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SPEAKERS

Amy, Stump The Chump, Jamie, Guest

Jamie 00:10
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. Hello, and welcome to Two Bees in a Podcast. Today, we are joined by Dr. Margarita Lopez-Uribe who's going to be discussing with us the impact of management practices on honey bee health. our In Five Minute Management section, we'll be talking about American foulbrood, and of course, we're going to end today's Two Bees in a Podcast with our famous question and answer segment, Stump the Chump. Hello, everyone, and welcome to another episode of Two Bees in a Podcast. Today, we are joined by Dr. Margarita Lopez-Uribe, Lorenzo L. Langstroth Early Career Professor. She's an assistant professor and extension specialist of entomology in the department of entomology at Penn State University. Margarita, thank you so much for joining us on Two Bees in a Podcast.

Guest 01:37
Thank you, Jamie, for the invitation. I'm really excited to be here.

Jamie 01:41
Oh, yeah, great. The topic that you will be discussing with us is the impact of management practices on honey bee health. And I really cannot wait to dive into that. But, Margarita, every time we start one of our episodes, we want to make sure our listeners have the chance to get to know the guests that we have. And so given that you're a new guest here on Two Bees in a Podcast, if you don't mind, could you tell us a little bit about yourself, how you got into the type of work that you're doing? Specifically, our listeners are going to want to know how you ended up getting involved with bee and pollinator research in the first place.

Guest 02:13

Yeah, that's a very interesting question. So, I am actually not an entomologist who was interested in insects early on, right? I grew up in an urban area in Colombia, South America. I did not have a lot of contact with nature as a child. But I did love biology when I was in high school, so I decided to start studying, you know, like, biology for my bachelor's degree in Colombia, and I took a course in entomology. For that course, we went to the Amazon rainforest, and to, you know, like, do kind of like a field course. And I found an orchid bee in the forest. And I just, you know, I was fascinated by just kind of like the diversity of bees in the forest. And it is going to sound a little bit cheesy, right, but that, like, that course really changed the direction of my, you know, like career because then I became very passionate about bees and pollination. And I decided to pursue, you know, like that as a career. So, my background is really on evolutionary biology and conservation genetics. So I started studying bees, looking at wild bees. And then for my postdoc, I had the great opportunity to work with David Tarpy at NC State. And so I started working more with honey bees, then the opportunity to join Penn State working as an extension specialist came through. And so right now, I really work at the intersection between, you know, wild bee populations and how they respond to changes in the environment and in honey bee management as well. So that's how I got to where I am.

Jamie 04:07
That's, that's such a cool background. I've always wanted to study or go see bees that are in the rainforest, the Amazon rainforest. So it's really cool that you had an experience there that actually changed your life trajectory. I think that's really neat.

Amy 04:20
Yeah, you know, I was just, I was just about to say, I'm super jealous. I can't imagine having the Amazon rainforest for a place to be able to, you know, take a course in entomology and be able to just walk around and be surrounded by the Amazon. That's pretty cool. That's, I think that's one of the more unique stories that we've heard. So that's really great. Do you do a lot of research on the wild bees in Colombia? Or do you do them in the United States? Or, you know, what does that kind of look like as far as some of your research?

Guest 04:49
Yeah, so that's, that's a good question. So yeah, when I was in Colombia, of course, I was doing research there. Then, I did my masters in Brazil, so I kept working in, kind of like, tropical bee systems, and then when I moved to the US for my PhD, I still continued working with tropical bees for part of my PhD, but then I mostly transitioned to systems here in the United States for logistical reasons, right? It's, it's easier to work here, getting permits to do collections in other countries is possible, but is complicated. So right now, I don't really have a main research focus outside of the US, unfortunately.

Amy 05:35
Yeah, that's all right, maybe some day. So we're here to talk about, again, Jamie had mentioned about the impacts of management practices on bee health. And your research is understanding how the environmental changes and human management can drive changes in the population of wild and managed bees, right? So can you tell us a little bit more about this?

