Episode 116 PROOFED

Fri, Feb 23, 2024 7:51PM • 44:12

SUMMARY KEYWORDS

varroa, bees, beekeepers, mites, compounds, chemicals, work, brood, honey bee, colony, lab, tested, cage, exposed, active ingredient, hive, strips, treatment, question, beekeeping

SPEAKERS

Guest, Dr. Cameron Jack, Stump The Chump, Amy, Serra Sowers, Jamie

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.

Amy 00:49
Hi, everybody. Welcome to this segment of Two Bees in a Podcast. Today, we have Dr. Rassol Bahreini, a honey bee researcher at the Department of Biological Science at the University of Alberta, Canada. We are excited to have him here today because he's going to be talking to us about our favorite thing. Varroa. Right? Cameron is going to be joining us today as a co-host on this episode.

Dr. Cameron Jack 01:14
Thanks, Amy. I'm happy to be back on the podcast, and yes, of course. We can't talk about bees for more than a minute without somehow working Varroa into the discussion.

Amy 01:25
Yeah, that's right. So, Dr. Rassol, we, as a lab, read a paper that you had published recently, and I know I'm gonna butcher the name of the chemical but I'm going to try my best anyway. The title of your paper was, "Miticidal activity of fenazaquin and fenpyroximate," is that right, Cameron? Did I do a bad job with that? Rassol, did I do a bad job with that?

Dr. Cameron Jack 01:50
Sounded okay to me.

Amy 01:52
Fenazaquin and fenpyroximate, then proximate. Alright, so we're looking at these chemicals against Varroa destructor, an ectoparasite of Apis mellifera. So Dr. Bahreini, can you tell us, first, just a little bit about yourself and some of your honey bee experience?

Guest 02:08
Hello, everyone. Thank you for the University of Florida to invite me for this podcast. Yeah, my name is Rassol Bahreini. I'm originally from Iran. I was a research scientist there, and I worked around 12 years on honey bee, exactly on the Varroa mite. And I graduated with my PhD in entomology in University of Manitoba with Dr. Rob Currie. And also, I was a former research scientist in the government of Alberta. I work on honey bee health, and now I am a honey bee researcher in the Department of Biological Science at the University of Alberta. I'm working almost around the 30 years with honey bee and most often my work was focused on the Varroa mite.

Dr. Cameron Jack 03:06
Yeah, great, wonderful. Well, I will tell you, as well, I was actually really excited to be one of the people to interview and talk to you because because you do a lot of work that's very interesting for me. What I'm interested in my career is looking for ways to kill Varroa and, so I've read your papers, and I've tried to adopt some of the methods that you've used to screen different chemical compounds in the lab. So I was excited to be able to talk to you and as a kind of joke before, but kind of in seriousness, we talk about Varroa all the time. It seems like in every episode of the podcast, we have to talk about Varroa management to some level and degree. A lot of the research that's being done right now is all about controlling Varroa. We know that Varroa is a large issue and we are interested to share with our listeners some of the work that you've been doing. So could you tell us a little bit about your study and maybe, some of the methods, and maybe, why you chose these methods to investigate these compounds, and maybe, why you chose the compounds that you did?

Guest 04:19
Yeah. Let me start with Varroa mite. Yeah. All Beekeepers know that the Varroa mite is the major problem for our beekeeping operation. For example, last year in Canada, in Alberta, we have around a 50% winter mortality. And we think most of the factor that impacts this winter mortalities are the Varroa mite and the ineffectiveness of chemicals. In Canada, we have a Varroa sensitive miticide that is registered for Varroa mite. It's Apivar, Apistan, Checkmite, and so far, there's some official report on resistance to Coumaphos, and Coumaphos is Checkmite, and also, to Apistan or fluvalinate. So, there are some reports on the less effectiveness for amitraz and maybe by Varroa. So I can say our beekeepers don't have too many tools to control the Varroa mite. Some years ago, me and Dr. Medhat Nasr, in the Government of Alberta, we decided to find looking for the new chemicals because we know that, in the future, our beekeepers will lose all tools and we don't have any effective miticide to control mites. So we're thinking maybe we should look for a new product. So, me and Medhat, we go looking for the chemicals. I can't say not new chemicals, actually, the active ingredient and the miticide that are available in the market, and the farmers use to control mites on the crops or in the greenhouses, so in total, we tested 26 compounds that are available in market. And some of them registered in Canada,

some of them registered in the States. So we tested and so far, we published two, three papers on these results.

