UF IFAS
UNIVERSITY of FLORIDA

EPISODE 208 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 joined by one of our own, Dr. Lena Barascou, who is a postdoctoral scientist here at the Honey Bee Research and Extension Laboratory in the Entomology and Nematology Department at the University of Florida. I am so excited to introduce her. Many of our Florida beekeepers have probably heard her speak about mosquito control and the mosquito impacts on honey bee colonies. So, I'm excited to hear from Dr. Barascou today. Thank you, Lena, so much for joining us today.

Dr. Lena Barascou

Thank you so much for having me.

Amy

So, we always ask all of our guests the same question at the beginning of our podcast, and that is tell us a little bit about yourself and how you got into the beekeeping world.

Dr. Lena Barascou

Yeah, so I'm from France, first of all, and I did all my universities in France until my PhD. And so I first started out in the world of agroscience. I have background in behavioral ecology, functional ecology, and I did most of my internship during my master's degree working on parasitoid wasp and how they help to regulate the pests in crops.

So, I was more interested in behavioral ecology, ecosystem services, and especially in how the landscape features, like edge rows can shape insect interaction. When I was set on doing a PhD in this field, I couldn't find an opportunity that fit exactly in with this topic. So, I kind of open myself to adjacent fields, and that's how I landed in the honey bee world because I found this amazing opportunity in ecotoxicology working on pesticide impact on honey bees. So, at first, I saw it as like a compromise, but it quickly became my passion because it combined everything I

like, behavioral ecology, [inaudible] ecology, applied research, and real-world applications for environmental policy and agricultures.

So, I spent more than three years doing my PhD in how pesticide affects honey bee health at both the individual and colony levels. And so right now I'm doing this postdoc in Florida with you. So, it's really cool to continue to work on honey bees and pesticides. So, yeah, that's how I got into the bee world.

Jamie

Well, we are grateful that you got into the bee world because you've been doing a lot of important research since you've been with us here in the lab. And Lena, I'm going to set the stage for this next question. So, Amy and I and now you, we're based here at the University of Florida in Florida. When I moved down here, someone told me the two things that made Florida habitable were air conditioning and mosquito control because we have lots and lots of mosquitoes. And of course, we get these floods, we get these hurricanes, there's a lot of fresh water, and so Florida just breeds mosquitoes. There's obviously a public health focus on controlling mosquitoes around the state. And then you've got beekeepers who know that mosquito-cides are being broadcast broadly and that these things might, you know, affect their bees.

So, every year we have beekeepers telling us, hey, we're worried about our bees, mosquito control might be affecting our bees, etc. So, Lena, with that background, could you talk a little bit about how you decided to do this research and the importance of this research?

Dr. Lena Barascou

So, during my PhD, I was working on agrochemicals, so pesticides protect crop production. So, I was interested to see, in this case, other families of pesticides and so more like pesticides used for public health. And so, I was really interested and to meet and talk with Florida beekeepers because I have expressed growing concern about the effect of this product and not a lot of studies have been done to look at the impact specifically of mosquito control products on honey bees.

Some of the studies have been done on the field and we didn't really see a lot of bad effects. But there are also laboratory studies that can be done at individual level, like on honey bee larvae and adult honey bees. And so that's why I was really interested in doing this part of the project during laboratory toxicity test to see what's going on with bees, but also for sure doing a field study to see what we can see in Florida. And it was super interesting and cool to work closely with the Anastasia Mosquito Control District. It's really interesting to talk also with mosquito control personnel. So, yeah, understanding the potential impact of this project on honey bees, I think it's essential to balance between the public health needs with environmental conservation, especially given the critical role of honey bees playing in the pollination and ecosystem health.

Amy

Yeah. So, there was a lab technician here at the lab who was in the field doing the field project, and then you did a lot of the laboratory work, and we'll talk a little bit about your methods in just a little bit. But can you talk about what projects you're conducting and what were the objectives and questions that you had for your projects?

Dr. Lena Barascou

Yeah. So, for this study, there are a lot of objectives. So, the main goal was to assess the impact of mosquito adulticide and larvae-cide application on honey bee colony strength in the field setting, but also in the laboratory setting at the individual level. So, the goal is to provide a critical insight for mosquito control personal and beekeepers, fostering collaboration to minimize the non-targeted effects of this product and of the mosquito control practices on honey bees while ensuring effective disease mitigation.