Guest 05:56

Yeah, so I think, you know, like this question has, like, two, perhaps, two long answers. So, I'm just going to go ahead and kind of explain how we approach this big question in the lab. So, we are really interested in understanding how bees are responding to direct selective pressures exerted by humans, and we study this through the lens of domestication. So, there are kind of like two ways in which we are studying this question. One is using, or you know, like, studying honey bees. And the case of honey bees is really the case of a species that has been domesticated throughout, you know, like many, many years for multiple traits, right? So, we have domesticated bees for honey production, more recently for pollination services, for disease resistance, but currently, we, like, one of the things that keeps our jobs exciting, but you know, like, it's highly problematic is that honey bees are still struggling under current beekeeping conditions, right? Like, we know that a high proportion of managed colonies dies in the United States every year. So, you know, it fluctuates between like 40 and 50%, for example, in Pennsylvania. So, one of the things that we are interested in is understanding how, for example, feral colonies, right, like colonies that moved out of management or managed conditions, can be successful in the wild, right? So, of course, feral bees colonies also die. But, we know that feral colonies can successfully overwinter, and they they don't receive for example, any management for Varroa mites, which we know is one of the main threats to honey bee colonies. So, this has been one of the questions that we have been investigating in the lab, how he said that wild, or you know, feral colonies can survive without Varroa control. And one of the things that we have found is that feral colonies can actually, sometimes, show high tolerance to things like viruses, right? And so what we find when we have done quantifications of levels of viruses in managed and feral bees is that oftentimes, colonies in feral conditions survive winters with very, very high titers of viruses like deformed wing virus, which always are lethal in conditions in, you know, in apiaries, in managed conditions. And there is actually new research from Europe showing, demonstrating the same thing that feral colonies or wild colonies, often, you know, like, develop these phenotypes of tolerance to viruses. So, we're very interested in that because we think that you know, like, this is kind of like understanding how natural selection, you know, like is shaping the directions of honey bee populations and the direction that we are taking this research right now is actually trying to do genome scans to understand, to better understand the underlying mechanisms of these apparent tolerance to viruses. So I think this research is very exciting. It is a little bit complicated because you know, like, it is exciting to find some traits that may confer benefits to honey bees, right? Like, we want our managed honey bees to, you know, like, survive. This tolerance to viruses poses some challenges for what this means in terms of pathogen spillover with wild bees. So, you know, I won't get into that because that's a little bit of a complicated area and we can talk more about it if you guys are interested, but, well, kind of like wrapping up this first angle of the research related to how bees respond to human management, that studying feral bees and how they are successful is one of our main research areas. The other aspect that we are currently investigating, and it's a big research theming in the lab, is not in honey bees, but it is understanding how bee populations are responding through, the other research area that we're investigating is how bee populations are responding to human management through changes in crops. Humans have not only domesticated honey bees, we know that humans have domesticated crops for thousands of years. And crops have been mainly domesticated to increase beneficial traits for us, for humans, right? Like, so, basically, changing plants to, you know, like, produce more fruit or sweeter fruit, anything we want. So something that is often kind of, like, missed is that in recent years, bees in agriculture has become the dominant ecosystem around the planet. And so this means that bees are interacting more frequently with flowers of domesticated plants. And I think this is happening right now more than ever. So, one of the questions that we have in the lab is how are bees responding to these changes, changes in

flowers? And so we have mostly studied bees using the squash bee system and Cucurbita system. And the reason to do that is that, you know, Cucurbita is the plant genus of squashes and pumpkins, and they were domesticated a long time ago, right here in the Americas. And they interact with these bees, these wild bees that are a specialist and only collect pollen from these plants. So, our research has demonstrated that, you know, like, squash bees, for example, have expanded their ranges and their populations have increased in abundance in recent years. And we think that this is likely the result of Cucurbita cultivation. So, I think, you know, like these, these kind of like, direct changes that humans are imposing on kind of like are driving on bees in plants, and how this is changing the way they interact and persist in the environment are kind of, is kind of like the main theme of the research questions that we study in the lab.

Jamie 12:16
Alright, so I was feverishly taking notes while you were speaking about that, Margarita. And there's, there's an interesting thing that you were saying I want to, I want to double back to. You were talking about how bees respond to direct selective pressures applied by humans, and you were mentioning how when bees returned to the feral or returned back to the environment, they're no longer managed, they can have developed, relatively quickly, virus tolerance. And so, my wife is a wildlife biologist in training, and I remember when she was doing a lot of her graduate work, they were looking, not she specifically, but she was talking a lot about those scientists who were looking at the development of feral hogs. And so how, you know, domesticated pigs, when they escaped the pins, very quickly can grow hair, their tusks can get larger and their behavior and phenotype changes, but just, just a generation or two ago, you know, they were a shiny pig in someone's pen. And with honey bees, I'm wondering, how long does it take after becoming feral do they start to show some of these traits of, for example, increased virus tolerance? I know there's, I know it's very difficult to look at a feral colony and know how long it's been feral, how many generations it's been feral versus domesticated. But I'm wondering, is there research on how long it takes to develop these traits once escaping management?

