UF IFAS
UNIVERSITY of FLORIDA

EPISODE 198 TRANSCRIPT

Jamie

Welcome to Two Bees in a Podcast brought to you by the Honey Bee Research Extension Laboratory at the University of Florida's Institute of Food and Agricultural Sciences. It is our goal to advance the understanding of honey bees and beekeeping, grow the beekeeping community and improve the health of honey bees everywhere. In this podcast, you'll hear research updates, beekeeping management practices discussed and advice on beekeeping from our resident experts, beekeepers, scientists and other program guests. Join us for today's program. And thank you for listening to Two Bees in a Podcast.

Amy

Hello everybody, and welcome to this episode of Two Bees in a Podcast. Today, we are rejoined by Dr. Andony Melathopoulos, who is the Associate Professor of Pollinator Health Extension at the Department of Horticulture at Oregon State University in Corvallis, Oregon. Anthony, we are so happy to have you back again.

Dr. Andony Melathopoulos

Great to be here Amy and Jamie.

Amy

So, we had you here in 2020. That was our first year of releasing the podcast. You were speaking to us in 2020 about pesticide applicator and then we also discussed viruses, bacteria and fungal pathogens. Jamie and I really wanted to use 2025 as a time to recircle back to some of the previous guests that we've had to just tell us about updates of your lab, of the projects that you're working on. And so we're excited to hear that. But before we get to that, some of our audience members do start listening to podcast backwards. So, can you just real quickly remind our audience a little bit about yourself, your background with honey bees and whatever else you'd like to share with us?

Dr. Andony Melathopoulos

Yeah, of course. I've been in honey bees since the ‘90s. I worked first. I did my master’s with Dr. Mark Winston. I was in the sort of the last cohort to go through there with Jeff Pettis and Danielle Downey. Great lab to be in. Then I worked at the National Honey Bee Lab in northern Canada in Beaver Lodge, Alberta. I did that for a number of years. I got to learn about the wonderful commercial beekeeping industry that we have on the Canadian prairies. I went back and did my PhD on lowbush blueberry pollination, where I was introduced to native bees and their role in some pollination systems, and then postdoc’ed with the great Shelley Hoover in

Lethbridge, Alabama, I think one of the best bee researchers doing practical research these days. And from there I was looking for a job and I got this great position at Oregon State University.

Jamie

Andony, I've been following all the stuff that you do and you're super active and super productive and we really could talk to you about a lot of different things. But my first question for you just deals with this massive, very large, probably the largest ongoing native bee survey effort in the US, So I'm going to ask you to talk about that. Also, I know you've got some links to the honey bee versus native bee competition stories that keep going around. So could you talk a little bit about this, this big project, this umbrella project where you look at these issues?

Dr. Andony Melathopoulos

Thanks, Jamie. Well, the initial motivation wasn't native bees versus honey bees. I've always loved apiculture. I think apiculture in the last couple of years has been underrated in regards to crop pollination. It's indispensable, and there's all these people out there who get great joy out of hobby beekeeping. And so, it was never that that initially motivated it. It was actually two things from apiculture that got me going on native bee research.

The first one was I knew you could say with some level of certainty how honey bee colonies were doing in a specific year. And when I got this extension position in the pesticide training and education that I talked about earlier, I needed to report back because that pesticide incident that brought about this position was a bumble bee poisoning. I needed to be able to report back to the legislature. How are native bees doing? And I thought this was a straightforward process. We do it in apiculture all the time, but it turned out to be very complicated.

This is where my second apiculture touch point comes in, is that I knew the bee clubs were out there. There was an organized group of people who are doing all sorts of things on the ground. It struck me that most of the native bee research was sequestered in universities and there wasn't really kind of groups on the ground that were engaged. So, I put those two things together, a native bee survey that was much needed because turns out we don't know anything very little about the distribution ranges, even a species list for many of the states out West with getting people involved with doing what turned out to be a very achievable task of collecting specimens, pinning them, curating them, identifying them.

So, those two things together have snowballed into almost 240,000 new bee records for the state of Oregon, by far the most contemporary bee records that have been amassed in any state. And what's really wonderful, it's each time they collect a bee, they have a picture of the plant. So, we have the interconnection between bees, native bees, even honey bees, they're collected as well, and the flora of Oregon. So that's the background.

