature is >25 degrees and below frames if temperature is <25 degrees.

Insulation is necessary to keep bees from freezing; 2" of high density extruded polystyrene is sufficient. Hives can be wrapped in pairs to conserve heat. Wraps should go on in early November. The bottom entrance must be kept open. Hives kept on a platform above the ground will use more feed than a hive on the ground.

Swarming
Swarming was increased this year. Bees do not fly in the rain and reduced flying increases bee life so bees were living longer and colony populations were higher. Some nucs also swarmed but the reason is not known.

Plastic foundation
It is OK for honey but not OK for brood. The frames warp and are built out slowly. It is important to use drawn comb for nucs and splits. Building out a frame is equivalent to 4 lbs of honey production.

To keep bees producing new comb put two new un-drawn frames in each honey super in the spring.

Howard Alexander and Waldemar were thanked for the use of their bee yards for the queen rearing projects.

Loonie Draw : John Speer – apple juice ; Monica Wiebe-lip balm; Hans Horst – book; Alex Remkes – lip balm

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HONEY SHOW SEPT 24-25th/16

The Honey Show was a good opportunity for public education and PR for our association. People love mingling with real live beekeepers and of course live bees. Thanks Waldemar for your observation bee hive, they always draw a large crowd. We get a chance to educate and correct many misconceptions. Everybody gains. Don't we all love talking about bees!

A special thanks to all the volunteers:
Art Quanbury, Monica Wiebe, Duane Versluis, Ken Rowes, Victor Dyck, John Russell, Guy Dupuis, John Speer, Waldemar Damert, Fern Saurette, John Noll, Veronica Lamour, Angie Cormier.

A very special thanks to the honey contest participants and the judges: Ken Rowes, Rheal Lafreniere, Josh Kolesar.

MBA Report April 2016
Margaret Smith, RRAA MBA Representative
No report

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pesticides have been found within bee hives [2], [3], [4], [5], [6]. Some pesticides have received extra scrutiny, notably the acaricides coumaphos and τ-fluvalinate, applied to bee hives for control of parasitic varroa mites, and the widely used neonicotinoid insecticides. These acaricides are applied directly to bee hives, accumulate in wax and were found in nearly all hives recently tested in both N. American and France [5], [6]. The neonicotinoids (especially imidacloprid) are of concern because they are toxic to honey bees, used on many crops and ornamental plants, and they tend to be systemically distributed within treated plants, potentially contaminating nectar and pollen of treated and rotational crops not initially treated with these products [7], [8], [9], [10].

Although pesticide drift and overdosing cause accidental bee kills no single pesticide has been directly implicated with widespread overwintering losses or CCD [2], [5]. It remains possible however, that combinations of toxins may cause adverse additive or synergistic effects that would be difficult to detect through surveys of beekeepers or analysis of their apiaries without dedicated multifactorial analysis. It has been shown, for example, that the toxicity to bees of some pyrethroid and neonicotinoid insecticides increases significantly when combined with certain fungicides [11], [12]. Similarly, Johnson et al. [13] found that coumaphos and τ-fluvalinate each synergize the other's toxicity to honey bees, perhaps through competitive inhibition of the metabolic enzymes that detoxify those pesticides. Given the many pesticides that bees encounter there may be adverse combinations of them eroding hive health in both subtle and dramatic ways.

The problem, of course, is the large number of potentially adverse pesticide combinations which prevents evaluation of all, or even most, combinations of them. This problem challenges our ability to anticipate the risks associated with bee's exposure to a novel pesticide or to identify combinations of toxins contributing to a colony collapse. If we could identify mechanisms of the honey bee xenobiotic metabolism and excretion systems that systematically mediate multiple-toxin interactions, we could reduce the overwhelming number of candidate pesticide interactions to a smaller set of compounds that are substrates or inhibitors of the most predictive mechanisms.