Dr. Cameron Jack 06:50
Well, I've just want to give you props for just a second, Rassol, because you just mentioned you tested the 26 active ingredients.

Amy 06:58
So many ingredients.

Dr. Cameron Jack 07:01
This was part of my PhD work, and I only got through five and it took me a long, long time. So I mean, I've just been really impressed with the high throughput work that your lab has been able to do in testing such a wide range of all these compounds.

Guest 07:18
Very, very hard, as you know, Jack. You published a paper on testing some chemicals, it was so interesting to me. And yeah, it was very hard work and we had a very good bee team in the Government of Alberta. We've worked very hard for almost five years to test these chemicals. Yes, and let me go with the results I can say. The result in the tool section for phase one, the phase one, me and Medhat, as I mentioned, we tested 26 compounds. In the first step, we picked 16 compounds from 12 different components. So, as I mentioned, we have some products available, now, to beekeepers to use for example, amitraz, coumaphos, or [inaudible.] They are from formamidine, from organophosphate class, and also from pyrethroids. So they go with another chemical with a different family to avoid from the cross-resistance in the future so they go and select the 16 active ingredients from 12 chemical classes and we tested only in the lab in the first step. In the lab, we check there and expose the Varroa mite for four hours through active ingredients in glass vials. And then we calculated the mortality for 24 hours and 24 hours. And also we do the same thing for honey bees. We expose the bees to the active ingredient in the small glass jars to calculate the mite and bee mortality and also to calculate and find the LC50 for mites and bees. To calculate and then know the LD50 of these 16 active ingredients for mites and bees, we treated mites and bees with a microinjector. We drop a very small amount around the one microliter of each active ingredient with different doses on trucks of the honey bees or worker bees or on the back of the mite. And we measure mortality again for 24 hours, mortality for mites and bees in the lab. The very brief result, the first step showed that there's some chemicals like fenazaquin, etoxazole, fenpyroximate, spirotetramat, and spirodiclofen. These five groups, these five chemicals, they are working almost good. They can control the mite, kill the mite. And some of them, not all, some of them were safe for bees and didn't show any high mortality for bees. So then we go to the second step.

Amy 10:35
So we noticed in your results, when we were going through and reading it, we did notice that you were reapplying the compounds every four days. And so was this an attempt to kind of keep that level known of the active ingredient in the hive? Or was that the second step of your research?

Guest 10:59
This is the second step, yeah. And so after we found those results from the first step, in the second step, because in the first step, actually, we treated bees and mites separately. We exposed the mite in the wild and the bees in another while to expose, and we never tested it together. So we designed a plastic cage, actually his name is apiarium, so we expose the bees and mite together in, sorry, two chemicals for 24 hours in the Appirio cages. So it looks like a mini honey bee colony. In each cage, we keep them around the 100 or 200 Varroa infected worker bees. Then, they expose them to a small stretch of the chemicals, like Apivar that we put in the colony. So actually, we mimic the colony condition. And so in this step, when we expose 26, here we exposed 26, including those already 16 compounds, this 26 compounds, when they were exposed to chemicals in apiarium, results showed us some compounds like fenazaquin and fenpyroximate was very high toxic to mites, and almost was safe for bees. So among these 26 compounds from the second step, we picked these two compounds to go forward for the second phase.

Dr. Cameron Jack 12:48
So just to kind of clarify, those apiariums, those were those were still in the laboratory, but they were cages with lots of bees, and the bees had mites on them. And so then you could apply them through -- you were applying it through a strip that was in the cage. Is that how the mites were exposed?

Guest 13:10
Yes, yeah.

Dr. Cameron Jack 13:11
Okay. And so then, you're seeing how many mites are coming off these adult bees that are in the cage and apiarium. So, now then, then you've taken, now, the things that have worked well in that kind of larger cage study, and now you're moving them into kind of a semi-field type of study through the mini colony assays right? That was the next step.

