COOPERATIVE EXTENSION UNIVERSITY OF CALIFORNIA

from the U. C. APIARIES University of California

July/August 2015

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Newsletter Emailed to You

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Summer Research in the E. L. Niño Bee Lab

I looked at the calendar the other day and realized that the summer is almost over. Time flies when you're having loads of fun and doing all kinds of cool research! Members of the E. L. Niño Bee Lab have been busy as bees this summer and here is a little taste of what we've been up to.

Cameron Jasper (PhD student) and Kyle Gray (undergraduate volunteer) have been working very hard to test the synergistic effects of amitraz and several pesticides and adjuvants on the adult worker mortality. As amitraz (metabolites) can accumulate significantly in wax Cameron and Kyle are exposing workers to amitraz-laced wax while the other pesticides are being fed to the bees.

They have completed several rounds and as I'm writing this they are collecting data for the final round of the experiment.

This experiment has been supported by the grant from California State Beekeepers Association (CSBA) and the results will be presented at this year's convention in Sacramento, California.

And as if that's not enough, Cameron has also been working on two other projects this summer for his dissertation. Great work Cameron and Kyle!

We are sad to say good bye to our visiting student Stefanie de Heij. Stefanie came to us from the Wageningen University in Netherlands where she is (was) a Masters student. She has completed her minor thesis here with us at UC Davis on the effects of miticides and pesticides on queen development and reproductive health.

She has also done quite a bit of outreach while she was with us. You might have seen her at one of many Häagen-Dazs Honey Bee haven open houses explaining away what's going on in the observation hive.

In her studies, Stefanie got some interesting data. But as every good scientist we first need to repeat the study and then we'll share the results with you. We will give you a sneak-peak at the CSBA convention though. This study was also partially funded by CSBA.

By the way, Stefanie has successfully defended her Masters thesis not too long ago and we are proud to say she passed with flying colors.

You will be missed, Stefanie. We wish you all the best!

The final project we've been involved with this summer is supported by The IR-4 Project. This group helps bring novel management tools to those specialty growers who might not be on the radar of big pesticide companies.

Bernardo Niño and a group of wonderful student workers have been conducting a field trial to test the effectiveness of several biopesticides for the control of varroa mites. The current trial is still in progress and the next one is slated to begin in January 2016. Keep your fingers crossed that we get some great results. This work is partially being funded by Project Apis m (http://projectapism.org/). We thank Leonard and Linda Pankratz for providing the queens and Vita Europe Ltd. for providing Apiguard for the study.

This is also the perfect opportunity to welcome the newest member of our lab – Patricia Bohls. Tricia will be starting with us in September as a PhD student and will be joining the IR-4 field studies. Her later projects will likely include studies of

queens. And Tricia is super excited to work with beekeepers and growers, as well as to develop outreach programs for children and general public.

Welcome Tricia!

Bee-toxic Plants

(in collaboration with Eric Mussen, Emeritus Extension Apiculturist)

This summer a few people inquired about bee-toxic plants and what they could do to help their honey bees avoid it. Many of you are familiar with the California buckeye (*Aesculus californica*) and that it can be toxic to honey bees (you can read more about it here http://ucanr.edu/blogs/bugsquad/index.cfm?tagname=California%20buckeye). Buckeye is particularly problematic after a poor rainy season when the weeds are not quite as plentiful so the bees have fewer foraging options.

However, there are a few more plants that you might want to be familiar with if you live in California. Death camas (*Zigadenus venenosus*) contains toxic alkaloids and cornlily which contains steroidal alkaloids (mostly cyclopamine). There are also a few species of locoweed (also known as milkvetch) that could pose a problem: *Astragalus lentiginosus* and *A. lusitanicus* contain indolizidine alkaloid, "swainsonine", *A. miser* contains nitropropanol bearing glycoside, "miserotoxin" and *A. bisulcatus* contains selenium metabolites. Curiously, amygdalin can be found in almond nectar and it is toxic to bees in cages but they handle it fine when foraging on almonds.