Amy

So, Andony, how do you plan on using the data that you've generated? How do you plan on using this information? And are you going to continue doing this survey as well?

Dr. Andony Melathopoulos

Well, on the question of continue, yes. We have now -- again, thinking about the beekeeping model that was always in the back of my mind -- formed an analog to the master beekeeping program called the, get this, Master Melatologist program. So, the Master Melatologists are trained, there's an apprentice level, a journey level, and we're hoping for a master's level soon where people just immerse themselves in melatology, the study of bees, which also includes honey bees, obviously, but you know, they're really trained to collect specimens. And now they've become this, it's expanded. So, Washington State Department of Agriculture is doing something very similar, British Columbia, Idaho, New Mexico. So now we've got this network of finding where these bees are, what their forage host plants are. And that kind of resolves one of the questions that I had at the initial stage, which species are in the state and how are they doing? There are some bees in the state of Oregon that have been collected exactly twice in history. You can't construct a range around something like that, but for some of the more common species, we now have good range maps, and we can start to answer some questions about how bees are doing over time.

My goal is twofold. The first is for people who are doing restoration work to have a much better tool for understanding what're the most consequential plants for the bee community that you have in an area. I think this bears in another way. Where should those plants be planted? I think, commonly, an approach that's been taken across the United States, especially with federal agencies, is to assume that in an agricultural area, the bee community, the native bee community, needs to be served as opposed to apiculture. What I think this does is it drives up prices because to do restoration work for native bees is much more expensive than planting legumes or something like that that will serve apiculture. I think what this is going to do in the long run is prioritize areas of high bee biodiversity where investments should be made. It also can help unravel what I think is the most frustrating thing that I've encountered, this native bee apiculture dispute, because we'll quickly see that there's areas that dominate for apiculture, and there's areas of a state or a region where the high bee biodiversity is, often in the high deserts, and these areas don't correspond to one another.

There's actually the big spatial separation between the regions where honey bees predominate and where our native bee biodiversity is. I think this will start to unravel these disputes and give us focus and be able to make investments in a sensible way over time.

Jamie

So, Andony, I actually find that fascinating. This is the first I've heard of this information and it's very interesting. I wonder if that holds true for other populations of native bees across the US.

That kind of leads really nicely into this next question I have. As you know, we have a lot of these questions that we, we pre-script to make sure we ask you everything that's cool that we want to know that you want to discuss. I just got a comment here about cuckoo bumble bee interaction with the apiculture industry. Behind the scenes, you mentioned some restrictions of land managers for apiaries. In other words, you can't move apiaries to certain places based on how the land manager feels about bringing in a non-native species. So, this seems like a big issue. You've already alluded to it in some of your earlier comments. So, you could talk specifically about that particular issue with the cuckoo bumble bee and maybe land restriction. But how do you recommend more broadly you balance these two issues of wanting to keep honey bees for all the reasons we want to keep honey bees, but also being aware of native bee populations that could be affected?

Dr. Andony Melathopoulos

Yeah, that's a great question, Jamie. The cuckoo bumble bee issue is one that I think is the tip of the iceberg when it comes to potential restrictions on apiculture, in the West at least. So, we've had two bumble bees that are listed in the United States and both of them have deemed that there's not enough information to designate critical habitat. So, when the species get listed, critical habitat can be designated, and that's habitat that's required, that's needed for the recovery of a species. There's a species that's just being proposed for listing right now, comments have just closed. Apiculture was drawn out for this cuckoo bumble bee. So, unlike honey bees, I guess Apis mellifera capensis is kind of like a cuckoo bee, but not really. We have social parasites rampant amongst bumble bees. So, there is a whole genus of bumble bees that parasitize the nests of other bumble bees. It's common. There's one that's a host on a bee that's another bumble bee that's had a restricted range, the Suckley cuckoo bumble bee. If you look at that section, it says on the listing of it, because it has experienced, it's very difficult to find now, it says apiculture may be considered, restrictions on apiculture may be considered as critical habitat, so that a beekeeper in an area that's deemed to be critical habitat would be restricted from making colonies up there.