Guest 13:35
Yeah, the next step was after we finished the lab board in this phase, the phase one. So we, me and Methad, went to test, not all 26 because too much 26 compounds tested in the field is lots of work and so, we needed lots of resources to do that. So, we picked some of the top compounds, such as fenazaquin, fenpyroximate, spirodiclofen and spirotetramat to test in the field, in semi-field. In semi-field, actually, I divided each full-size colony into three parts and each small part treated with a smallest strip of the chemicals with three different doses, like 500 milligrams per colony, 1000 milligrams per colony and 1500 milligrams per colony. So the colonies were exposed, actually they had mites, they're exposed to chemicals for seven days and every seven days for four times we repeated this. So it's been that for four weeks. The exposed honey bee colonies, the mini honey bee colonies to the chemicals with different doses and the results, with that, again, semi-field results confirm the lab result. So we found that fenazaquin and fenpyroximate again, they showed the best efficacy to control mites and almost was safe for bees.

Amy 15:16
So this is very fascinating. I like the process of just looking at the compounds and then, of course, trying to have realistic field conditions because ultimately, we want to help the beekeepers. So they can help with Varroa treatments and having more available to them to combat Varroa. And so, after your study, I'm wondering about the steps of what it would look like, I assume, and I'm not quite sure if you looked at the timing of the treatment and when this should be administered. So what would the next steps look like to determine the time that the treatment should be administered to bees?

Guest 15:57
Yeah, it's a good question. There are two concerns here. First, we need the effective -- we found the chemical, we should have an effective applicator. Because in the old experiment, only traditionally, the drop down chemicals on the piece of the cardboard and put them in the colony. We know that the cardboard is not working well, because they cannot consistently release the chemical like Apivar or Apistan strips. So we should be looking for effective or very high efficiency applicator and then we can determine how long we must treat the colony with this chemical. If we want to follow the, for example, Apivar, we can put this chemical, when they find the candidate chemicals, we can do that colony, for example, with strips. Five frames for six or eight weeks. But we know that each chemical has a different behavior from different families. So we cannot actually go through this. So we just decided for now in the first step to treat it with four times, seven-day intervals. But in future, in phase two, me and Dr. Olav Rueppell at the Biological Science Department in the University of Alberta. In the second phase, we are looking to find, among the five candidate compounds, we're looking to find the best compound and they were effective those. We're also looking how this compound effects on the bees. Still, we don't know the effects on the queens, on the drones, on the larvae. So we are going to do this and find this sublethal and sublethal effects of the compounds on the different castes of the bees.

Dr. Cameron Jack 18:06
So, this is great and you just mentioned the next steps. You got to see what it's going to do to the entire colony or what's it going to do the brood and kind of ensure that before a chemical is released, I guess, as a treatment for beekeepers that we know what's going to happen. So I guess my last question for you really is, what does that process look like for you? I mean, once you do this next round of testing and you're narrowing it down even more and you find your compound that you think is the winner, like this one is the best, it's safe for bees, it kills Varroa, what's that process like afterwards? How do you move that forward and make it available for beekeepers?

Guest 19:02
Yes, good question. Yeah. Actually, we as scientists, our job is to find the untested chemicals on the colony to be, as you mentioned, it should be safe for bees for operator beekeepers and also a low residue in the honey and wax and highly effective for Varroa mites. So, if you find one or maybe two compounds at the final step to introduce to the market, so we, as scientists, we can just provide that information for Health Canada or PMRA, Pest Management Regulatory Agency, that they register the product and pesticide in Canada. So we provide the information for them, this is a candidate, the best compound and this is the information on how to kill the mites and how it is safe for bees. So after that, I

think, I can say, it is the responsibility for commercial or companies, if they are interested, to make a commercial product for beekeepers.

Amy 20:16
Yeah, that's interesting. I mean, you can chime in on this as well. That process kind of takes a long time. Right? I'm really excited to see how this does get moved forward. Hopefully, it will be very helpful to beekeepers, and maybe it will become commercialized and used in the apiaries to help with mite reduction.