So, we have, I can say, 4 different objectives. The first objectives were more about the field part, to determine the level of pesticide residues that we can find in beehive matrices, such as pollen, wax, honey and so on. The second one was to evaluate the effect of this treatment as a spray on honey bee colony strains parameters by estimating the number of bees or brood cells. And also in the field, we'd like to determine if there is like an immediate impact of an adulticide spray event on adult honey bees that can be directly exposed to the treatment at the nest entrance, for example. So, the other side of the project is more like the laboratory part. So, the goal is to evaluate the toxicity of the active ingredients commonly used in these mosquito control products, but also the toxicity of the formulations that are used in the environment by the mosquito control district. And so, we are looking at the toxicity of this project on honey bee larvae, but also on adult honey bees.

Jamie

Lena, that's actually quite a bit of stuff, so I'm going to say it out loud. Just make sure I can wrap my mind around it because I think this is so important. So, essentially, with mosquito control, you're doing a field level project where you're looking at the levels of residues and hive matrices, spray impact on colony strength parameters and what's happening to adult bees directly exposed at the nest entrance, and then you've also got complementary laboratory studies where you're looking at both the active ingredient and the formulated products on adults and larvae. So, could you talk briefly about the difference between active ingredients and formulated products?

Dr. Lena Barascou

So, the active ingredient is a specific pesticide always composed like the formulation to a certain percentage. But there is also in the formulation adjuvant and surfactant that we don't really know the name of, and we don't really know the percentage of this surfactant and adjuvant was

composed with. But the activity ingredient is like the pesticide, which is going to have a specific mode of action to kill mosquito, in this case, or the larvae of mosquito. For the larvae side, I don't know if I'm really clear but –

Jamie

No, that's perfect. So, with all this in mind, you've basically got these three studies, a field study that's got multiple parameters you're measuring, and then lab studies that you're doing, adult research and larval research. I guess, can you walk us through the methods associated with each of those projects? And you could just start first with the field project.

Dr. Lena Barascou

So, first of all, it was done before I arrived in the lab, but I was analyzing all the results, and I'm currently writing publication on the result. But briefly, we purchased and established 30 nucleus honey bee colonies with 5 frames. So, we placed them in different areas which are both heavily treated with mosquito control products, and some didn't receive any treatment. And so, we placed these colonies on these different sites between August 2023 and November 2023.

So, we had a total of 6 sites, 3 identified by the Anastasia Mosquito Control District as a way of high priority that receives the treatment and three others were determined as control and non-treated areas. For the pesticide residue, we just collected some honey, pollen, wax and brood samples in each hive before and after this treatment period. We just sent these samples to a specific laboratory for residue analysis. And to look at the impact of this product on honey bee colonies, we measure some colony strains parameters by only visual inspection. So, estimate the number of bees in the frame and the number of brood cells. The last objective in the field was to determine the immediate impact of spraying events of mosquito adulticide on adult honey bees. We just placed 3 screen cages, each containing an average of 600 honey bees on the top of each experimental colonies. And so, 24 hours, the spraying event, we measure the number of dead bees, and we collect some of them also for further residue analysis.

Amy

So, Lena, I think actually, you know, I'm thinking about the timeline of it and many of our listeners, because they're not in Florida, don't realize that our hurricane season is actually between June and around October, right? So, I guess the timing of the field study was perfect because that's typically right after a hurricane or a rain event that mosquito control is spraying at that time.

Dr. Lena Barascou

Yeah, Yeah, that's right. Because sometimes, after a hurricane, the different mosquito control districts have some calls and so they have an urgence to spray some area of high priority. And so

usually it's like between, yeah, June and October. So, our field study was between August and November, but the treatment was until end of October.

Amy

So, Lena, that was a great summary of what you all did in the field and analyzing the data for that. I know that once you started here, you were doing lab stuff and so you were looking at adult bees and you were looking at larvae and you were measuring active ingredients and formulated products. I'd love to hear about the methods of how you do each one of those.