Guest 13:40
Yeah, that's, that's a very good question, Jamie. And I think, as you said, it's very hard to know with certainty, but what I think is happening is that these traits are, you know, these traits exist in manage colonies, right? Like, these are probably not phenotypes that are evolving de novo, as, you know, like colonies escape, you know, managed conditions. So, I think what, you know, like, the likely scenario is that these traits just become really beneficial, right? Like, it is, basically, it's kind of a matter of, you know, like, you either respond in a way that allows you to survive or you die. And so, I think these shifts in phenotypes can happen very quickly, right, especially because we know that from a genetic perspective, for example, managed honey bees in the US are, we have kind of like high diversity, genetic diversity, because what we have in the United States is basically, you know, a combination of multiple sub species that have been introduced for centuries, right, to the country. So it is likely that, you know, like there are a lot of beneficial traits that are in the population and that become really, really beneficial once honey bees are kind of like escaping to wild conditions. But with certainty, I don't know exactly, you know, like, if we can say x number of generations. I do think that it can be very quickly though.

Jamie 15:12

I think that's absolutely fascinating, because that's why your work, right, is so important, because it makes me wonder, what phenotypes do honey bees possess that would help them survive Varroa and viruses and some of these other stressors that we may be suppressing through our management of colonies? I mean, I think it's fascinating, kind of what you're doing, and the potential research avenues that can just roll out of the of these types of topics.

Guest 15:40
Yeah, it is. I think, you know, like, this is why we're very excited about this. One of the, one of the things that I would like to make clear, and I think we're going to talk about these later during the conversation today is that some of these ideas are the, the drivers of treatment-free management, right? And so a lot of beekeepers really would like to, you know, like, see their colonies just kind of like do what they do in nature and let them be and figure it out. The only problem with that is that the mortality, right, in wild populations is still high, right? So it's not like these managed honey bees are escaping to the wild, and then they are all of the sudden, all of the sudden becoming, you know, really, super colonies and surviving everything. They still die. And really, at what rate is unknown. We did some estimations. And so, you know, like, it can be comparable to managed conditions, but still, many of these colonies die, because, you know, they are still, you know, like, susceptible to a stressor. So, I guess I just wanted to leave that, you know, like, caveat that the study of feral bees does not necessarily, you know, like, advocate for, we should just like, let the bees without treatments and figure out what to do, because that, you know, like, there's a high mortality rate associated with that.

Amy 17:02
Yeah, that kind of has to do with my next question for you. You know, I guess you were saying that some people choose to do a treatment-free thinking that that's going to help, you know, the health of wild and managed bees. And so just from your research, what should we be focused on? Or what should we be concerned about related to the bees? You know, I guess we can't just all do treatment-free and just see if it's survival of the fittest, right?

Guest 17:25
Yeah. So I mean, I think that, related to management, right, like, we have been working on a large project, actually doing side-by-side comparisons of different management systems on honey bees. And one of the management systems was treatment-free. So, when I say that the mortality, the mortality is very high for the, you know, when you don't treat for Varroa, I'm sure you know, like this is not news to anyone, it's very high. We did it in an experimental setting. We started an experiment with like 300 colonies, and we followed them for three years. After the third year, of the 100 colonies that were in the treatment-free system, we, I think we only had one that survived, and the other two systems, you know, like the survival, controlling Varroa was really high. So, definitely, Varroa is a big problem for honey bees and is, you know, like, I guess, you know, is at the center of beekeeping management practices. But thinking of the problem of bee health more zooming out, right, and thinking of the big picture, I do think that the lack of floral resources is probably at the core of the problems that we're seeing with wild bees and honey bees, right? And because we know that if there is not enough food, right, and bees don't have optimal nutrition, then this has all of these negative cascading effects on other things, like, you know, they are more susceptible to pesticides, they are more susceptible to diseases and other stressors, right? So I do think that one of the, the, the main challenges is, you know, like, or the core of the problem is a lack of floral resources. I also think that another big factor that has received less

attention and so it is kind of unknown to what degrees is, is a big problem and will become a big problem is climate change, right? The climate is changing very rapidly, rapidly and in some ways in unpredictable ways, right? Like every year, we used to have very predictable patterns of climate and seasons. And right now everything is, you know, like, in some ways unpredictable. So, I think one future direction, you know, like should really try to better understand how honey bees are going to respond to these rapid changes in climate.