Dr. Cameron Jack 20:41
Yeah, absolutely. I mean, I know that it takes time. And that's unfortunate. I mean, I'm a beekeeper too, right? I mean, I also want to kill mites. And so, there's a lot of, I know that we all kind of feel this pressure to produce and we want to have something, we want to have an answer. But it's kind of a slow process, and there's a lot of hoops to jump through as well. So even if a company picks it up, like you said, Rassol, which is, what kind of the goal would be to have somebody want to manufacture this and sell this. I mean, there's going to be work on there. I don't know if this is exactly true, but I've often heard that from the time that a compound is discovered, to be effective against in a pest, it can still take over a decade before it comes to market. And I hope that can be sped up a little bit, streamlined, because, as beekeepers, we're desperate for good solutions for controlling Varroa. So, I really appreciate all that you've talked to us about, Rassol, and sharing your work and your research and commend you for your good work. I wanted to ask if you had any last words of wisdom or anything else that you thought that the beekeepers should know, or anything that we didn't talk about that you wanted to share with us?

Guest 22:15
Yeah, thank you for inviting me to have a talk with you. I'm so happy to share my result. Yeah, as you mentioned, it maybe takes time. We cannot say maybe next year, I introduced the new chemicals to the market and it's coming quickly to the beekeepers. No, it takes time, because registration as Jack mentioned, yeah, it takes time to new product coming to the market as a commercial and for this. So, in the general program in Canada, we are working as a bee health. So, this part is we are working on the synthetic chemicals. Also, we are trying to modify using soft chemicals like oxalic acid for beekeepers. We have a national plan to measure Varroa resistance to synthetic compounds through our provinces. So all of them, they help their beekeepers to try and manage the mite for now, until they find any new chemicals. At the end, I should be thanks to all the Alberta beekeepers because they support us. We had a very good support from them for this project. And I hope we can find the final product for beekeepers, and share our results with all beekeepers in North America.

Amy 23:47
Great, thank you so much, Dr. Rassol. Thank you on behalf of the lab and everything that you've done for beekeepers and all the hard work that you've done. Thanks for joining us today.

Dr. Cameron Jack 23:58
Yeah, thank you very much. It's been a pleasure to talk to you.

Guest 24:01
Thank you. It's my pleasure.

Amy 24:23
Well, Cameron, I'm really glad that you are co-host with me today because you obviously know way more about these compounds and testing them and looking at their efficacy and whether they work or not.

Dr. Cameron Jack 24:35
I don't know if way more is true, but I do, I mean, this is kind of what I did for my PhD or for part of my PhD work, it was looking at and screening different compounds and trying to find efficacy in the lab. So I mean, like I said, I'm familiar with Dr. Bahreini's work and and some of the methods that they've used. And as I maybe fan boyed a little bit there, but it was just the fact that I've used a lot of the methods.

Amy 25:04
I think he did that back to you. I felt like, you guys are like, yeah, like I've read your paper before. That's so funny. I mean, it's really cool just understanding the process of eliminating compounds. And just like, he started out with 26, right? He just slowly went down and looked at different chemical classes and things like that. But something that I was really interested in, and other beekeepers may be interested in this as well is that we know that we hang these strips down in our colonies for some of the mite application, the mites strip application that we do. He was talking a little bit about using cardboard, and what that would have to look like and change later on, if this would go out for the industry to use. And so I guess it started making me think like, what is that whole process of using the strips? And what's the idea behind using the strips? And how do you think that these compounds could be able to move forward?

Dr. Cameron Jack 26:02
At this point, with just kind of reading the article that we were discussing today was, yeah, they were applying it into cardboard strips, they were air drying it, and then they were sticking it in either the mini colonies, or the apiariums. They were just trying to find a way to quickly get that chemical onto some adults and drop bees in kind of a realistic manner. I mean, the beauty of strips is beekeepers know that you drop them in the hive, and then you come back at a certain time and remove them. And that's it. It kind of has a prolonged exposure. So what is going to have to happen next, and it doesn't sound like his group is there yet, because they're still selecting and gonna obviously have to test for bee safety, but once you find those ingredients, the active ingredients, those chemicals that you think could become a product, then it's going to come down to a formulation chemist. So there's going to be specific people that kind of focus on this type of work and are going to have to figure out how to prolong that chemical, how to increase the exposure in the hive, and how to best deliver it to the mites. So for instance, amitraz strips, they have and the strips themselves, I mean, they're impregnated with the active ingredient, amitraz, but there's oil on them as well. So, as the bees are moving through the brood area, they're picking up that oil that has the active ingredient in it, and they're moving it around, and they're touching each other, and eventually it's contacting the mites and it's going to kill the mites. They