I think we're already seeing this outside of the Endangered Species Act, where you might have a land manager or maybe you're out in Georgia or in Florida and you try to bring some colonies on, they say, I'm worried about the native bees. So, this is a very specific issue that has broader implications. When I went back and looked at the records that we submitted from Oregon, which were the largest quantity of data that when Fish and Wildlife is looking to do an assessment of a species for whether it's endangered or threatened, they ask everybody for data. And we provided a lot from the Oregon State Arthropod collection by our taxonomist, Lincoln Best.

When we went through those records, it was notable how old they were. First thing, there were lots of problems with the data. The age of the data is really significant because often times when people recorded a bumble bee in the 1930s, they would say Corvallis on the label, or they just write it down. It turns out that if you look at records where there is an actual elevation put on the

label versus the ones that had no elevation, there's a huge difference. Makes you think that the person who caught the bumble bee in Corvallis may be potted at very high elevation and looked at the closest town. So, when you look at just the elevation of this bumble bee, very high elevation bumble bee outside of where most apiculture takes place, outside of where most agriculture takes place. So, in some ways, it's a roundabout way of coming to it, oftentimes when people look at native bee honey bee competition, it's based on data that's thin. It's also based on data that is exceptionally old and maybe unreliable.

So, we've written to US Fish and Wildlife Service saying that, in both of these cases, there's not a really strong case that apiculture will have an effect.

Amy

Yeah. So how do you recommend that we balance the two?

Dr. Andony Melathopoulos

I come back to getting data, and I think what's really crucial is being able to highlight in a region or a state these areas where there are extant plant communities, where there are unique bee communities, and being able to target them for restoration. And I think this means for beekeepers in the beekeeping industry, when the conservation group say this monument needs to be protected, we have to get behind them and say, yes, we agree, those places need to be protected. This should be another trade-off, which I am frustrated with, the conservation organizations, in turn, when we have a massive honey bee colony loss like we're having this year, or when we need some low-cost forge in valley bottoms, they need to back that up. I think the fragmentation that we lacked, frankly, during the Obama presidency when there was a kind of concerted push is not helping matters.

We have to be able to get on one consistent message, and we should be able to chew gum and walk at the same time. We'll be doing things more efficiently. It'll be more cost effective if we target areas of high bee biodiversity and put special resources there, and, really, when we're in agricultural areas, focusing on apiculture resources to be more cost effective. But it really will lead to better outcomes. And it's frustrating to me the extent to which this seems to have splayed into two arguments, when in fact it's one.

Amy

Yeah. So, I want to take this conversation over to looking at some of the other projects that you've also been working on and looking at the feasibility of forage in different agricultural contexts. So, could you tell the audience about some of the projects related to the forage in in these contexts?

Dr. Andony Melathopoulos

Thanks, Amy. I really think that Project Apis m. is a consequential organization in the United States. All beekeepers should support it. I was recently in California, and I was really amazed at the Seeds for Bees program where there is, for beekeepers from around the US who come into almonds for pollination, increasing acres of legumes and Brassicas ready there for the bees. There are all sorts of evidence that this helps the colonies out. I saw a survey recently where beekeepers are willing to offer their colonies at even a slightly lower rate if the grower does these investments. It's wonderful. It's the most successful program out there. I am jealous. Living in Oregon, just north, we don't have that kind of program in place. Of course, we don't have almonds. So, this kind of changes the dynamics and the economics of this. But I really was interested in seeing where we could stick forage into agricultural areas in the way that I described, a really cost-effective program like Seeds for Bees for Oregon.