Jamie 19:56
I think you are spot on with that last one. Someone was asking me recently what I thought about climate, and I will tell you, when you look at beekeeper surveys, they mentioned every year that weather is one of their chief issues that they face. You know, it's not something we can manage against, a scientist, you know, Varroa, nutrition, queens, and these things, but beekeepers are always talking about weather, and I see such low volumes of climate research being done with honey bees, you know, how this has the potential to impact honey bees, specifically, but pollinators in general. So, segueing a little bit, can you tell us a bit about your research on management of honey bees and research on some of these feral bees that you've been looking at as well?

Guest 20:35
Yeah, so I think, you know, like, I would like to spend some more time talking about the beekeeping management project that I just mentioned briefly. Really, the goal of that project was to assess how well organic beekeeping management could actually work for beekeeping operations that, you know, like, have the goal of extracting honey for income for beekeepers, right? Because one of the things that we have concluded is that beekeepers that use these chemical-free, treatment-free system are usually beekeepers that have other goals for beekeeping, right? So they are either, you know, like trying to breed for better colonies, or they are just, you know, like recreational purposes, right? But beekeepers that need to produce honey, because that's a source of income, they need colonies that can survive. And we wanted to help beekeepers, especially in Pennsylvania, where most of our beekeepers are, you know, liking the kind of side-liner, hobbyist, you know, like size of operation, we wanted to help them by developing management protocols that would rely less on synthetic chemicals. And so with this project, basically, we had these long-term three year project following 300 colonies on three different management systems. So, one was the chemical-free treatment, the other one was the organic treatment, and then a treatment that we call conventional, which basically, you know, like, is something that aligns better with, like, larger scale beekeeping operations. One of the cool things about the project is that we actually met with a group of stakeholders, which actually use these different management systems in their operations. So, we had regular meetings with them. They basically told us what to do for each of these management systems, because we wanted to replicate in the experiment what they are doing in their apiaries. So, before I forget, I want to mention that this is actually a project that was led by Dr. Robin Underwood, she works very closely with my lab. So, you know, she was kind of like the leader of that project. And it would be great, you know, if you want to invite her to talk more details about that, but bottom line, after three years, we found that the organic management system is very, very effective. Beekeepers can have very high survival of their colonies. So, for the three years, we had survivals that hover around like 85% of the colonies survived. And we also found that the colonies, or the apiaries seem to be more productive than the apiaries that were managed through kind of conventional management. So, we found benefits of these management system, both in terms of survival, right, and in terms of economics, and you know, like, kind of productivity of the, of the apiary.

So, we're -- all of this is unpublished but we're, we're already doing a lot of extension work kind of spreading the word out, and we're very excited about the outcomes of the project.

Amy 24:09
Would you be able to touch base a little bit on the organic beekeeping management again? Just, you know, what does that look like and what that is. I think, you know, sometimes with organic beekeeping, sometimes we get confused with just even organic farming, you know, and what that is.

Guest 24:24
Yeah, okay, so yeah. Amy, that's that's actually a really good question because there are two things that I would like to say about that. So, one is that the management is organic, right? But by no means beekeepers could market their products as organic, right, because kind of like the regulations for labeling something as organic require that you have large acreage of organic land, which is really hard to find in continental US. So, basically, the management was, you know, like, we limited, for example, Varroa mite control to organic acids, right, like, so we avoid completely synthetics. And there were other methods used, like, for example, comb drone removal, right, like some more, like, IPM management practices. But yeah, so the colonies were absolutely, you know, like free of any synthetics for the three years. However, because the, because of the funding source for the project, right, like this project was funded through the organic agriculture program from the USDA, we did place the colonies in organic farms. So, they were not necessarily, you know, like large organic farms, but, you know, they were placed in organic farms. And so, one of the things that was very surprising for us was we actually, we quantified the pesticide residue in watts of these colonies that, you know, we were using for the experiment. And across the three systems, we found that the watts was extremely, extremely clean, right? So when we compared our numbers of pesticide residue from our experiment, with, like, most of the studies published in the US, basically, we found barely any traces of pesticides. So, it poses the interesting question, right? Like, even if you cannot market your honey as organic in the US, perhaps, you know, like placing colonies in organic land may give honey bee colonies, you know, like some benefits. Again, you know, like, this is not something that we tested, right? All of our colonies were in organic land. I can tell you that the wax, the pesticide residues, you know, like, were very low, suggesting that, you know, like, the exposure to pesticides was perhaps lower than they would be if the experiment was done in a different way. And so, yeah, it is kind of a big question still, you know, like regarding how that, you know, it may benefit or not, honey bees.

