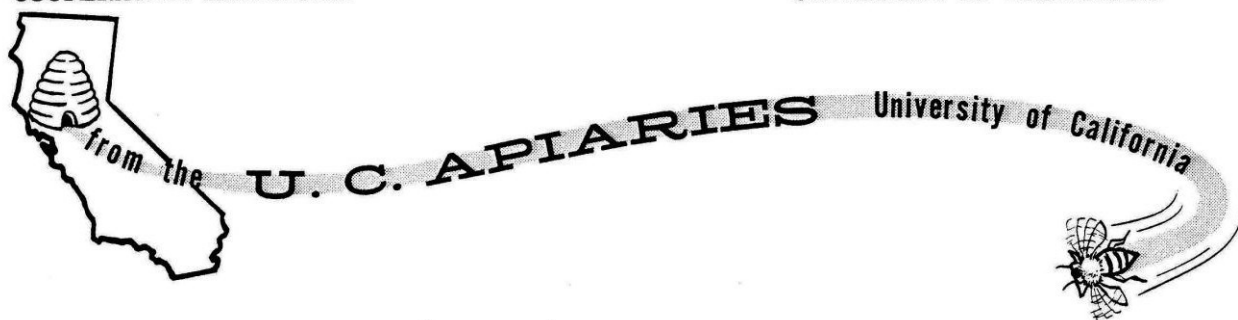


COOPERATIVE EXTENSION

UNIVERSITY OF CALIFORNIA



May/June 2015

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|---------------|--------------------------|--------------------------|---------------------|---------------|
| <i>Varroa</i> | <i>New research tool</i> | <i>Beekeeper tenants</i> | <i>Kids' Corner</i> | <i>Events</i> |
|---------------|--------------------------|--------------------------|---------------------|---------------|

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Varroa mite management

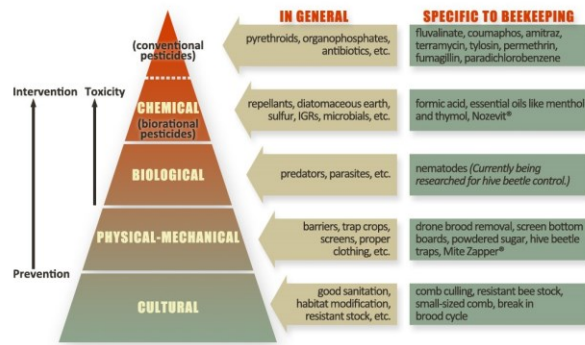
As I traveled around the state talking with different bee clubs I heard from many

beekeepers that they would prefer to use miticides for *Varroa* management only as their last resort. Since there are many great articles, blogs, websites already devoted to alternative *Varroa* management, I want this blurb to be a quick primer for those who are just starting beekeeping or those who are just starting to think about non-chemical approaches.

When it comes to pest or pathogen, control, an Integrated Pest Management (IPM) approach is highly recommended. This means that you should be making an informed decision about management by understanding the host and pest biology and their interactions and actions should be taken based on thresholds. Although, as a community we are still a little unclear as to what a true threshold is for *Varroa*. IPM also integrates multiple tactics and is considered safe, profitable and

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environmentally friendly. Below is a great rendition of the classic IPM pyramid that also incorporates beekeeping-specific approaches (modified from “Beekeeping Basics”, The Pennsylvania State University).



As the Pyramid demonstrates preventions should be the foundation of your management. To increase your chances of being successful, you should set up a plan of action well in advance of identifying any problems in the hive (this applies not only to *Varroa*). “Knowledge is power!” so you should try and check your colonies regularly and the frequency will depend on your beekeeping style, time availability, how many colonies you have, etc.

A quick side note! In the E.L. Niño lab we try to check our research colonies about every ten days, but that is because we really need to know what is going on with them at all times so we can conduct our research successfully. If you do decide that you will be checking your colonies less frequently just remember that if a queen is lost it takes 16 days for a new one to develop, about five-seven days for her to mate and then up to another seven days for her to start egg-laying. The queen lays about 1200-1500 eggs during the season so feel free to calculate how many workers you are

losing in this time period. The outcome could be worse if workers fail to make a new queen and you end up with a colony full of laying workers.