The membrane-bound transporter proteins from the ABC transporter family of proteins are found in all phyla [14], [15]. The xenobiotic transporters in this family actively shuttle toxins across cell membranes to reduce the intracellular toxin and metabolite concentrations. Working in concert with metabolic enzymes, these transporters mediate a baseline tolerance to a diverse array of toxins including numerous drugs, pesticides and phytochemicals [16], [17]. Several of these transporters, especially members of the ABCB, ABCC, and ABCG subfamilies of transporters (referred to here as Multiple Drug Resistance, or MDR transporters), are of medical importance, playing a role in resistance to multiple cancer and antiparasite drugs [17], [18], [19].

MDR transporters are relatively unstudied in insects, and completely neglected in honey bee toxicology. These transporters act in several insect tissues, including the cuticle [20], malpighian tubules [21], [22], midgut [23] and at the blood-brain barrier [24], [25] to transport toxins, including pesticides, towards excretion [17]. The honey bee genome contains genes coding for orthologues of these proteins, which presumably protect bees from toxins as they do in *Drosophila melanogaster* [24], [26], [27], chironomid flies [28], mosquitoes [29], *Heliothis virescens* (tobacco budworm) [20] and *Manduca sexta* (tomato hornworm) [21], [25]. It seems reasonable therefore to consider the role that these proteins play in honey bee tolerance of pesticides and to begin an analysis of potentially inhibitory compounds that bees commonly encounter.

The most well studied MDR transporter, p-glycoprotein (p-gp), has both a diverse range of substrates and is inhibited by an array of drugs, pesticides and plant compounds [17]. This inhibition is a mechanism by which MDR transporters would cause adverse interactions among many chemicals; one compound inhibits the transporters thereby increasing sensitivity to other toxic substrates. The drug verapamil is a potent inhibitor of p-gp and possibly other MDR transporters [30], [31]. It is frequently used as the standard inhibitor of p-gp where it increases the sensitivity of treated cells, tissues or organisms to toxic transporter substrates [17], [18], [26]. Here we use verapamil inhibition to determine if 5 pesticides are substrates of MDR transporters and therefore potentially synergized by other inhibitors more likely to be encountered by honey bees. Remarkably, three widely used in-hive pesticides and medications (the previously mentioned acaricides coumaphos and τ-fluvalinate and the antibiotic oxytetracycline) are known substrates and/or inhibitors of mammalian p-gp [31], [32], [33]. We suspect that these in-hive medications and pesticides may be interacting with bee's MDR transporters, increasing their sensitivity to these and perhaps other pesticides and toxins. The frequent contamination of hive wax with these acaricides [6] and routine treatment of hives with oxytetracycline [34], [35], [36], [37] undoubtedly increases the exposure of bees to these compounds, with potentially significant consequences if they are indeed substrates or inhibitors of honey bee MDR transporters.

Interaction of neonicotinoid insecticides with insect MDR transporters has not yet been reported. Because of the likelihood of exposure of bees to these insecticides we ask if the neonicotinoid insecticides imidacloprid, acetamiprid and thiacloprid are substrates of honey bee MDR transporters. Evidence of neonicotinoid processing by MDR transporters would be significant because inhibition of those transporters **Cont'd on pg 5)**

(From pg 4) could cause mortality at lower doses than normally expected for individual compounds.

Results

When fed to bees verapamil significantly increased the toxicity of all 5 acaricides/insecticides. Mean mortality of young worker bees topically treated with the acaricides coumaphos or τ-fluvalinate was significantly higher when bees were pretreated with verapamil (Fig. 1, Table 1). Control mortality following topical application of acetone was 0% for both sucrose and sucrose+verapamil fed bees. Acute oral toxicity was also significantly higher for all three neonicotinoids (acetamiprid, thiacloprid, imidacloprid) when bees were pretreated with verapamil (Fig. 1, Table 2). Increased mortality at higher concentrations and at the later end point (48 h) was observed for thiacloprid, and at 48 h for imidacloprid. The effect of verapamil pretreatment did not differ among concentrations of these insecticides (Table 2). Control mortality of sucrose only and sucrose+verapamil cohorts averaged 2–3%.