Amy 27:14
That's awesome. Thank you so much for answering that. I know that, you know, sometimes it gets kind of confusing when we talk about organic, and you know, what that looks like. And so, all of the things that you mentioned, for sure, make a lot of sense for it to be, you know, organic beekeeping management. So that's kind of cool to hear about. Okay, so you kind of mentioned, again, you didn't really study this at the same time, you know, quantifying the pesticide residues and wax, it was less than maybe a conventional area. And so what are some tips or strategies that you have for beekeepers and the general public about conserving honey bee populations? What does that look like? You know, would you recommend them to do more organic farming or put them on organic farms? Or, you know, do this organic beekeeping? What are some tips you have?

Guest 28:02

Yeah, I mean, so I think, you know, I have actually started talking a little bit about, you know, like this idea of conserving honey bees. So, in my, in my view, honey bees are not really, kind of, you know, a conservation, you know, or, you know, like preserving honey bees is not a conservation issue, right? Like, we need to conserve honey bees because we need them for agriculture. So, I do talk a lot about, about, you know, like, bee welfare, right? Like, we need to make sure that honey bees are like, as beekeepers, we are doing everything that we can to keep our colonies, you know, healthy and strong. And I think, you know, this was at the core of this project on organic beekeeping. I think one of the problems of the whole campaign on, you know, like, pollinators are in decline, let's save the bees, is that a lot of people are becoming hobbyist beekeepers, because they want to save the bees without realizing that, really, that is not saving the bees, right, because the conservation issue should be really focusing on wild bees, and that being a beekeeper, a good beekeeper is really hard, right? It is, it is becoming harder and harder, as we know, like, we have all of these environmental problems. And so, I do think that, you know, like, emphasizing the idea of bee welfare and how much beekeepers need to be on top of their colonies and, you know, making sure that they treat them when they when it's needed, that they feed them when it's needed. I think is it is something that we in our extension problem program, we, you know, like, emphasize on and on when we give talks and, you know, through our educational program,

Jamie 29:56
So, Margarita, that was great. Thank you so much for all the work that you're doing on this very important topic. I really appreciate you for joining us on the segment on Two Bees in a Podcast.

Guest 30:05
Thank you, Jamie, for the opportunity. I hope that our research program really helps with solving real problems that beekeepers have. And yeah, thank you for the opportunity.

Jamie 30:17
Perfect. Everyone, that was Dr. Margarita Lopez-Uribe, the Lorenzo L. Langstroth, Early Career Professor who's an assistant professor and extension specialist of entomology in the department of entomology at Penn State University, talking with us about our research on management practices and their impact on honey bee health.

30:50
Have questions or comments? Don't forget to like and follow us on Facebook, Instagram, and Twitter @UFhoneybeelab.

Amy 31:14
All right, we are at that Five Minute Management, Five Minute Management. And the next couple of segments are going to be about management of different honey bee pests. So, the first one is going to be American foulbrood. And then we'll talk about European foul brood in our next episode. But, Jamie, let me go ahead and get the timer ready. You've got five minutes to talk about American foulbrood, and go.