So, I applied for funding from Project Apis m., and I've had a number of projects where I've looked at the real problem that we have here in the arid west. There's no problem. Any beekeeper in the Pacific Northwest knows in the spring your colonies are invariably going to swarm. The nectar and pollen pulses in the Pacific Northwest are strong in the spring. There's no need to supplement anything in the spring, but after our blackberry, our main honey crop goes in June out of bloom, we have nothing, and it's really hard for those colonies. There's a real need to get something that's going to, after everything dries down, sprout back up and bloom and provide a final nectar and pollen pulse. So, I've been really focusing on that issue. One project that we did with Project Apis m. funding is we looked at about 73 forage plants, everything from forage chicory, sweet clover, various Brassica species, forage parsley, things that could be grazed in the spring and would grow back. We evaluated them for nectar and pollen production, and we found some interesting things, at least for our region. The one thing is right on top of it all are all the Brassicas, the mustards, the forage cabbage, they're all very high pollen producers. Anybody who's ever tried to make a honey crop close to a Brassica crop knows it'll be contaminated with Brassica pollen immediately because there's just so much pollen coming off it, tons of pollen. They're also pretty good on nectar as well. But we found when it comes to legumes, at least in our region, and this is interesting, out competing things like alfalfa and some of the clovers are bird's-foot trefoil. Bird's-foot trefoil in our region is the most consistent nectar and pollen producer when it comes to legumes late in the season. So, two really great findings that have come out of this. Right now, we're doing a research project, another follow-up project. We noticed that one place where some of this habitat could go are on field margins. We have, out here in the West, unlike out there, the grass goes brown about after the last mowing in May. What if we could have some plants in there that could survive in the grass and then once that grass goes dormant, we could have this tremendous bloom late in the year. So, we have this beat up the grass project where we have these turf plots, which we're timing very targeted herbicide applications and also flail mowing. And it's trying to see how we could maximize the establishment of these turf systems on the edges of fields. That's just underway, but the plots look great.

Jamie

So, Andony, then I want to pivot to some of the results and management recommendations that you have from these projects, like based on the information that you have coming in, what are what are some comments you would make to that?

Dr. Andony Melathopoulos

We have a problem with Brassica in the Pacific Northwest in that we are also a leading supplier of that seed, and so there are restrictions on growing Brassica plants in our region. So, we're really starting to focus on two plants, well three plants, actually. The one is a forage chicory, which blooms late in the year in a non-irrigated system, the trefoil, but also California poppy. The problem with the trefoil is once it establishes it's great, but we need to be able to take the grass away enough, the competition, for it to establish. And the problem whenever you do this in any system, if you take the grass away, then invasive weeds move in. So, we're trying to come up with a nice lock key system that you could set the grass back sufficiently so that you can get this trefoil established. If we could get large areas of trefoil established on field margins across the Pacific Northwest, it would fill a void that we currently have in terms of nectar and pollen in the Pacific Northwest.

Amy

So, I know I had pivoted over to the foraging and the agricultural projects that you were talking about. I want to go back to the native versus the honey bee issue. Can you tell us where you would like to see this go and then what recommendations do you have regarding this issue?

Dr. Andony Melathopoulos

Well, I guess the first thing is I think beekeepers are predisposed to do melatology. I have never met a beekeeper who says I hate native bees. I hear this narrative out there that beekeepers are opposed to native bee conservation. They're not. We know the biology. We know the anatomy. We are really interested in them. So, I think the first thing is having opportunities to learn more about this issue because I think sometimes you may go to the farmers' market and somebody says you're selling honey, and they say, but isn't that hurting the native bees?

I promise you that the person asking that question doesn't know that much about native bees. So, first message is as beekeepers, you need to educate yourself. Get some rudimentary background on native bees, you know a lot more than you think you do and heading off that kind of public conversation.

The second thing is we need way more data. I think there are real threats to native bees, but I think we're dealing with it in a scattershot way. I think we need to identify and pinpoint where those areas are and really put our muscle behind fixing them. And this is going to require more data. So having initiatives that are serving native bees, not using these old records and

extrapolating forward, but actual contemporary surveys of native bees, I think we need more of them. Those people as well, in the Master Melatologist program, for example, need to appreciate apiculture. So, when they're being educated on native bee surveys, they need to have a sense of how difficult apiculture is on a commercial scale, how necessary, you can't actually do without apiculture, and how pleasurable it is. I think some people who get focused on native bees don't realize how fascinating Apis is. It is a fascinating native species in Europe and Africa and the Middle East. So, it is a native species and it's really interesting. They should learn more about it. But boiling it down, I think on a continental scale, we have to find these hotspots, and we have to have a program at the federal level that targets apiculture specific forage where apiculture predominates, and native bee forage where we have native bees predominate.

If I can just say one last thing, I hate the opposition of honey bee to native bee. It assumes that native bees are one thing. There are some native bees that are so common, no threat of anything happening to them in every city. The same native Holictus ligatus that you find in Portland, you will find in Georgia, or you'll find in Florida. “Native bee” is not very descriptive. We have to move off of that. There are super common native bees that are ubiquitous. We need to be able to talk about the native bees and target the native bees that are actually having some trouble. Talking about them as honey bee versus native bee as a blanket is unhelpful.