Verapamil synergizes honey bee mortality by five acaricides/insecticides.

Mean mortality (±SE) of honey bees (average of 24 and 48 h) following topical (A, B) and oral (C, D, E) exposure to pesticides. Bees were pre-fed sucrose or sucrose+verapamil (1 mM) solution. For each pesticide, different letters indicate significant differences between treatments ($p<0.05$).

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Oxytetracycline significantly increased the mortality of bees exposed to coumaphos and τ-fluvalinate. For comparison with the verapamil synergism reported above, mean mortality of bees treated with 2 ug/ul coumaphos increased from 7% (n = 4 cages) to 51% (n = 4 cages) following feeding of OTC (1.4 mM), a significant but smaller increase than that caused by verapamil). OTC feeding increased the mortality of bees treated with 3 ug/ul τ-fluvalinate from 5.6% (n = 10 cages) to 39% (n = 8 cages), $p = 0.002$). Mean mortality of cohorts fed OTC alone were below 10% and were not significantly different from those fed sucrose alone.

Figure 2. Oxytetracycline (OTC) synergizes honey bee mortality by in-hive acaricides.

Mean mortality (±SE) of honey bees pre-fed sucrose solution (50%) or sucrose+oxytetracycline (1.4 mM) and topical application of (A) coumaphos (average of 24 and 48 h) and (B) τ-fluvalinate (24 h). For each pesticide, different letters indicate significant differences between treatments ($p<0.05$).

doi:10.1371/journal.pone.0026796.g002

Discussion

Here we provide the first evidence that the MDR transporter(s) inhibited by verapamil play a role in protecting honey bees from pesticides, and that the acaricides coumaphos and τ-fluvalinate, and 3 neonicotinoid insecticides are substrates of these transporters in insects. The observation that coumaphos and τ-fluvalinate are substrates of honey bee p-gp or another MDR transporter was anticipated from previous study of mouse cells, and suggests that insect and mammalian MDR transporters share substrates. Clearly, the abundance of these pesticides found in the wax and pollen of bee hives [6] coupled with evidence that their toxicity to bees is increased through inhibition of MDR transporters implicates them as toxins of interest in any multifactorial explanation of high overwintering colony losses.

This is the first report that neonicotinoid insecticides are substrates of insect MDR transporters. In efforts to protect honey bees, energetic opposition to the neonicotinoids has arisen in North America and Europe, but direct implication of them in overwintering losses has not been sustained by recent research [2], [6]. Estimates of the environmental exposure of bees to imidacloprid are typically low relative to the LD_{50} [6], and studies have not demonstrated hive-level consequences of imidacloprid contamination [38]. Our results suggest that inhibition of MDR transporters may reduce the LD_{50} of neonicotinoids possibly amplifying acute and chronic effects to bees at lower concentrations.