One particular inquiry to us was about oleander. While oleander can be toxic to pets and humans if ingested in very large quantities, it seems that honey bees are just fine with it for a couple of reasons. Honey bees don't seem to be attracted to oleander very much (in all his years being curious about bees, Eric Mussen has only seen a bee visiting oleander once). And imagine this, oleander is a cheating plant and it doesn't produce nectar. It has pretty flowers to attract pollinators, but it doesn't actually reward them with the sweet nectar.

Now what happens with the pollen might be a different story, but usually bees will collect pollen from many different plant if present. This would likely dilute the effect of potential toxins. These are all likely the reasons why in the past 45 years Eric Mussen has never heard of bees being poisoned by oleander.

A quick note on a couple of things beekeepers do to minimize bee exposure to potentially toxic plants: move the bees from the area where the problematic plants are (but remember bees can forage up to five miles), place pollen traps to minimize the storage of pollen from these plants (it might be necessary to supplement feed bees if this

is the case), or simply count on the dilution effect (as I mentioned before, the bees forage on various plants so the pollens are mixed).

If you would like to learn a little bit more about some of the plant toxins potentially toxic to bees here is a reference: Detzel and Wink (1993) "Attraction, deterrence or intoxication of bees (*Apis mellifera*) by plant allelochemicals" Chemoecology 4 (1): 8-18.

Antibiotics Use in Honey Bee Colonies
(by Bart Smith, USDA)

On December 11, 2013, The U.S. Food and Drug Administration (FDA) implemented a plan to help phase out the use of medically important antimicrobials in food animals for food production purposes, such as to enhance growth or improve feed efficiency. The plan would also phase in veterinary oversight of the remaining appropriate therapeutic uses of such drugs. See http://www.fda.gov/AnimalVeterinary/NewsEvents/CVMUpdates/ucm378166.htm

Implementation will require a beekeeper to get a prescription or veterinarian feed directive (VFD) from a veterinarian who has a "Veterinarian-client-patient relationship (VCPR)" with the beekeeper in order to purchase and feed antibiotics to honey bees for the prevention and control of American and European foulbrood diseases. A list of drugs affected by this plan can be found at: http://www.fda.gov/AnimalVeterinary/SafetyHealth/AntimicrobialResistance/JudiciousUseofAntimicrobials/ucm390429.htm

It should be noted that the list includes oxytetracycline (Terramycin), lincomycin (Lincomix) and tylosin (Tylan) which were over the counter drugs labeled for controlling American foulbrood (AFB) in honey bee colonies. Oxytetracycline was also labeled for preventing AFB, and for the control and prevention of European foulbrood.

The FDA has been working with companies that produce antibiotics to make label changes on their products. During 2014, Elanco Animal Health changed the label for Tylan Soluble Powder to be prescription only. (Most existing stock of the over-the-counter product in the U.S. has been sold out and is no longer available at the time of this writing – 8-2015.) A copy of the new label can be viewed at http://www.elanco.us/labels/Swine/Tylan_Soluble.pdf

Zoetis, the maker of Lincomix, still has the product labeled for sale over-the-counter. ~~See the attached pdf file.~~ This product will be changed to prescription only before or by the end of 2016. (An exact time-line for the change has not been determined.)

On June 2, 2015, the FDA announced the Veterinary Feed Directive (VFD) final rule. See http://www.fda.gov/AnimalVeterinary/NewsEvents/CVMUpdates/ucm448620.htm
Drugs included under the VFD will require a veterinarian to write a VFD for a producer that will allow that person to purchase and use the product specifically as written. This will include oxytetracycline.

Prescription drugs for bees can only be obtained from a local or on-line pharmacy. Additionally, drugs included in the VFD may only be obtained from a licensed medicated feed mill.

A clarification from FDA: some oxytetracycline products will require a prescription and others will require a VFD. The bottom line is that a vet, who has a beekeeper as a client, will have to give an order for any antibiotic use on bees.

At the time of this writing (8-2015), it is unclear if Fumagilin B will be subject to the new requirements.