Jamie

Andony, I really appreciate your stance. I don't know how to say it except the native bee versus honey bee issue that we're facing. I think you really laid out a good road map. This one's particularly important to me. Obviously, I work really on behalf of honey bees and beekeeping sustainability because that's what I was hired to do at the University of Florida. But I will say, from like a personal level, I've been keeping bees since I was 12. At the time of this recording, that was 35 years ago. So, I just have a long-standing love and appreciation for honey bees and apiculture. Now, as someone who professionally has to answer this question all the time, well, what about their impacts on native bees? What about these issues that we're facing? And do we need to ban them? And all of these other issues? It's a really difficult issue for me personally to face.

So, I just want to say thank you for your take on it. I like the fact that you give an endorsement of data-based information and decisions. I feel like around the world, we often make a lot of knee jerk reactions to a lot of things that show up in the science realm. I'm a huge fan of data gathering and data-based decisions, but it takes time. It just takes time to get that information to make those wise decisions. I just want to say thanks. I appreciate you joining us on this podcast.

Dr. Andony Melathopoulos

Thanks, Jamie. Thanks, Amy.

Amy

Something I really liked about that episode, Jamie, was when Andony was talking about, you know, we really have to lay off the native bees versus honey bees. He said that, and it was like, yeah, we probably do. I mean, how many times do we get emails and people ask us about what is this competition? And we hear this and that. So, I'd love to hear your thoughts on this.

Jamie

It's a tough issue for sure. Like I said when I was speaking to Andony directly, I've been keeping honey bees for a very long time myself and love it. Of course, that's not a justification for allowing honey bees to be in a place if they truly are hurting native bees. This explosion of honey bee research that's come out as a result of Colony Collapse Disorder in 2006, now, there's bee labs all over the country and all over the world and honey bee people, etc. It's also created an explosion in native bee researchers. It started to feel 15 years ago like an us versus them situation. I know a lot of scientists are trying to walk the line very carefully, but the truth is, and I believe what Andony believes, the truth is, we just don't have the volume of data that would be necessary to make some of the claims that people are making against or maybe even in some context for honey bees in this, quote, native bee versus honey bee issue that we're facing.

This is not an issue that's unique to the US where honey bees aren't native. Even in Europe and other places where honey bees are native, there's the, well, honey bees may be native here, but you guys are keeping them in much higher densities than they normally would be, which is hurting the other native bees. I really like the practical and very pragmatic view that Andony's taking. We need more data. It's definitely a bit more specific than these over generalizations that people are making. There might be hot spots of areas that honey bees don't have to visit, but that would be very good for some of the threatened native bee populations. And like he said, not all native bees are created equal. There are some whose populations are doing just fine, thank you. So, it's a very nuanced story that I feel like is not being communicated well. I appreciate Andony's thoughts on it.

Stump the Chump

It's everybody's favorite game show, Stump the Chump.

Amy

Okay, everybody. Welcome back to the question and answer segment. Jamie, the first question that we have today is about drone comb. So, using drone comb within your integrated pest management, when and how do you use drone comb? Will Varroa levels go up if you do it wrong? Because we've talked a lot about Varroa being in drone comb and using that in drone comb. So, will levels go up? There are a lot of parts to this question, so I'm going to start there and then and then I'll ask follow-up questions. How about that?

Jamie

So, this is a good series of questions, and I really appreciate the opportunity to go over this. So, drone brood removal is one of those things that's named what you do. The idea is that Varroa are more attracted to drone brood than they are to worker brood. So as a result, you can substitute one of the frames in your brood box that is predominantly worker comb with a sheet of drone foundation. The bees will build out drone comb, the queen will lay unfertilized eggs in it. So, essentially one of your frames can be dedicated to the production of drones. Now that you've got this frame that's full of drone brood, the idea is that mites will preferentially go to that drone brood. It doesn't mean there'll be no mites in the worker brood, it just means that a lot of them will go to drone brood. Once all those larvae are completely capped over on that frame of drone brood, you can remove that frame, freeze it for 48 hours and return it to the nest. That freezing will kill the developing drones, it'll kill the developing mites. The bees in the nest, then, will go clean out the drones from those brood cells, and then the process starts over again. You would do it and do it and do it and do it again, constantly taxing that Varroa population in the nest. So, obviously, this is something that can reduce Varroa populations. But it is also obvious that this is somewhat labor intensive, right? You've got to put this drone comb in there. You've got to time it such that you go back once it's all capped. The bees are putting the energy into producing drones that you are then taking from them and killing. So, it's kind of a net energy sink in that regard. But on the other hand, it might be worth it if you reduce the Varroa population such that they're not going to be a problem for your colonies later.