The large increases in sensitivity to pesticides by inhibition of MDR transporters and the chemical diversity of the synergized pesticides suggest that these transporters may mediate adverse synergisms of diverse toxins in bees. Because of its clinical importance in human health, proven and candidate p-gp substrates and inhibitors of many types have been identified [16], [17]. Knowledge of these compounds may help us identify chemicals likely to interact with honey bee MDR transporters. In the first application of this mechanism-based strategy to honey bees, we uncover a significant negative interaction among three medications routinely applied to bee hives [35], [36], [37]. OTC, coumaphos and τ-fluvalinate are all known to interact with mammalian p-gp [31], [32], [33]. If honey bee transporters behave similarly, we would expect increased toxicity following co-application of a toxic transporter substrate and an inhibitor. As anticipated, concentrations of OTC similar to those applied to bee hives increased bee's sensitivity to both coumaphos and τ-fluvalinate. OTC is applied to bee hives in the late fall and/or early spring, often in tandem with one of the acaricides [36]. Our results suggest that co-application of these compounds could increase the likelihood of intoxication by the acaricides and other pesticides contaminating beeswax and food stores. These results raise the possibility that adverse interactions of medications (such as OTC) and pesticides (coumaphos and τ-fluvalinate) contribute to the loss of honey bee colonies during the winter or early spring, a common feature of CCD. Although the per-bee concentration of OTC used here is similar to field application rates, the pesticide concentrations are higher than those found in bee hives (see [6]). Therefore, although we have demonstrated that verapamil and OTC increase bee's sensitivity to these pesticides in acute laboratory bioassays, additional testing of lower pesticide concentrations over longer time periods is necessary to fully understand the field relevance of these interactions. Additional work is also required to directly demonstrate that OTC inhibits p-gp or other efflux transporters in honey bees. Nevertheless, we show here using OTC and the acaricides as **(cont'd on pg 7)**

Red River Apiarists' Association

Editor's Note & musings by Ken Rowes

I apologize for such a technical main article, however, it does show medical research and knowledge is aiding in the bee world of understanding. Especially in the micro-chemical inter–play within bees.

It has taken me all of September to extract, strain and pack my last crop of honey. The longest ever, why, commitments and a fall hi moisture content. Finally getting it down it was a bit farther then expected 16.7% which meant it was a little harder to strain. That said it is exceptional to me with distinct flavour and dark amber colour.

Commitments were to the two RRAA apiaries I volunteered to provide honey supers for, manage some of the colony management and the honey collection, extraction and packaging while keeping lots separate and weighed for the RRAA association. Hop scotching around this with my own apiaries and the RRAA newsletter has had its toil.

I think it well that an editorial committee / group share the draft and publication. A simple template in Microsoft Publisher is used to which reports and articles of interest are pasted and /or composed. A file exists with articles of interest so when the need exists less hast is involved. The final article is captured in Adobe reader. The copy is e-mailed to the RRAA distributor and hard copies made from a transferred flash disc copy at Staples copying store in Winnipeg. These are stuffed in envelopes labelled and stamped once size and weighed by the editor then dropped in the mail in Winnipeg.

It would be convenient to have a person to capture and coordinate the classifieds, another who lives in Winnipeg who could capture a final copy via e-mail and carry out the final publishing and mailing to those who have no e-mail.

And of course an under studied so that If and when the editor (myself) steps down the editorial will be well stable for another to fill the position with some support learning prior to. Especially if the editor is away on holidays as past presidents have been wherein a 1st and 2nd vice president is available..

So my plea is for some editorial support to whom I will gladly guide and support.

CLASSIFIEDS

1 <u>For Sale:</u> Plastic queen excluders $3.50 each. **Contact, Lance W. Phone # 712-6783, Email; lancewld@gmail.com**

2. <u>For Sale:</u> Insulated hive boxes with Metal Lid and Bottom Treys $20; Honey-Frame Display Case $20,; Cobana boxes for comb honey $20; Nuc Boxes $10; Super shells with damaged frames $15; Boxes with wired frames but no foundation $10; Supers and Brood Boxes -$ 20 - $40; Honey pails- various sizes, Hive stands $5; Lids with metal or wood top $10; Bottom boards $5 / Screened Bottom Boards $8; Bee blowers $75-$150; Skunk prevention plates $1; Screened Plastic bottom boards $15; Inner covers $1; Frame building jig and Wiring jig and pre-cut wood pieces for building boxes and frames; Pure beeswax foundation $120 ; Boardman feeder trays, jars and lids $4; Beekeeping suits, gloves, veils, tools -all in excellent condition.
Smokers $20-$25; Fencers for bear protection $75 -$200; Metal Fence Posts, Fencing Wire; Bee Cozies Winter Wrap [new] $15; Mann Lake 3" pro feeders [new] / $25 case of 5.; Misc.
Charles Polcyn at 204 284-7064 or at vernapolcyn@yahoo.ca
Contact Charles_polcyn@ymail.com or Charles 204-284-7064 Wpg. Or farm 204-348-2506.