would have to do something similar, right? And that takes time and it's a whole nother monster on its own. That's the kind of work that typically, you would expect a company to do so. So as Rassol said, we're going to find these compounds, and then they're hoping that a company picks them up, and then kind of takes it over the finish line, kind of working on all that with the formulation chemistry. But it's still kind of a long road ahead.

Amy 28:25
Yes, it is. And that's just the beauty of science, right? Beauty of research.

Dr. Cameron Jack 28:30
It's always moving, but it, unfortunately, never, or usually never, moves fast.

Amy 28:37
Yep, that is true. So another thing that I wanted to discuss was he's in Alberta. And so he'll be working with these compounds. If he gets to the point where they do want to make it a product. They're in Canada so that's a little bit different than going through the process here in the United States, because there is a process to have registered project products. S what do you think the differences-- are there differences between what we can apply here in the United States and those beekeepers in Canada?

Dr. Cameron Jack 29:11
Yeah, I mean, there are differences. I'm not as familiar with the kind of the regulatory and approval process that might be in Canada. So maybe some of our listeners can chime in to a discussion and give us their thoughts, but basically, there are differences. Rassol mentioned four different synthetic chemicals that they have registered in Canada. Three of them are the same as us, coumaphos, amitraz, tamifluvalenate but he also mentioned flumetheran, which is another pyrethroid. It's not registered in the United States. And so there are some differences. There will likely be some differences in the process of bringing compounds forward and getting approval for us. That's got to go through the EPA, the Environmental Protection Agency, and they're going to want to see a lot of data to show that not only is this chemical going to be safe for the honey bee colonies where we're applying it, but also the environmental impacts and that's kind of stuff that just takes a little bit of time. So it's good as for the role of the scientists to find these compounds. But then it's a whole nother ballgame to actually get a product registered.

Amy 30:47
Awesome. Yeah, it's always, again, it's just the logistics and understanding the process of everything and how it actually gets into our hands. So I'm excited to see the future of, maybe, some of these compounds, if they ever end up out on the market.

Dr. Cameron Jack 31:04
Yeah, me too.

Stump The Chump 31:10
It's everybody's favorite game show, Stump The Chump.

Amy 31:22
Alright. Welcome back to our question and answer time. So the first question we have, Jamie, has to do with brood breaks, and, basically, using brood breaks to kind of get rid of mites. And so what is the efficacy of creating a brood break in your colony? Does it work? How many mites are there? Is there a reduction? Let's talk about that.

Jamie 31:43
I'm gonna answer this question by telling our listeners how dumb I am. So the question essentially was, what's the efficacy of a brood break? In other words, if I do a brood break to control Varroa, what Varroa population reduction can I get? I'm like, oh, man, that's a good question. Let me look it up online quickly and see if I can find any manuscripts. So I'm scrambling around online to try to figure it out and then I'm like, oh, wait, I'm stupid. You and Dr. Cameron Jack published a paper where you reviewed the efficacy of all the Varroa treatments ever tested, including brood breaks. So you should have a number in a paper that you wrote, moron. And I'm like, ah, snap, I'm so stupid.

Amy 32:26
So this is Jamie talking to himself, by the way.