Now, I know those of you who've listened to our podcast for a long time know that I routinely give an endorsement of the Honey Bee Health Coalition's resources on Varroa control. And they have a fantastic document, a fantastic PDF on Varroa control outlining how to sample all this stuff. Towards the middle of that document that you can find online by Googling Honey Bee Health Coalition Varroa and scrolling down until you get the management guide, about the middle of that document, they go through the typical life cycle of a honey bee colony throughout the year. So, it starts kind of dormant. There's low or no brood, the bees aren't so active. The population increases, where the population is growing rapidly, lots of brood being produced. This is what you see in late winter, early spring. Then it goes through peak population when the colonies are as strong as they will be, kind of coming out of the major nectar flow and going through summer. And then you've got a population decrease in fall until you kind of get that stable population in winter. Why am I telling you all this? Well, if you go to those tables in that guide, it puts drone brood removal in highly, moderately, or lower effective options or least effective options in those different phases.

So, for example, in the dormant phase, drone brood removal is not even an option because they're not producing drones. During population increase, so, late winter, early spring, they rate drone brood removal as a highly effective control option because you're taxing an already low population of Varroa. The bee populations are growing and it's something that you can do, and they rate it as highly effective. At the peak population of honey bees in a colony, they put drone brood removal as one of the least effective options. So, in late spring, going through summer, it's

not something that's going to make a big dent in Varroa populations in your nest. And then when you're going into your population decrease, late summer and fall, drone brood removal stays a least effective option, again, because the viral populations are so high at that point that taking out that drone brood is not very effective. So, not only do they have that, but they even have an entire page dedicated to drone brood removal to talk about the efficacy of drone brood removal and the timing of using it. But I just kind of use those examples to answer your very basic questions.

Amy

So, in the process of drone comb removal, you talk about how you take a frame out, right? You take that drone comb out; you stick it in the freezer for 48 hours. So, a couple of follow-up questions related to that. When you take that frame out of the hive, should you leave that space vacant, or should you put another frame inside of it? Well, I'll let you answer that one first, and then I have another one.

Jamie

For sure. So, I'll do that one first. Let's pretend you've got a standard ten-frame Langstroth hive body, and one of those frames you've dedicated to the production of drones. So, you've got nine frames that are pretty standard with standard foundation, worker size cells, etc. And you've got that 10th frame that's now drone comb, drone brood removal, rotational frame. So, when you take out that frame, you've got that gap in the hive. I would not leave that gap. I would put a frame of some sort into that gap. Otherwise, the bees are going to build Burr comb if there's nectar coming in. So, the best way to do this is to replace it instantly with another pulled comb of drone comb so the queen can instantly start laying. But if you follow that pattern, if you think about that pattern, let's just say you put in a brand new pulled drone comb, the queen lays eggs in it, it takes three days for those drone larvae to emerge. Those larvae then grow and grow and grow over the next week before the cell is capped. Then once it's all capped, you remove it because mites have gone into those capped cells. Well, if you put a fresh drone comb in there, it's another 10 days or so, maybe a little bit longer, before mites are ready to go into drone brood that's the right age. So, really, you're not constantly taxing Varroa populations because the timing and the age of that brood is such that you're only really catching drones going into it every 8 to 10 to 12 days. So, in theory, the best way to do it is to always have a frame of drone comb in a nest where the drone larvae are the right age, but that just borders on impractical. So, in reality, when you take out the one drone comb, if you could replace it with an already pulled drone comb so the queen can instantly start laying in it, it works better that way. It's not the best possible way it could work, but it's the most probably feasible from an amount of work standpoint.