This brings me back to the topic at hand – *Varroa* management, and to the bottom of the IPM pyramid - cultural control. Cultural control means that you are changing the environment in such a way that it supports pest management. For example, purposefully creating a short break in brood cycle can help with reducing *Varroa* numbers in your colonies. Probably my favorite form of cultural control is the use of *Varroa* hygienic and/or resistant honey bee stock. There are several lines available for purchase (e.g., Minnesota hygienic, *Varroa* Sensitive Hygiene) or you can try and breed your own.

Going up the pyramid, physical/mechanical control includes things like drone comb removal. Mites prefer to develop on drone brood so to remove the mites a drone frame is placed in a colony, then removed after it is capped and usually frozen to kill the mites.

I’ve been asked by several beekeepers what to do if they want to use this form of control but are also wanting to provide drones for their breeding program. If you are interested, you can find an answer in a paper by Wantuch and Tarpy 2009 which specifically talks about how to use drone trapping without losing the drone population. The paper can be found here: <http://www.cals.ncsu.edu/entomology/apiculture/pdfs/Wantuch&Tarpy.2009%20copy.pdf>. Other methods are the use of a bottom board and powdered sugar dusting but they are likely to be more effective in combination with other approaches.

Biological control is a use of another living organism to control a pest (think ladybugs and aphids). Let me just mention a couple of unexpected, but potentially promising solutions. A species of predatory mite, *Stratiolaelaps scimitus*, commonly used for control of fungus gnats and thrips in plant production industry is being explored for varroa mite control. However, this is a soil mite and considering the differences between the soil and hive environment I'm not sure if this will be a sustainable solution.

Another rather interesting critter is being explored – a pseudoscorpion. After doing a quick search of the literature, I found a few articles that suggest pseudoscorpions might be preying on varroa mites in the hives, however, I also came across a few articles stating that pseudoscorpions are likely feeding on remnants of dead bees. Considering a great need for novel *Varroa* control options, it is likely that the exploration of these organisms will continue.

I will stop at biopesticides, and maybe tackle that topic in a future issue of the newsletter. “Prevention rather than intervention!” is likely to help you reduce the chemical input into your hives. No matter which management tactic you chose, the bottom line is you should be a good beekeeping neighbor and prevent the spread of *Varroa* which has been so devastating to the beekeeping industry.

Being a Good Beekeeping Tenant (in collaboration with Eric Mussen)

I started receiving inquiries about what to expect (and/or request) if a beekeeper asks to place their bee hives on someone's land. I mused over this with Eric

Mussen and we thought some of this information might be good to discuss here. Make sure you pass this info on to others.

We all know that the apiary locations are tough to come by, so it is very important, when you actually get the location, to maintain practices of being a great “tenant.” This will likely ensure your being able to come back to the same location year after year and you will be providing community service by protecting beekeepers' good name. For the beekeepers who have large numbers of colonies, hundreds or thousands, finding a suitable and safe resting location can be a particular challenge, but these suggestions relating to how to be a great tenant should apply to beekeepers with any number of colonies.

Among the first things to do is review the municipal and/or county ordinances pertaining to beekeeping at that location. If allowed

, then ask the owner for a permission to place the colonies on the property. Talk over any expectations and answer their questions. While not required, it might be a good idea to put a few things in writing to protect yourself as well as the “landlord.” If you are lucky enough and the owner says, “Yes,” then make sure you are accessible to them and keep communicating about any changes that might affect them (for example, when you will be bringing the colonies, if you would like to increase the number of colonies, etc.)

If bringing in large numbers of colonies it would be best if they are stationed in fairly isolated locations, again ~5 miles away from humans and other animals (e.g., livestock). This should prevent any potentially unfortunate

interactions between bees and others. For the sake of the “landlord” and primarily the bees, the beekeeper should periodically visit and check the colonies to determine what might need to be done with them (e.g., feed, pest management, etc.)

A big problem could arise if one doesn’t take into account availability (or lack-thereof) of forage and water. In CA and especially during these drought years, there is very little for bees to forage on in late summer and the beekeeper should, and they often do, feed supplemental feed (carbohydrates and proteins) to their colonies. This, among other things, minimizes robbing (especially robbing of other beekeepers’ colonies that might be in the vicinity), ensures resources for colony growth and most importantly precludes colonies from starving to death.