Can Plant Bugs Roust Bee Colonies?
(By Eric Mussen, Emeritus Extension Apiculturist, UC Davis)

"Can chinch bugs kill honey bee colonies?" a California commercial beekeeper asked me.

Chinch bugs are commonly occurring insects here, but they are normally turf grass pests that do not cause many problems elsewhere. In this case, the bugs were very numerous, especially inside hives that the bees had vacated.

Upon request, the beekeeper sent us some digital photos of the insects. They looked like nymphal false chinch bugs (*Nysius raphanus)* to our taxonomists. So, I looked up what false chinch bugs might be doing in a beehive. They were not feeding on the bees, as far as anyone can tell. And that is not surprising, since these bugs feed on plant sap, not other invertebrates.

What I did find is that false chinch bugs can build up very large populations quite quickly in the late winter and early spring, especially on mustard and wild radish, and on canola and other cruciferous plants later in the season. As the plants dry down or are harvested, the bug population moves into other irrigated crops or landscapes. According to information from the UC Statewide Integrated Pest Management Program: "Adults are good flyers and can move significant distances. False chinch bugs tend to aggregate in large groups on plants or on walls of houses." Sometimes they find their way inside houses and can become rather distressing.

In this case, it appears that after the canola adjacent to the apiary was harvested, the bugs sought new spaces to congregate, including all over the outside of the hives and inside six pallets of bee hives (36 colonies). Apparently, the number of bugs just overwhelmed 25 colonies and the bees absconded, leaving behind goodly amounts of viable brood.

I guess we haven't seen it all yet.

Nosema as STD

I'm sure most of you know by now that I am particularly interested in everything about queen mating, reproduction and health. So when I read an article talking about *Nosema* being horizontally transmitted from drones to queens during mating I thought I should share it here with you.

One of the big questions puzzling scientists is why do some animals mate with multiple mates while others don't. This polyandrous behavior is particularly pronounced in honey bees where *Apis mellifera* mates with an average of 12

drones (Tarpy et al. 2004 Insect. Soc. 51) while the giant honey bee *Apis dorsata* can mate with up to one hundred (yep, you read that right!) males (Wattanachaiyingcharoen et al. 2003 Apidologie 34).

Thus far several studies show that these multiple matings by queens can be quite beneficial for the colony. So why is it then that many more social insects are monandrous? One possible answer is that single matings reduce the chance of being exposed to sexually transmitted diseases (STDs).

And just how many STDs are honey bees exposed to? Well, we know about DWV being transmitted from drones to queens (de Miranda and Fries 2008 J. Invert. Pathol. 98), but what else? Authors of the article that appeared in Scientific Reports a couple of months ago show that we can possibly add *Nosema apis* and *ceranae* to this list.

To start off with, Roberts et al. found that 69% of drones tested contained *Nosema* spores in their semen. Interestingly, in the second year of testing drone semen contained only *N. ceranae* which is consistent with reports that *N. ceranea* is becoming a more prevalent *Nosema* species.

As the next step, authors instrumentally inseminated queens with either ~10000 *Nosema* spores in saline solution or with *Nosema*-containing semen. Queens were collected for further analyses either at time of death or after 25 days for saline-inseminated or 14 days for semen-inseminated queens. They confirmed that none of the saline-inseminated control queens were infected with *Nosema*. Three semen-inseminated queens were placed in hives to start egg-laying in order to determine whether they transmitted *Nosema* to their offspring.

The authors determined that *N. ceranae* infection was significantly more frequent and intense than *N. apis* infection. Interestingly, while *N. apis* was found only in the queen guts, *N. ceranae* was located in the gut but also in spermathecae and ovaries. Queens also contained far more spores than they were inseminated with indicating that *Nosema* was reproducing. This was the case with queens inseminated with both saline and semen containing *Nosema.*

Finally, while queens were found to harbor *Nosema* spores after insemination, they did not appear to vertically transfer it to their offspring. Four hundred eggs were tested for *Nosema* and none were found to be positive.