Amy

Yeah, definitely. Well, related to work, so, after you pull that frame out of the freezer, it's capped, right? So, do you uncap it before you put it back in? Do you just put it back in and let the bees uncap it? What is the recommendation after that?

Jamie

Good question. So, you just put it back in the hive, the bees do all the work for you. But I want to go back to something, Amy, that I said earlier because I think you raise a very important point. Remember in drone comb production, you are giving one tenth of your frames to the control of Varroa. So, the bees are constantly rearing drones that never emerge. And then on top of that, once you freeze them and put them back into the hive 48 hours later, the bees then expend energy to uncap, abort, clean, and then rear the next generation of drones, all the while having 10% fewer worker cells that they can lay in. So, there's an energy cost in this process and also a net loss of workers because you can't produce one frame's worth of workers. Now, again, you could argue that all of this is worth it if the Varroa populations go down, and some of the research definitely supports that. Otherwise, we wouldn't be talking about it as a Varroa control method. But you're going to have to weigh the pros and cons. There's no really good way to optimize this. So, the best way is to just constantly have a frame in that space collecting drones. When one goes to the freezer, another goes into that empty space, ready for the queen to lay eggs in again.

Amy

All right, so the last follow-up for this first question that we have. Is it even a beneficial technique to do that drone comb removal if the beekeeper is using a VSH queen or should they just let the drones flood the area? Should they just let the drones develop and do their thing?

Jamie

Yeah. These are good questions. So, it's all really kind of personal preference. I've never seen efficacy statements. In other words, if you do this, you reduce it by 25% or 50%, etc. But there's some clear positives. On the other hand, this is obviously not something commercial beekeepers can do because they can't do this to 10,000 colonies. I mean, just having 10,000 frames dedicated to the production of drones is huge. So, basically, this is something that hobbyists and maybe some sideliners can do, especially if they're not interested in chemical intervention. Obviously, too, if even if you look at the Honey Bee Health Coalition's web page, it mentions that this is something that works best when it's coupled with other treatment options. So, yeah, if you're going to use a VSH queen, Varroa sensitive hygiene queen, it will probably amplify the impact that you're getting with drone brood removal. But I would say, probably for most sideliners or commercial beekeepers, this isn't a viable option. It's something that may be hobbyists can do if they want to try their best to go the no chemical route, but doing drone brood removal would not supersede doing other strategies to control Varroa. You would still need to do other strategies.

I will say, too, the Honey Bee Health Coalition, in addition to having this management guide has an entire video dedicated to drone brood removal. So, you can go watch the video as well to find out more information about this.

Amy.

Phew. That was the first question.

Jamie

I know. That was a question marathon.

Amy

Really was. Okay, so for the second question for the Q&A of today, the questioner is asking about queen balling. Is this always aggressive or are the bees protecting the queen?

Jamie

Interesting question. I've never actually had this asked to me before. So, what is balling? When bees do not like a queen for whatever reason, they will ball her. From the outside looking in, it looks like just a tight cluster or a small cluster, but a tight cluster nevertheless around the queen. If you see this really tight group of worker bees, maybe 100 or so, in this little tight ball, and you kind of finger your way through it, you'll often find the queen at the center of that ball, especially if you're seeing this inside the nest. Now, this is a natural defense that honey bees have against a lot of nest invaders. Some species of Apis do this better than Apis mellifera does, but this balling behavior is often used against Hornets or other things specifically in Asia. But for Apis mellifera, you see it used a lot with queens. When they don't want to queen, when they're trying to kill a queen, when a foreign queen comes into the wrong nest, maybe after her mating flight, etc., you'll see this tight cluster around the queen. I also see it if a queen is released from a queen cage too early. If you're introducing a queen into a colony, she's released by the bees too early from her queen cage, the bees might attack that queen and ball. The whole concept of balling a queen is a very negative connotation. So, when we use the phrase balling a queen, we are meaning that aggressive behavior where they're biting, pulling at and stinging the queen. So, in the phrase balling, we are referring to something that is always a negative exchange between the workers and the queen.