3. <u>Wanted</u>: Honey **contact: John at 204-943-0166 Email:honeyb@mymts.net**

4. <u>For Sale:</u> Honey from queen rearing classes $2.00 / lbs to members. In 9.5 kg (20.9 lbs) containers. Containers are Ken's and would like them returned.

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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 **Elmwood Legion 920 Nairn 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

(from pg 5) an example, how identification of MDR transporter substrates and inhibitors can highlight potentially dangerous chemical combinations and improve the assessment and management of toxicological risks faced by honey bees.

Materials and Methods

Insects

Bees were collected for laboratory bioassays from newly established colonies reared on new frames and freshly drawn comb. Colonies were not treated with apicultural medications or pesticides. Frames with emerging workers were taken from hives and placed into dark growth chambers maintained at 33±2°C and (70–80%) RH. Newly-emerged bees were collected from the frames daily and maintained in groups of 20–30 in 80×100 mm metal mesh cages capped at each end by standard polystyrene petri dishes. Bees were fed sucrose solution (50%; w:v) through 1 mm holes from a 2.0 ml microfuge tube.

Chemicals

Terramycin (oxytetracycline, 5.5% soluble powder, Pfizer) was purchased from Dadant and Sons (Hamilton, Illinois). Coumaphos, τ-fluvalinate (both technical grade) and verapamil were purchased from Sigma-Aldrich Inc. (St. Louis, MO). Commercial formulations of imidacloprid (Admire Pro) and thiacloprid (Calypso) were provided by Bayer CropScience (Durham, NC), and acetamiprid (Assail) was provided by United Phosphorous Inc. (King of Prussia, PA).

Drug pretreatments

Verapamil (1 mM) and oxytetracycline (OTC, 1.4 mM) were incorporated into 50% sucrose solutions for oral dosing of 1–3 day old workers. Preliminary feeding trials of 1 mM solutions of oral verapamil revealed no toxicity. The 1.4 mM concentration of OTC provides a per-bee exposure comparable to that of the label-recommended dosage of 600 mg applied to a hive containing 12,000 bees—a typical colony size entering winter [39]. Sucrose-drug solutions were made fresh every 3 days and the vials supplying each cage were replaced as needed.

Topical bioassays of insecticides/acaricides

Cohorts of 3–6 day old workers pretreated by feeding with the two sucrose-drug solutions were anesthetized with CO_2, and 1 ul of coumaphos (2 ug/ul)or τ-fluvalinate (3 ug/ul) in acetone (or acetone alone for controls) was applied to the dorsal thorax of each bee using an ISCO microapplicator driving a 1/4 cc tuberculin syringe. After application, bees were returned to cages containing the sucrose-drug or sucrose-only solution. Mortality of bees in each cage was recorded at 24 and 48 h. 5–10 replicate cohorts of 25 bees were tested for each acaricide - pretreatment combination.

Oral bioassays of insecticides

Pre-fed cohorts of 3–6 day old workers were fed sucrose syrup containing one of the neonicotinoids. Mortality of each cage was recorded at 24 and 48 hours. Imidacloprid was tested at 5 and 50 ng/ul, acetamiprid at 25 and 100 ng/ul, and thiacloprid at 25, 100 and 500 ng/ul. These concentrations caused low-intermediate mortality of bees fed sucrose-only solution in preliminary range-finding experiments. 2–13 replicate cohorts of 25 bees were tested for each toxin concentration - pretreatment combination.

Analysis.