Jamie 32:28
Exactly. This literally happened three minutes ago when I was preparing to answer this question. So let me answer it this way. Dr. Cameron Jack and I have a paper where we reviewed every Varroa treatment ever tested anywhere on planet Earth, or at least anything that's been published in the research literature. In fact, we interviewed Dr. Cameron Jack not so many podcast episodes ago where we talked about this manuscript. We're going to make sure and link this manuscript in the show notes so that you can have a look. So please make sure and check that out. But there is a section in that manuscript called brood interruption, and brood interruption is where we discuss the manuscripts where this has been shown through research projects. Okay, so with that background, and for the rest of our listeners, a brood break, which we call brood interruption in this manuscript, is essentially creating a broodless period in your colony under the premise that Varroa have to reproduce on brood. So if you create a brood break, there will be a period of time there is no brood on which Varroa can reproduce. Therefore, you are reducing their reproduction rates for that period, and hopefully, reducing the number of Varroa that you have in your colony. So we have found a manuscript that we report in this article that says caging a queen -- so by the way, caging a queen is one way to introduce a brood break. If a queen can't run around in a hive, she can't lay eggs. If she can't lay eggs, you're going to have a brood break. So there was one group of scientists who said caging the queen for about 20 days can reduce the Varroa population by about 40%. So Cameron and I also, as part of Cameron's PhD project, did a study on brood breaks, and we showed that it's not a sufficient standalone treatment for Varroa. The real power of brood breaks has less to do with creating a natural Varroa reduction by creating the brood break, and instead, has way more to do with brood breaks forcing all of the Varroa in the nest on to the adult bees and you have to do a brood break for at least two to three weeks because you have to allow all the developing brood to grow, go through the complete cycle so that there's no capped brood in the nest. So it's better done, usually, in the 21 to 24 day cycle. So let's just say you do it for 24 days. That

means you'll have no brood of any type left in the nest, including drones, which means all the Varroa will be on adult bees. The power of this is, now, you can treat the colony with some sort of acaricide and all of the Varroa will be exposed to it. So that's when people use oxalic acid or formic acid or thymol, or any number of treatments, amitraz, whatever. So the power of a brood break has less to do with breaking the Varroa reproduction cycle and more to do with forcing the mites onto the adult bees, making them significantly more vulnerable to treatment with any number of treatments, and it can improve the efficacy of treatments that otherwise have low efficacy. For example, oxalic acid is not very good much of the year because 70% or more of mites might be in capped brood. So if you treat with oxalic acid, which is a boom -- a treatment now -- you're only killing the mites that are available to be killed, not those ones that are hiding in the brood cells. So the brood break can take something like OA or thymol or Formic, which are normally so-so treatments and make them really good because all of the mites are now exposed to it. There are downsides to brood breaks, right? You'll lose a month of brood. Caging queens to create this situation can be detrimental to the queens. So in this article, we have a whole paragraph on brood breaks. We cite all the literature we could find where people tested this, but the real power of brood breaks is to force all the mites to a very vulnerable position, which is where they can be treated with an acaricide.

Amy 32:33
So a queen can be caged and not lay eggs for a couple of weeks, and she's okay?

Jamie 37:00
Absolutely, Amy, but the second part of your statement is where it gets real dodgy, which is, "She's okay." A lot of folks have shown that you can cage queens for this period of time. But when Cameron did this study as part of his PhD work, we did create a brood break. And you might have seen a little bit of a Varroa reduction, but the queens were not always okay. Think about it. It's just hot in Florida for a good chunk of the year. So you're stopping a queen from laying, you're hoping that she stays alive in that cage for an extended period of time, so there are probably times of the year this is better done than other times of the year. That kind of thing really hasn't worked out. So you get a little bit of benefit from Varroa from just the break, you get a big benefit if you treat while a brood break, but you also carry a risk of there might be harm to your queen and you might create a queenless situation downstream that you have to deal with.

Amy 37:56
Oh, beekeeping. So fun. Alright, so the second question we have this person is following up on something that you had mentioned in a past Q&A about giving bees clean water. I guess this person will provide clean and fresh water from tap in a little fountain that they have. But they're finding that the bees are getting slightly offended about it and they don't like that water. And so what do you mean by giving the bees clean water? Have you ever seen a situation where bees will actively avoid clean water, or clean to us at least?

Jamie 38:30
Amy, I always get nervous about questions that start with, "Jamie said..."

Amy 38:35
That's right. I hear that all the time.