The authors do, however, point out that we cannot be completely certain of whether this transmission occurred directly via insemination or possibly via grooming after insemination. Regardless, it seems that pathogen and parasite transmission could indeed be one of the reasons why many social insects do not mate multiply. Most importantly, the queens can indeed become infected during insemination which should be something to be considered by bee breeders.

Full reference: Roberts et al. (2015) Scientific Reports 5:10982, DOI: 10.1038/srep10982 For the full article go to http://www.nature.com/articles/srep10982?message-global=remove

Kid's Corner: Jake Reisdorf and Carmel Honey Company

Normally, in this segment I like to present an educational piece, but this time I will be writing about something, or better yet, someone very inspirational.

If your parents, siblings, friends or neighbors attended the Bee Symposium at UC Davis this May then they might have told you about Jake Reisdorf. As he spoke at the Bee Symposium his passion for all things honey bees was very evident.

This young man of only 12 years of age learned about honey bees and thought they were fascinating. He started a hive as a class project and ended up with a business – the Carmel Honey Company.

Jake not only extracts honey from his hives, but he passes on his passion and knowledge to others by talking at various events. He also is planning on expanding his business by providing care for honey bee colonies for those who'd like to support honey bees but might not have the time to maintain the colonies themselves.

I had the pleasure of meeting Jake for only a brief moment, but I certainly hope I will continue seeing him around in the beekeeping community. He is quite an entrepreneur and all I can say is "You go get 'em, Jake!"

To get inspired by Jake and to learn about his business check out his website http://www.carmelhoneycompany.com/ or visit his Facebook page https://www.facebook.com/CarmelHoneyCompany.

And remember: You too can do more great things!

Upcoming Events

Lots going on in the next months!

1.) **Truth or Myth? Neonicotinoids and Their Impact on Pollinators: What is the Science-Based Research?** September 9, 10am-6pm at UC Davis Conference Center. http://ccuh.ucdavis.edu/public/copy_of_public/neonicotinoid-pollinator-conference-2015/neonic

2.) **Lunchtime drop-in: Learn about volunteer opportunities at the Garden.** September 25, 12-1:30pm. If you always wanted to learn more about pollinator-friendly plants here is your chance. Come find out how you can learn about plants all while helping the pollinators at the Häagen-Dazs Honey Bee Haven, UC Davis.

3.) **Fall open house: Integrated Pest Management for bee gardeners.** October 2, 5-7pm at the Häagen-Dazs Honey Bee Haven, UC Davis. A perfect opportunity to learn more about integrating various approaches into your garden pest control strategies.

4.) **Western Apicultural Society Conference 2015.** October 1-3, 2015. Healthy Bee – Bee Healthy! in Boulder, CO. http://www.westernapiculturalsociety.org/

5.) **BC Honey Producers Association.** October 15-18, 2015. Courtenay, B. C. Canada. http://www.bcbeekeepers.com/

6.) **Beginners Introduction to Mead Making.** Robert Mondavi Institute, Honey and Pollination Center, UC Davis. November 13 and 14, 2015. To register:

http://honey.ucdavis.edu/events/introduction-to-mead-making

7.) **2015 California State Beekeepers Association Annual Convention.** November 17-19, 2015. The convention will be held at the Hilton Sacramento Arden West, CA. To stay updated go to: http://www.californiastatebeekeepers.com/events.html

8.) **2016 American Beekeeping Federation Conference and Tradeshow.** January 5-9, 2016. Sawgrass Marriot Golf Resort and Spa, Ponte Verde Beach, FL. For more info: http://abfconference.com/

9.) **2016 American Beekeeping Research Conference** (in conjunction with ABF Conference). January 8-9, 2016. For more info go to: http://aapa.cyberbee.net/

Lastly, it looks like the El Niño will really be bringing us some rain this year. To read more in the UC Berkley Urban Bee Lab Newsletter "The Buzz" go to: http://us9.campaign-archive2.com/?u=53acb23a77cbcebd257dc3e5b&id=5b9876a177

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Sincerely,

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