The effects of verapamil or OTC pretreatment on insecticide/acaricide mortality were tested using a repeated measures analysis of variance (Proc Mixed, SAS). Following transformation (arcsine square-root), mortality was analyzed with a model that included pretreatment, insecticide concentration if multiple levels were used, and time endpoints (24 and 48 h) as fixed factors to assess the main effects and their interactions. Because only mortality at 24 h was available, analysis of τ-fluvalinate combined with OTC, was performed using a simple t-test, comparing the τ-fluvalinate and the τ-fluvalinate+OTC treatments.

Acknowledgments

We thank Jeffrey Pettis, Mike Embrey, Peter Swaan, Jeff Scott and David Onstad for thoughtful discussions and suggestions.

Author Contributions

Conceived and designed the experiments: DJH. Performed the experiments: DJH. Analyzed the data: DJH GPD. Contributed reagents/materials/analysis tools: DJH GPD. Wrote the paper: DJH.

References

For references please refer to associate numbers in text to the publication on line.

Editor: Guy Smagghe, Ghent University, Belgium

Received: December 3, 2010; **Accepted:** October 4, 2011; **Published:** November 2, 2011

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A NEW METHOD FOR OBSERVING HONEY BEE BEHAVIOUR

Observation hives have been used to study the behaviour of honey bees since the pioneering studies of François Huber in the 18th century. Observation hives generally consist of glass walled hives containing a small number of combs and bees. A frequent objection to their use is that they are usually housed and observed in daylight or artificial light, in contrast to the darkness of a natural bee nest. It has therefore been a criticism that results obtained using observation hives may not always represent normal behaviour. In a new study published in the Journal of Apicultural Research, Kaspar Bienefeld and colleagues from the Institute for Bee Research, Hohen Neuendorf, Germany, outline a new method for the long term undisturbed observation of bee behaviour under infrared light, which minimises these problems.

Their novel setup comprises a glass walled observation unit consisting of a single comb containing a queen bee, workers

and brood, together with an infra-red camera unit, and a supporting unit consisting of many combs of bees which is contiguous with the observation unit via a wire gauze. The supporting unit provides the normal temperature and humidity conditions of a complete colony, ensuring that conditions remain as normal as possible.

As an example of the use of this technique, the authors studied so called "hygienic behaviour", whereby bees genetically disposed to being hygienic, remove diseased pupae from the hive, in this instance due to infestation by the parasitic mite varroa. Although it has previously been clearly demonstrated that hygienic bees will remove pupae infested with varroa, the mechanisms whereby the bees identify that the cells are infested have remained unclear.

As described in the paper, the results of this study provide support for the hypothesis that bees are using foreign odours to detect the varroa mites and remove them from the hive.

IBRA Science Director Norman Carreck says: "This new technique will allow researchers to study undisturbed honey bee behaviour, and will have many uses in bee research".

http://www.ibrabee.org.uk/news/press-releases/3809-a-new-method-for-observing-honey-bee-behaviour

Red River Apiarists' Association – Executive Meeting

Peppercorn Restaurant in Oakbank MB.– October 1 , 2016

Present at the meeting:

Waldemar Damert, John Speer, Ken Rowes, Duane Versluis, Armand St. Hilaire, Margaret Smith, Art Quanbury (recorder)

The main purpose of this meeting was to address the issue of lack of member involvement as volunteers in helping with the activities of the association.

Discussion was wide ranging and addressed topics such as: consequence of having some executive positions vacant if incumbents step down and no one steps up to fill them; including a clause in membership renewal/application form to require members to be involved at some level; creating a life membership category for long standing members who might not be able to be more involved than attending meetings and passing on their considerable expertise; changing nature of honey show competition to make it less formal/intimidating and more of show casing Manitoba beekeepers and RRAA members products.