Jamie 38:38
Yeah, in fact, I've got an email waiting in my inbox that started, "Someone quoted Jamie as saying and now..." anyway, it's just what it is. That's what happens when you answer questions publicly or talk about bees publicly, people will always be able to get back at what you said. By clean, I exclusively mean toxin-free. So I'm essentially saying you don't want bees necessarily to be collecting irrigation runoff in treated fields or from retention ponds that are treated for whatever. So by clean, I don't mean they can't be mud puddles or ponds or things like that. I'm definitely in agreement with the individual asking the question that you will more often than not see bees actually going to what we call dirty sources of water, that weird stagnant puddle that's in a cow pasture, the edge of a green pond, or something like that. That suggests that bees might actually get more from water than just water, right? They may not just be using it to thermal regulate. So that kind of thing doesn't worry me. So I'm not saying clean from the fact that it needs to come straight out of a tap or straight out of a deionized water model. I'm saying clean, exclusively from, you just don't want pesticide residues in it. So that is my principal meaning of clean when I say clean water.

Amy 40:05
Alright, I think that's fair. So for the third question we have, this is a fun question. Is it okay to work bees in the rain?

Jamie 40:14
For you or for the bees?

Amy 40:16
I know. That's what I was thinking.

Jamie 40:17
Well, you don't want to open a hive and expose the adult and immature bees directly to rain going into the hive. Okay, so then you're like, well, then it's not okay to work bees in the rain. Well, I will tell you, I've worked bees in the rain plenty of times. And the way that I do it is I will put a temporary canopy over me if I'm working alone, or someone working with me will hold an umbrella that's really large, that will cover me and the other person in the beehive. I know, you giggle but it's true, especially in the research world, there are times where you have to work a colony. It's very scheduled, it's a treatment day or a day you've got to put in a food or a day you've got to collect a sample, whatever. And you just kind of have to do it. So I've worked bees in the rain, and many of those situations -- in fact, I hate to tell the story, but I'm going to because it's fun to me. When I went to the University of Georgia and worked in as an undergraduate in the lab of Keith Delaplane, Dr. Delaplane was a great mentor and friend during those years when I was working his lab, and I learned a lot from him. But early on, like, early on, like maybe the first week of working in his lab when I was a freshman at the University of Georgia, he needed some samples collected and we were both at the bee lab. It's kind of at a research farm outside of Athens, Georgia. And he's like, "Jamie, I need you to go collect some samples of bees." I was like,

"Okay, I will." He's like, "Now." And it was flooding. Like Noah's Ark type flood, and I'm like, "You mean in the rain?" He's like, "Yeah, you can carry this umbrella." And one of my first memories of working at bees at a research institution is holding an umbrella with one hand and trying to work the colony with another hand while collecting a sample. And I remember just getting soaked. I learned a few things in that very important lesson, which was you can work bees in the rain, you just don't want the water to get into the hive. Number two, you're going to get soaked so you need a good reason to have to do it. And number three, which is what most people think of when they think cloudy, rainy days, the bees were a little bit defensive. They didn't really want to be worked.

Amy 40:39
Shocking.

Jamie 41:51
Yeah, they didn't want their hive ripped open while it was flooding. You don't want to work bees in thunder and lightning but in the rain, it can be done if you have a way to keep yourself and the bees dry. But, at least the bees.

Amy 42:42
You know what? I think about this past March 2022, we had our Bee College event. It was two days and it was pouring. I don't know if you remember that, Jamie. But I think that every single person that attended that Bee College, that will be a memory that lasts with them forever because we worked bees and I know that everybody just got super stung.

Jamie 43:05
Well, the key to working bees and keep working in the bee lab is you gotta buy waterproof boots.

Amy 43:10
Yep, there you go.

Jamie 43:11
So, at least you can stay dry.

Amy 43:13
I know. I think we all bonded over that moment in that Bee College, so thank you to everyone who attended that Bee College. I'm sorry it rained. It was out of our control. Alright, so those are our question and answers for today. If you have more questions, please feel free to send us an email or contact us on social media. We are @UFhoneybeelab.

Serra Sowers 43:34
Thank you for listening to Two Bees in a Podcast. For more information and resources on today's episode, check out the Honey Bee Research Lab website at UFhoneybee.com. If you have questions you want answered on air, email them to us at honeybee@ifas.ufl.edu or message us on social media at UF honey bee lab on Instagram, Facebook and Twitter. This episode was hosted by Jamie Ellis and

Amy Vu. This podcast is produced and edited by Amy Vu and Serra Sowers. Thanks for listening and see you next week.