Jamie 31:37

Wow, this will be tricky because this is just a bad, bad pathogen. So, just very quickly, American foulbrood is caused by a bacterium. And it has two stages, a vegetative state, which is kind of the active growing infectious state, and then a spore state. The spore state is when the environmental conditions are bad and the vegetative bacteria die. The spore can persist for decades and decades and decades, and when the conditions are right, it can become vegetative. The way I say it is like it reanimates, which is what makes American foulbrood so bad. Historically, it's been quote, controlled, using antibiotics, but antibiotics only killed the vegetative state, so, the spores persist. So, when your colonies get it, and you treat, the condition looks like it goes away, but the spores are still there and they may come back a year later, two years later, five years later, 10 years later, etc. So, how do you address it? Well, the best way to address is prevention, to not get it in the first place. But that's much easier said than done. So what folks will do is use hygenic stocks because hygenic bees can detect developing bees that are dying to this disease, and they can remove the developing bees from the colony, and then maybe you'll never see it. Maybe, maybe you have low levels, but the bees are simply dealing with it. You need to learn how to recognize it. This is one of those diseases that new beekeepers need to be able to recognize quickly, so that they can know when they have it, so that when they learn to recognize it, they should monitor their colonies closely. In theory, you should practice good hygiene, right? You shouldn't move suspect combs between colonies. Limit movement of this disease between hives, and if you have colonies that are showing signs of infection, they need to be dealt with. So how do you deal with it? First, the historic recommendation is to burn those colonies, because once they have American foulbrood, you cannot get rid of it. You need to check your state laws or your regional laws. In many states in the US, as an example, by law, you're supposed to burn the colonies. And not just burn it, you're supposed to dig a hole, put the colonies in it, burn it and bury the ashes. I mean, the stuff is that contagious. It'll be on your hive tool, your smoker, your gloves, your hands, other equipment. So the historical recommendation is to burn the colonies. And that may be required, where you live. There are some other ways that you might be able to deal with if your state or region permits you to do it in a way that doesn't require burning. So, let's say I go to a colony -- let's, let's, let's just walk through what I would do if I had an apiary of 10 colonies and I found it in one colony. What I would do is burn and bury the ashes of that one colony, the one that is confirmed to have American foulbrood, then I would treat the other nine with an antibiotic. Historically, again, they would prophylactically treat with an antibiotic so that you'd never see it but really that's not a good way to do it because you're just masking the signs of infection. So I would only use an antibiotic in response to finding a positive colony or two in the apiary. I'd destroy that positive colony or two, and then treat the remaining colonies with an antibiotic. I would sterilize and sanitize my hive tool, my smoker, my gloves, etc. There are some folks who are not required to burn those colonies. And what they will do is just a modification of the following. Regardless of what they do, I always recommend that they destroy the frames from colonies that have American foulbrood, but you can sterilize the remaining equipment: the boxes, the bottom boards, the lids, etc. And there are a few ways to do that. Way number one is there are some areas that permit gamma or radiation of the old equipment. Now, gamma or radiation is not available for all beekeepers, there are facilities that provide the service, you usually have to pay for it. So some beekeepers might take advantage of that. You can actually heat sterilize the equipment at 130 degrees Celsius, which is about 266 degrees Fahrenheit for 30 minutes. There are multiple ways you can do that. You can use a 1.5% bleach solution. So, soak the equipment in this bleach solution. You can scorch the inside walls of the boxes with flames. Some folks even do wax dipping, dipping with two to one ratio of paraffin wax to micro crystalline wax, they'll do this for 10 minutes at 160 degrees Celsius or 320 degrees Fahrenheit. To me, a lot of this is just extra work. It's just extra work. Now a lot

of folks want to do it, and that's fine. But to me, it's sometimes easier to just burn the sick colonies and treat the remaining colonies. There is another method that some beekeepers use, it's called a ship's swarm method, which is where they will remove all the bees from the infected equipment, they will destroy the infected equipment, they will move the bees and the queen over to new infection-free equipment, they'll treat those bees with an antibiotic, and then they will monitor that colony closely to make sure that American foulbrood doesn't develop in that colony. The trick, at least in the US with antibiotics at the moment, is you need a prescription or a VFD to purchase and use those antibiotics in the colony depending on how you're going to use it and what antibiotic they use, that you're going to use, and outside of the US, antibiotic use may not be an option at all. So, I know I went through all of that very quickly. And I said a lot of different things. But I only have five minutes in the Five Minute Management segment. So, what I want to tell you is there are a handful of really good documents where this is fleshed out more and these documents are available online. One of those was produced by Dr. Megan Milbrath at Michigan State University. We'll make sure and link that document. Another one was produced by the Honey Bee Health Coalition. And both of those documents give the numbers that I shared, the heat times, the different treatment options. And all my answer was really based on both of those. So we'll make sure to link those in the show notes in case you have more questions about treating American foulbrood in your colonies.