A decision was made to have exec. members prepare an outline of what is involved in the different exec., positions and the forming of committees that members could support and take part: that the several executive members make a brief presentation at the next regular meeting. (**My understanding was that we needed only to make a brief presentation at the upcoming meeting about our concerns re: lack of involvement and indicate areas where members can be involved. The written description will be prepared in time for the November meeting. Since we have a speaker, Chris, for the upcoming meeting we can't take too much time away from him)**

Honey Shows: Armand
Newsletter: Ken
Social: Art
Education and Promotion: Waldemar and Marg
Communication/Social Media: Duane

The next executive meeting is planned for October 29, same time and place

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MANITOBA HONEY SHOW
2016 Competition Results

Class 1

Liquid Honey, White
First place: Monica Wiebe
Second place:

Liquid Honey, Amber
First place: Donna Hourd

Liquid Honey, Dark
No entries

Granulated Honey, White
First place: Donna Hourd
Second place:
Third place:

Bee-Ginner
First place: Guy Dupuis
Second place:
Third place:

Best Taste
First place: Donna Hourd
Second place: Monica Wiebe
Third place: Alex Remkes

Class 2

Chunk Honey
No entries

Comb Honey
First place: Alex Remkes
Second place:

Frame of Honey
First place: Donna Hourd
Second place:

Beeswax
First place: Donna Hourd

Class 3

Photography
a) **Honey Bee Pollination**
First place: Jamie Peters
Second place:

b) **Beekeeping in Manitoba**
First place: Jamie Peters
Second place:
Third place:

c) **Other Bees and Insects**
First place: Monica Wiebe
Second place: Jamie Peters

d) **Honey – In Many Forms**
First place:
Second place:

Champion Honey Show Exhibitor
"Best in Show: Donna Hourd

Honey Judges:
Ken Rowes
Josh Kolesar
Rhéal Lafrenière

Congratulations to all entrants!! **—//\\—**

Canadian honey, half of which comes from Alberta, is being stung by fake Chinese stuff: Beekeepers

DAN HEALING, THE CANADIAN PRESS FIRST POSTED: FRIDAY, SEPTEMBER 02, 2016 01:42 PM MDT
CALGARY — As they finish harvesting this year's crop, Canadian honey producers say they are being stung with prices that have fallen by about 50 per cent since a year ago, a devastating blow that some are blaming on a global glut of what they say is cheaper, low-quality Chinese exports. While Prime Minister Justin Trudeau promotes closer business ties during his visit to China, the Canadian Honey Council accuses the Asian giant's honey marketers of improper trading practices, including disguising the origin of its products by shipping them through other countries and "adulterating" the product by adding syrup made from other sugars. China, for its part, says it takes strict steps to ensure quality inspections for its export products. "We've definitely tightened our belts and we're a little nervous if the price doesn't come up how many years we can keep going on," said Dani Glennie, a 20-year veteran of the Saskatchewan honey industry who has been working with her parents in a beekeeping operation since she was 11 years old. "What it takes to produce the honey in our operation is $1.27 per pound and right now we're getting $1.13 per pound. So we're losing money and at that rate we won't be in business very long." She said the farm was getting more than $2 per pound last summer. Industry participants say demand for bulk Canadian honey is low and storage capacity is limited because of unsold product from last year. Statistics Canada estimates 95.3 million pounds of honey worth about $232 million were produced last year. Alberta produced about half of that — 42.8 million pounds — up 20 per cent from 2014. Producers say this year's crop is at least as big as last year's. Ron Phipps, a global honey markets expert based in New York and member of the U.S. National Honey Board, says prices have tumbled as world honey exports rose by 60 per cent in the past 10 years. But he says modest growth in the number of hives and a declining productivity rate per hive due to bee health issues can't fully explain the honey glut. He, too, blames Chinese shippers, alleging that they have been routing product through dozens of countries around the world for years, in part to avoid U.S. anti-dumping levies on Chinese honey imports that have been in place for more than a decade. Phipps, who heads an import-export