Bees need water just like you and I need water for our survival. They also need water to maintain the appropriate temperature and humidity in the brood nest in the summer months. Beekeeper should ensure there is an appropriate water source nearby for the bees, and if there isn’t such a source, the beekeeper should provide the water (or work out a deal with the landlord to help maintain a water source). Otherwise, there is a great risk that the bees will become a nuisance for the property owner or any other inhabitants within 4-5 miles that might have large sources of water in their backyards (e.g., pools and evaporative coolers are big favorites of bees).

A few other things to keep in mind. Will the colonies be behind a locked fence or not? With a recent rise in hive thefts many beekeepers are worried whether or not their hives or other equipment will still be

there when they come back to check them. This is yet another reason to keep your hives well maintained and behaving since the land owner might be willing to “keep an eye out” for your hives when you are not there. State regulations require that you register your hives and “post” apiaries off your property by either putting up an appropriate sign or marking the hives with your name (or company name) and your telephone number. Keep in mind that in certain areas fences might not only keep humans away but also bears.

A quick reminder, honey bees can be very sensitive and even succumb to toxins of certain plants. The notorious one is the California Buckeye, but death camas and cornlily in damp, upland meadows and locoweeds in drier areas can be deadly, also. It would be wise to check around and see if there are plants that could cause issue for the bees if they end up getting into them. I can tell you that honey bees don’t seem to discriminate against Buckeye and will readily collect both pollen and honey.

Now for the uncomfortable discussion – money. As the property owner could be held liable for honey bee related injuries it would be appropriate to pay the land owner a fee for the use of their property. There are no guidelines as to how much should be paid and this is usually something to be worked out between the two parties (although there was a mention of \$100-300 depending on the size of the location). However, many beekeepers do carry their own general liability insurance.

Lastly, make sure that you create minimal disturbance to the land where your bees are kept and ALWAYS clean up after you do any hive work. Probably my favorite

line from the California State Beekeepers' Association "Public Land and Land Owners 11/17/14" brochure is: "(beekeepers usually) Leave only footprints when they leave." Well, and presumably their hives.

If you have some time I would highly recommend you looking over the brochure as it not only tells the land-owners what to expect from having bees on their land, but also provides a clear set of suggestions for the beekeepers. You can find the brochure here: <http://www.californiastatebeekeepers.com/sources/Land%20Use%2011-17-14%20APPROVED.pdf>. For other useful information for California beekeepers take a look around the CSBA website <http://www.californiastatebeekeepers.com/index.html>.

A new promising research tool

I ran across this article a few months ago while writing a review on honey bee breeding and was fascinated! Schulte et al. published in journal PNAS discussing a successful insertion of a part of a foreign DNA into a honey bee genome. Since GMOs (genetically modified organisms) have always been a controversial subject you might be getting a bit worried at this point but please believe me when I say this is good news for the advancement of honey bee research. And NO – there are no GMO honey bees flying around.

But first let's start by talking about what was actually done. Some have attempted before, but not with success, to accomplish what Schulte and colleagues have succeeded in doing. While the entire process is too detailed to describe here, I'm providing a quick, simplified version.

Researchers started off by having a queen lay fertilized (female-destined) eggs which they then removed from the colony and injected with the genes of interest. Now just imagine all the effort and the hours that have gone into making this first step a success - honey bee eggs are remarkably tiny! When larvae hatched they grafted them into a queenless colony to create new queens.

They placed the emerged queens into small mating colonies and yes they made sure that no experimental queens or their offspring would get out. They then induced the new queens to start laying unfertilized (male-destined) eggs with carbon-dioxide, a commonly used anesthetic for instrumental insemination that also happens to trigger egg-laying. This created a large pool of drones they used to determine if the insertion of a new gene was successful checking for the presence of a fluorescent coloring in the heads of pupal drones.

While this was really just a proof-of-concept experiment, it is indeed a great leap for the honey bee research community. Even with increased interest in honey bee research there is still a lot to be discovered and let me tell you we are way behind those studying fruit flies - the lab rats of the insect world. But now, with a real possibility of being able to utilize this genetic tool the hope is that we will be able to more efficiently characterize many biological processes and how they are regulated, which in turn should give us answers as to what we could do to improve honey bee health.

For example, I am very much interested in understanding the regulation of honey bee queen post-mating changes (e.g., ovary activation, changes in pheromones,

etc.) and the specific drone contributions that regulate them. This tool should make my life easier and speed up the process of determining which drone proteins transferred to the queen during mating might, for example support queen longevity. These proteins could then be synthesized and used during instrumental insemination, the process often necessary for breeding pest and pathogen resistant honey bee stock, potentially increasing the queen life-span, sperm survival or egg-production. Wow, now I'm really excited about the possibilities and I hope you see the value in this advancement as well.