Amy 38:09
So, Jamie, you went a little bit over five minutes, but I think our listeners will forgive you for that. That's all right. It's very important. American foulbrood is very important to understand and learn about, so, as Jamie mentioned, we will be adding those resources to our additional notes, which is located on our website www.UFHoneyBee.com. That was our Five Minute Management about American foulbrood.

Stump The Chump 38:43
Everybody's favorite game show, Stump the Chump.

Amy 38:58
Okay, we are at that question and answer time. So, our first question, Jamie, it starts with a person who used to keep reptiles. As a former reptile keeper, this person was familiar with heating snake cages. So, their question was wondering if those you know, heat, you know, I know that they have like heat cages, they also have like heating pads, so this person's wondering if this could be applied to provide heat during the cooler months for a honey bee hive. What do you think about that?

Jamie 39:34
I'm going to give my opinion, and I'm going to give the research. So, my opinion is is that it can be applied for this purpose. I believe that it is theoretically possible to develop a hive that, you know, you could plug into a wall, as an example, plug into a receptacle or an outlet, maybe with an extension cord or solar power or something where the hive could produce heat much like an electric blanket, or in this case, the individual speaking about reptile scenario. So, I think it's possible. I think maybe some some interesting questions would be, is it necessary? Right? And number two, what would be the benefit to that? And I think what they would say in return to me is maybe, you know, we're providing that heat for the bees rather than the bees having to do it themselves. And that is certainly true. Bees, conceivably living in a warmer hive, that itself generates heat so the bees don't have to work to could save them some energy, might, might increase survivability and things like that. So, I totally get it, I understand the

question. But I'm not sure it's necessary, because, you know, bees are adapted to do this. And as long as they have the adequate resources that they need, the colony is sufficiently large and disease free heading, disease and pest free heading into winter, they can do a pretty good job on their own and come out of that cluster in response to environmental cues. You might even argue that if there's an artificial heat source during winter, bees would not necessarily read the environmental cues appropriately, and might brood up when they shouldn't, or things like that. But I certainly believe the theory behind the question, I certainly understand the motivation, and it, in fact, might be worth while, which leads me to my last comment is I've just never seen any research on it. There may be some out there, but I've never really seen research on it. And maybe even more importantly, I haven't really seen people talking about it at research meetings. So that shouldn't belittle the idea, it shouldn't negate someone from trying to do it. It's just that, to my knowledge, it's not been looked at thoroughly, because I've just not really heard it discussed. So, maybe there is a benefit, maybe not, but I can see the motivation behind that question.

Amy 41:43
So, for the second question we have this person was wondering about the diet differences between the Asian honey bee, Apis cerana, and the Western honey bee that we have, Apis mellifera, and whether there's a diet difference that leads to the way that they manage Varroa.

Jamie 42:02
So, Amy, you expertly said both of those species names correctly, they just rolled off the tongue. They're just like, you got it perfectly right.

Amy 42:10
I practiced before this.

Jamie 42:10
You did, you did. Now you're ready to say dorsata, laboriosa, andreniformis, florea, koshevnicovi, nigrocincta, nuluensis --

Amy 42:12
Now you're just showing off.

Jamie 42:13
-- mellifera and cerana. And then, you would have all nine species of apis down, but you did a great job. All right. So mellifera, as you said, is the Western bee, that's the bee we keep. Cerana is often known as the Asian bee, the Eastern honey bee. And the reason the listener asked this question is because cerana is the natural host of Varroa, mellifera is the introduced host of Varroa. And the reason Apis cerana handles Varroa so well is because it's had a long time to develop with it, whereas the bees that we keep have not. So, the questioner or the listener's asking essentially, well, they're presuming that there are diet differences between the two species of bees, therefore, this diet might contribute to their ability to control Varroa. And so, what I would argue is that the research collectively suggest, well, let me let me pause and rethink what I was about to say. I would say what I'm about to say, doesn't preclude the impact of diet on Varroa. But what I, what I will add to that is all the research I've ever seen today is all behavioral, and there are some key behavioral differences that Apis cerana does to

manage Varroa than what Apis mellifera does. For example, how they cap cells. Varroa only reproduces on drones and Apis cerana. There's a lot better hygienic response and grooming response to Varroa in Apis cerana than there is in Apis mellifera. Now, you could make the philosophical argument that a lot of these differences, perhaps, are rooted in diet. But I would, I would argue that as far as we know, most of the difference is in response and behavioral, and not diet. And as I shared earlier, that doesn't preclude the impact of diet, maybe there is a diet impact, but, but it probably has a lot more to do with the behavioral differences between these two bees and the fact that Apis cerana just simply had a much longer exposure to Varroa, so they've had the opportunity to develop more characteristics that would allow them to combat Varroa.