Dr. Lena Barascou

So, during a toxicity test, the goal usually is to determine two different endpoints. So, the little dose of these chemicals that we call LD50. So, it's a dose that kills like 50% of test bees usually after a single exposure of pesticide. But we also have to determine another endpoint called NOAEL. So, it's a known observed adverse effect dose. That means the highest dose of pesticides at which no adverse effects are observed. And usually, this one is determined after a chronic exposure, that means a repetitive exposure of a pesticide. And so, I was doing that for both only bee larvae and adult bees. And the final goal was to use this toxicity endpoint to calculate the risk of each mosquito control product. This is kind of the first step in pesticide risk assessment before going deeper in semi-field and field study. It's kind of like a screening step. So, how can I do that? Usually, for the larvae I have to wear them in vitro and expose them to the pesticide for a specific diet. So, we are following the official protocol by Dr. Schnell.

First, we have to cage the queen to get some first stage of larvae four days after caging the queen, we can draft, and so that we know that all of its larvae are the same age. During the grafting, we transfer all of this first stage of larvae from the frame to a plate containing wells and we keep them in controlled conditions. And so, the pesticides are added to the diet for only one day or for continuous day during the level development depending on if we want to do a single or a repetitive exposure. Every day we have to check the mortality during the larvae development, pupil development and sometimes until adult emergence. For the [inaudible] bees, it's much easier because we just need to get emerged bees and place them in plastic cup cages. And after that, we can expose the adults for super solution for [inaudible] exposure, or we can expose them topically with a drop on the thorax for a contact exposure. We also, for adult bees doing acute or single exposure or chronic exposure always, usually until 10 days.

Amy

I'm listening to you say all of this and you make it sound so easy. I bet you've gotten really good at grafting and, you know, feeding each of the larvae in those little cells.

Dr. Lena Barascou

Yeah, I'm kind of like, like I said to beekeepers, when I'm doing presentation, I'm like the queen in this kind of toxicity test because I have to feed all the larvae by myself.

Amy

Yeah, definitely. Jamie, is the method for feeding larvae, for grafting, doing toxicology work, wasn't that something that you all came up with as far as a method for it?

Jamie

Yeah, so she referred to a Dr, Schnell. Dan was actually a postdoc in my laboratory at the time, and he and another individual, Hudson Tomei, who is a Brazilian visiting PhD student, took older methods of rearing honey bees in vitro that were not very reproducible, and they changed a lot of parameters and made them very reproducible. And now this is the method that many scientists around the world use when rearing honey bees in the lab and using those protocols to test the impacts of pesticides on bees.

Amy

All right. So, Lena, this is very easy for me to ask you a question, and I know it's going to be a little bit longer as far as the answer goes, but what were the results that you found? I guess we can start with the field and then we can move over to the laboratory.

Dr. Lena Barascou

Yeah, I will start with the field study. So, the main result, to be very brief, is that we found some residue of active ingredient we used in the mosquito control project, but at a very low concentration. So, usually the maximum that we found was 71 nanogram per gram of samples. But interestingly, the pollen was the matrix which shows the greatest levels of accumulation of this pesticide, and the active ingredient chlorpyrifos was the most frequent pesticide found in the hive. So, this active ingredient is kind of, I think, common and is used commonly in many fields. So, it can be used on agrochemicals for protecting crops and also on mosquito control products. So, that's why we found it kind of everywhere and most frequently.

But the main and interesting result for beekeepers is that we didn't really find, in this study, significant differences in the mortality or in the parameters between colonies located in the treated and non-treated areas. And we didn't find any mortality after the direct impact of the spray event on adult bees. But we also detected some active ingredients as a residue in the adult bees that were in the screen cages and exposed to the spray for 24 hours. That's all our main results for the field study. If I can go to the laboratories toxicity test results, so as I said before, we determine the two main endpoints, LD50 and NOAEL for each active ingredient and formulation. So, the LD50 helps us to know which active ingredient of formulation are the most toxic for bees. For example, in our case, the Duet and Dibrom are two common formulations of mosquito control products that are used here in Florida, they were highly toxic to honey bee

larvae based on the LD50 that we found. According to the risk quotient that I calculated, the risk of the formulation is not always low at the label application rate.

And so, Dibrom, at the maximum application rate, presents a risk to honey bee larvae after both a single or a chronic exposure. Another formulation is Mosquitomist Two U.L.V. So, it's like a real name, but it's composed of chlorpyrifos that we found in our matrices. This formulation presents a risk only after a chronic exposure. We also tested the larvae side, but this larvicide appears to be safe for honey bee larvae, so it's good news. And about the adult bees, we found that Dibrom was the most toxic product followed by Duet and Mosquitomist Two U.L.V. And it was a risk that we obtain. Usually, all the insecticides presents a risk after chronic exposure with Dibrom, again, representing the highest risk. After single exposure, only Dibrom and Duet present a risk to adult bees, but not the Mosquitomist Two U.L.V.