Now, a follow-up question could be, well, could there ever be a tight cluster around the queen that might be for her protection? I've never seen an example of this in the literature. Of course, when we look at queens on the face of a comb, you will get workers around her. We call that her retinue. But they're not biting and stinging and pulling at various body parts. So, in the case of a ball, it's this tight cluster around a queen. Now, I have heard of one example, but I don't read about it being tested in the research literature, so I'm just saying this anecdotally. I know around African honey bees that have made it to the Americas, they often refer to a trait called nest

usurpation where a swarm of African-derived honey bees might land on the outside of another honey bee colony, say of European-derived honey bees, they might form a ball around their own queen. As that swarm melts into the nest of that European honey bee colony, the queen from the European-derived honey bee colony is lost, and the worker bees, around their own queen and the African honey bee swarm that's now in the European honey bee nest, will slowly release the tension around their own queen, almost as if they're introducing her into the nest in which they're invading. That is a story, a series of steps that I've heard referred to when African-derived honey bee swarms are usurping populated hives of European-derived honey bee colonies. They would argue that that ball might form a protective layer around the queen as they slowly introduce her to the European honey bee colony.

This is not a behavior that we see a lot. I know in the literature you'll read about colonies usurping other colonies and they'll often refer to this balling of the queen and protection of the queen. But I would say that a lot of this is still somewhat anecdotal, and we don't know for sure, even though it's one of the stories that's consistently told around this nest usurpation behavior. So, it is possible that honey bees are smart enough to do this as a way to introduce their own queen into a colony in which they're invading. But I would say that more work needs to be done before I'm willing to commit to that idea.

Amy

Sounds good. All right. For the third question we have, does thymol kill tracheal mites?

Jamie

The most basic answer to that question is yes. You can find papers, research papers, through Google Scholar and other search platforms where people have tested essential oils against tracheal mites, one of those being thymol. I looked it up, found a paper myself right off the bat. A natural question follows, then, do any of the registered thymol-based products that are registered for use against Varroa give the added benefit of tracheal mite control? The answer is, I've not seen support for that in the literature. I have often wondered the same thing because it's very reasonable to believe if you're putting these thymol-based products into your colonies for Varroa control that you might get an added benefit of tracheal mite control. But none of the products are labeled to say that. And without that information, basically that's the companies' unwillingness to commit to that or go through the approval process. So, that doesn't mean it does or doesn't work. My guess is, is that you get some added benefit of using these products for Varroa to control, as a side effect, tracheal mites, but they're not labeled for that use.

We do know that menthol as an example does control tracheal mites. There have been menthol-based products to control tracheal mites, and of course there's clear results for other essential oils including thymol impact on tracheal mites. But there are currently no registered products that

include thymol for use against tracheal mites, or at least to my knowledge. So, even if it does work, it's not really an option that's available for us at the moment.

Amy

Yeah, definitely. I feel like we should have an episode where we talk about the history of mites. I mean, maybe not even just in the United States, but the history of mites and different chemical treatments or active ingredients, that kind of followed it and what that kind of looks like. I think that would be a fun episode to do. What do you think?

Jamie

Oh, for sure, absolutely. When I think specifically about Tropilaelaps, let's face it. Right now, Varroa has gotten the press over the last 40 years. Now, the light is shining on Tropilaelaps for fears of its global spread. Of course, you've got, then, this under considered tracheal mite. When I first started keeping bees, tracheal mite was one of those things that we had to treat for, right? Grease patties, menthol-based things. Now nobody talks about it. It's probably because a lot of these chemicals that go into colonies to control Varroa also have an effect on tracheal mites. Don't know that for sure. That's the hypothesis. But it's just one of those mites people don't really talk about much anymore, and maybe to our detriment.

Amy

Definitely. All right, everybody. Those were the questions that we have for today. Don't forget to send us questions by sending us an e-mail or reaching out to us through one of our social media pages.

Thanks for listening to today's episode. This episode was edited and produced by our podcast coordinator, Mitra Hamzavi. Thanks, Mitra.

Jamie

Visit the UF/IFAS Honey Bee Research and Extension Laboratory's website, UFhoneybee.com, for additional information and resources for today's episode. Email any questions that you want answered on air to honeybee@ifas.ufl.edu. You can also submit questions to us on X, Instagram, or Facebook @UFhoneybeelab. Don't forget to follow us while you're visiting our social media sites. Thank you for listening to Two Bees in a Podcast.