Amy 44:18
Yeah, that's fair. All right. So, for our third question, a lot of beekeepers will reuse old frames, right? So, I mean, we don't want to buy new frames every single year, every time, you know, we want to, well, even when we make a split, we have to use new equipment. But, beekeepers will use old frames and so, this person's wondering, do we need to worry about hive health and/or toxicity when using old frames?

Jamie 44:44
Interesting question. So, this, this is kind of the way that I always think about it. If those old frames were generated from the demise of a colony who died to something I unequivocably know what it was, then I am likely to reuse those old frames without fret or worry as long as it was not something that could carry over in frames. That was a whole bunch of jibber jabber, but let me give some practical examples. If the colony died to small hive beetles, I'd reuse the frames without blinking. If the colony died to Varroa, I would reuse the frames without blinking. If the colony died to starvation or queenlessness, or any of those types of things, it wouldn't be a problem for me to reuse those old frames. If, however, they die to American, they died to American foulbrood, I'd burn those frames and never think twice about using them again. The questioner is specifically asking, right, about toxicity. So, if I have a strong belief that these frames came from a colony that either died to pesticide exposure or may have died to pesticide exposure, then I would not reuse them. I would just cut my losses and discard them. But, I have personally never encountered that scenario. I know plenty of beekeepers who have, and many of those would just toss out those frames because it's not worth a gamble. But, more often than not, your bees are dying from something that you can identify what it was, and most of the time, that 'what it was' will not carry over into new frames. Now, there are some debates out there right now, how long things such as viruses can be stable on wax combs, you know, is giving those wax combs two weeks enough time off, or one month enough time off, or three months enough time off? And I would say the jury's still out on a lot of that. But, frankly, most beekeepers I know who believed that their colonies died to viruses will reuse the combs, you know, later anyway. So, if I wanted to know were their toxic residues, you know, some sort of pesticide residues, built up at a level in the combs that would be worrying to me, I would say consider sending those combs off for residue analyses. The USDA lab in Gastonia, I believe North Carolina, in the United States is a place where you can send your samples off to the cost of that nearing $400 a sample. They'll screen for, I don't know, 180-190 different residues. There are probably similar toxicology laboratories in countries around the world that will provide that service to beekeepers as well. It's almost always going to cost money. And even -- but, but what I would argue is that more often than not, in my case, it's not really worth the fee becaus it's usually a very small and focused kill if I think it's pesticides, and then we throw the combs away and it wouldn't be an issue. But

if I were a commercial beekeeper, lost an entire apiary to what I thought was some sort of pesticide exposure, I either wouldn't use the combs ever again, or I'd consider sending a few off for residue testing to see if they've got high levels of something that would be detrimental to bees.

Amy 48:05
Alright, that sounds good. Well, everyone, thank you so much for sending in your questions. We really appreciate it. I feel like, Jamie, the questions just keep getting harder and harder just because they're just getting more specific.

Jamie 48:16
They absolutely do. It's kind of worrying. They make me work harder and harder to be able to sound like I know what I'm talking about.

Amy 48:22
Yeah, they're gonna put Stump the Chump out of business.

Jamie 48:24
Yeah, exactly. Because there'll be nothing but Stump the Chump. And then people will actually get a T-shirt for Unstumping the Chump, for actually asking a question I can answer. We need that, we need that T-shirt. Unstump Jamie.

Amy 48:47
Hi, everyone. Thanks for listening today. We'd like to give an extra special thank you to our podcast coordinator, Megan Winfrey and to our audio engineer James Weaver. Without their hard work, Two Bees in a Podcast would not be possible.

Jamie 48:59
For more information and additional resources for today's episode, don't forget to visit the UF/IFAS Honey Bee Research Extension Laboratory's website ufhoneybee.com Do you have questions you want answered on air? If so, email them to honeybee@ifas.ufl.edu or message us on Twitter, Instagram or Facebook @UFhoneybeelab. While there don't forget to follow us. Thank you for listening to Two Bees in a Podcast!