And we found, finally, that the larvae side can be a risk even if it's safer than the insecticide. But for the adult honey bees, we found a potential risk after exposure. So, it’s maybe complicated to understand, but this is what toxicity test is in the honey bee world.

Jamie

I actually have the advantage to all the other listeners of this episode in that you've written draft manuscripts for the larva and the field studies, and I'm actually reviewing those now. So, I'm very familiar with the data and all the stuff. I want to ask you a million questions, but maybe I'll just save that for a later day because our listeners out there around the world, they're beekeepers, maybe some bee scientists, etc., but a lot of beekeepers, and they want to know, okay, what does all of this mean for us? Is mosquito control dangerous or not dangerous for our bees? Is it risky or not risky? Is the threat high or is the threat low? I know a lot of what you found is preliminary. We still have to submit it for reviewers who get their chance to help us think about this stuff critically. But just kind of backing up and looking at your research as a whole, where do you kind of stand on this from a risk to bee colonies perspective?

Dr. Lena Barascou

Yeah. So, I can say that based on our field study, we didn't see a margin impact on the colony strengths and on adult mortality in the field, even if, you know, I realize that they receive aerial spraying. So, I think it's good news for beekeepers. But we found some pesticide residue in the hive materials and especially in pollen. And so, exposure is happening for sure, but there is no visible effect, and these effects are not immediate. So, we just have, I think, to be just cautious. Everything in the lab, we found some potential risk, which is just a screening step. It's at the individual level based on the highest application weight. So, usually, mosquito control personnel, I talk with some of them from the Anastasia Mosquito Control District, and they'll usually use the minimum application rates. So, I don't think there is a high risk for beekeepers and their bees,

but we can just prevent the potential exposure of this product on the colonies by doing some different protection of the colonies, moving some hive or things like that.

Jamie

Lena, I think that was a really good answer because I completely concur. So, Lena, I really appreciate the time that you've taken to talk to our listeners about your research. And again, I know it's not published yet, you're working on those manuscripts now, but I do believe it's going to help shed some insight on this kind of risk that mosquito control poses to bees, at least certainly under the situations that we've tested it here. So, thank you for your time, Lena. I really appreciate you for joining us on Two Bees in a Podcast.

Dr. Lena Barascou

Yeah, thank you so much for having me. It’s a real pleasure to share my experience and talk about honey bee research and toxicology.

Amy

Jamie, I think it's really unique that we do live in an area where there is mosquito control. I mean, that's just kind of the reality of it from a public health perspective, which you had mentioned earlier as well. So, mosquito control is one of my stakeholders. Let's just summarize the project, the results, and was there anything that you found surprising?

Jamie

Yeah, a lot to unpack here because I am pretty intimately familiar with this research. I want to say before I get too far, though, I want to give a shout out to Dr. Cameron Jack from our laboratory. He was actually the principal investigator on the grant that allowed us to hire Lena and to do this work with the Anastasia Mosquito Control District here in Florida. Okay, so as Lena said, the background of this issue is, hey, we got bees, they got mosquito control. How might that impact our bees? And if I were to unpack it, I would just say, yes, beekeepers here are worried about mosquito control. That's not unique to Florida. It's just very robust in Florida because there's a lot of mosquito control here. We're a warm, wet state, right? Both of those things favor mosquito production. We also have a lot of bee colonies and various places around the state treat. They fog, they release compounds from the air, from the ground, from trucks, etc.

So, there's a lot of opportunity for bees to get exposed, and our beekeepers believe that they're getting exposed, right? Lena comes in and she's like, well, I'm going to look at this at the field level and at the lab level for both adults and immature bees. It's funny, one of the most impressive things, it was kind of surprising, but maybe not to me, about this is we started with the field study, which is usually the second set of studies you do. What Lena said is, you know, she kept bees in what we called hotspots that got a lot of mosquito control treatments and then control sites that weren't getting any. I guess the biggest surprise is that we didn't really find any

colony differences between colonies in the hot spots and colonies in the control spots. I mean, we weren't seeing dead bees. We weren't seeing dead brood. We weren't seeing colony strength differences. If you caught what Lena just said, she said that we caged bees and placed them at the nest entrance so that they would be outside the nest and available for that direct drift that you would get from these applications. And she didn't see dead bees there. So, that was surprising. Maybe not, but sort of. I

t's not so surprising because this is what I've been hearing about mosquito control when people look at it from a research perspective. But it's a little surprising because all the beekeepers kind of expect something different. They expect the mosquito-cides to be killing bees. And then she, you know, pivoted to those two lab-based studies where she's looking at larvae and adult bees. This is important because it can kind of give you a microcosm of what's happening. And she did see some effects on larvae and even adults, but really those effects weren't great enough to be seen in the field study. I think that's kind of consistent with what I've heard about mosquito control research and impacts on bees.