company, alleges there is mislabelled honey coming into Canada and the U.S. and DAN HEALING, THE CANADIAN PRESS FIRST POSTED: FRIDAY, SEPTEMBER 02, 2016 01:42 PM MDT | UPDATED: FRIDAY, SEPTEMBER 02, 2016 01:53 PM MDT Canadian honey, half of which comes from Alberta, is being stung by fa... http://www.calgarysun.com/2016/09/02/canadian-honey-half-of-which-... 1 of 2 9/21/2016 3:29 PM new technologies are making it more difficult to identify it because they wash out pollen, antibiotics and other country specific markers. New processes can make the product lighter in colour and remove strong flavours so that it resembles high-quality Canadian white honey and commands a higher price, he says. Canada was the largest exporter of honey to the U.S. in 2015 with about 17 million pounds at an average price of about US$1.89 per pound, he said. The Chinese embassy in Ottawa said it was unaware of allegations that Chinese honey producers engaged in improper trade practices. "We currently have no information about the issue," spokesman Yang Yundong said in an email. "The Chinese government and enterprises have always taken strict quality inspection measures for export products." Kevin Nixon, a central Alberta beekeeper and chairman of the Canadian Honey Council, said he wants the federal government to increase the number of inspectors looking at honey imports and give them the advanced testing equipment needed to see through disguised shipments. He said he is scheduling meetings with officials from Agriculture Canada to press for changes to labelling regulations that would clarify for consumers whether they are buying 100 per cent Canadian honey products in grocery stores. According to the Canadian Food Inspection Agency, labels on honey products must show the country of origin for imported honey used in the product. The honey must also be given a quality grade of either Canada No. 1, Canada No. 2 or Canada No. 3, whether the honey in the product is domestic or imported. Nixon said some manufacturers put origin information on the back of the label and place the grading information on the front. That may leave some consumers with the impression the product is 100 per cent Canadian when it isn't, he said, adding that his organization would like to see the grading designation clarified by getting rid of the word "Canada." Dani Glennie, the Saskatchewan honey producer, said her family is dealing with the lower prices by putting as much honey as possible into storage. "Luckily we built a storage facility last year, otherwise we would have to liquidate whatever we could at rock-bottom prices," she said. She said the honey harvest at her farm, Glory Bee Honey, in Landenburg, Sask., wraps up this week, after which her family will feed and medicate its 4,000 colonies of bees and winterize their hives.

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Wax Works

Hillview Honeyworks has expanded their wax rendering plant becoming more efficient to give bee keepers the most out of their wax and slum glum with competitive prices. We also purchase wax . You are welcome to give us a call about the current wax pricing and how long it will take to render your wax.
Our rendering fees for this year are as follows

Cappings $.35 @ lb (which includes slum gum pressing)
Frames/slum $1.50 @ lb

We also offer queen excluders cleaning.

We are looking forward to doing business with you !

Mike Rodgers
204-871-4689
Mitchell Rodgers
204-871-6393

Red River Apiarists' Association - Winnipeg, Manitoba
2016 MEMBERSHIP APPLICATION

I apply for membership in the Red River Apiarists' Association. Membership includes one-year subscription to the newsletter "The Bee Cause" (8 issues)

RRAA membership fee (cheque payable to RRAA or Red River Apiarists' Association. @ $25.00/year
NEW: Optional Beekeeper Liability Insurance (**details on RRAA web, Links, Insurance)** @ $45.00/year

TOTAL PAYMENT ENCLOSED……$_____

Name _____ Tel. _____
Address _____
City _____Prov._____ Postal Code _____
E-mail address _____
Signature _____

New Member [ ] Renewal [ ] Student U of M Beekeeping course [ ] [free 1st year] Other. Please specify. _____

Newsletter Delivered in electronic pdf via e-mail [ ] or on paper via Canada Post [ ]

This completed form may be brought to the meeting or mailed with your cheque to : **John Speer, RRAA Treasurer**
Box 16, Group 555. Winnipeg, Manitoba R2C 2Z2. Please do not send cash in the mail