Full reference: Schulte, C. et al. (2014) Highly efficient integration and expression of *piggyback*-derived cassettes in the honeybee (*Apis mellifera*). PNAS 111(4): 9003–9008. doi: 10.1073/pnas.1402341111 (<http://www.pnas.org/content/111/24/9003>) For a brief commentary on this article go to <http://www.pnas.org/content/111/24/8708.full>.

Kid's Corner: Don't forget about the "other" bees!

I know, I know this is an apiculture newsletter, but I've been seeing so many other bees in our beautiful Häagen-Dazs Honey Bee Haven garden (<http://hhbhgarden.ucdavis.edu/welcome>) lately that I really can't help myself. I want to suggest a fun project you can do while supporting native bees that can be found in your back yard and are a very valuable contributor to the ecosystem (a community of living things interacting with other living and non-living things in their environment).

Did you know that there are approximately 4000 native bee species in the United States and over 1500 call California their home?! About 30% of these bees are solitary bees (unlike honey bees that live in large colonies, solitary bees spend their life alone) that nest above ground in various holes. And one way that you can help them is to provide them with a nesting habitat in your back yard.

Recently, I've had the pleasure of spending time with two Girl Scouts who want to provide a place in their community for the native bees to lay eggs and produce new bees. One way to do this is to get already cut and hollowed out bamboo sticks, bunch them up, tie with a yarn and place in a suitable place in your yard. But that wouldn't be that much fun now, would it.

To get your hands dirty you can use wooden blocks (not pressure treated as this could harm the bees) and burrow holes in them of various diameter and 2-3 inches deep. There are a few more things to consider when making these nests so before you go onto your bee block-making adventure you should visit: <http://hhbhgarden.ucdavis.edu/wp-content/uploads/2014/10/How-to-use-bee-blocks.pdf>

One of the requirements is to protect these nests from the inclement weather and this is where you can have a lot of fun, building and decorating your "bee houses" that will house your bee blocks. Let your imagination run wild and create something beautiful and very useful for your back yard!

To see a few bee houses in action come and visit us at the Honey Bee Haven

Planning Ahead for Your First Hives

Two sessions offered: September 13 and 20, 2015



Instructors:

Elina L. Niño and Bernardo Niño

Course Description:

We are very excited to be hosting our inaugural “Planning Ahead for Your First Hives” short course at the Harry H. Laidlaw Jr. Honey Bee Research Facility at UC Davis. The short course will include lectures and hands-on exercises. This course is perfect for those who have little or no beekeeping experience and would like to obtain more knowledge and practical skills to move on to the next step of owning and caring for their own honey bee colonies.

Lecture modules will cover:

- Honey bee biology
- Beekeeping equipment
- How to start your colony
- Maladies of the hive

Practical modules will cover:

- How to build a hive
- How to install a package
- Inspecting your hive
- Monitoring for mites

Participants will have the opportunity to learn about and **practice** many aspects of what is necessary to get the colony started and keep it healthy and thriving. At the end of the course participants will be knowledgeable about installing honey bee packages, monitoring their own colonies and possible challenges with maintaining a healthy colony.

Logistics:

The course size is limited to 24 participants per session. Please bring your bee suit/veil if you own one! The \$95 registration fee covers the cost of course materials (including a hive tool), lunch and refreshments on the day of the short course. Participants are responsible for obtaining their own lodging. Short course will be held at the Harry H. Laidlaw Jr. Honey Bee Research Facility on UC Davis campus. For directions visit: <http://elninobeelab.ucdavis.edu/map.html>

**For more information on registering for the short course contact
Bernardo Niño: elninobeelab@gmail.com.**

or you can schedule a guided tour with the staff garden director Dr. Christine Casey (<http://hhbhgarden.ucdavis.edu/visit-us/reservation/>). There are also many events happening at the garden this year so come and check us out!

P. S. Make sure you talk to your parents prior to using any tools to create the nests and remember “Safety first!”

Upcoming Events

1.) **Lunch drop-in: Discussion on Native Ants.** Häagen-Dazs Honey Bee Haven, UC Davis. July 17, 2015. Come and talk to our resident ant expert Dr. Philip Ward.

2.) **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>

Sincerely,

Elina L. Niño

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