I think one of the novel things that Lena did that was different from what we see a lot is she tested formulated products versus active ingredients. Active ingredients, like the name implies, would be the ingredient in the formulated product that's supposed to be doing the killing. It's the active ingredient. Well, a formulated product, though, is full of other stuff, adjuvants, surfactants, other things. So, she looked at the active ingredient toxicity and the formulated product toxicity, and she's able to compare those two for larvae and adults in these trials. So, she's creating a large body of data that can be used to inform the risk mitigation process for mosquito control. It's just really exciting to see her do that. It has been fun to watch her generate these data, fun to read through these papers that she's working on currently, and we hope those will be released, you know, in the next year. It takes a while to get things reviewed and accepted and published, but I think this is a good first step in understanding the impact of mosquito-cide on honey bees. And Amy, of course, this is relevant everywhere. If you're a warm, hot climate, and the tropics are even just outside of it, mosquito control is probably a really big thing in your area. And of course, as beekeepers, we all want to protect bee health while respecting human health, which is why they do mosquito control in the first place.

Amy

Yeah, definitely. Lena has given the talk around the state and probably beyond, and it's interesting the feedback that she gets, right? She's getting feedback from all different directions on their thoughts of this, and we've seen beekeepers and beekeeping associations working with their local mosquito control, and I'm all for that. It's really great to kind of see that collaboration between those two entities work together to minimize the impact, exactly what you said, minimizing the impacts of the honey bee colonies, but also while protecting the public. So, yeah, I think that's really all great and I'm excited to see what future research brings.

Jamie

Amy, I 100% agree with you. Lena is just providing research data and how this whole thing works is we've got to generate the data so that those data can inform our recommendations. And Amy, I think it would be a fantastic idea to follow up this podcast by maybe interviewing someone from a mosquito control district or someone with some expertise training beekeepers and mosquito control personnel about how to live with the other. I know you and I have done a lot of that in the past, but we have a robust infrastructure here in Florida where I believe we could have a guest to actually talk about, well, what are some recommendations we would give to mosquito control? What are recommendations that we give to beekeepers? But this is a very important issue. It's not going to go away just with the studies that we've done. It's certainly something that beekeepers around the world want to know all about.

Stump the Chump

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

Amy

All right, welcome back to the question-and-answer segment. Jamie, we've got three questions. The first question is about vaccinated queens. This individual is saying that vaccinated queens seem to be widely available to the general public. And so, we're wondering what are your thoughts on the safety/efficacy? Should small scale beekeepers be ordering vaccinated queens? Why or why not? There's a lot to this question, so I'll just kind of leave it at that.

Jamie

Yeah, so I do have some thoughts about this question. First things first, you know, I'm a scientist, so I'm a beekeeper and a scientist. And as a scientist I need to be overwhelmed with data before I would say, okay, I'm going to change my management practices. To give you an example, I believe we have resistant stocks of bees to Varroa, the hygienic stocks, the Russian stocks, things like that. So, I would advocate everybody use the resistance stock. That doesn't mean you're going to get rid of all Varroa, but you should use it.

Well, here in this context, there's a company, Dalan, or Dalan, I forget how to pronounce it. They've been doing some vaccination work and showing that queens that they vaccinate are able to pass American foulbrood resistance traits to their offspring. That's the original effort through this research that they are doing, and the data supports their statements. These vaccinated queens, their offspring are more resistant to American foulbrood than others.

Now, if you get into the weeds of the research, you'll see that when they did a lot of this in vitro testing, so in vitro means in the lab, they were getting offspring that had greater levels of resistance to American foulbrood. But it's a little tricky, and I'm going to just play it on the 100 offspring. In the unvaccinated individuals, you know, maybe 90 to 100% of those individuals

would die from American foulbrood. In the vaccinated individuals, they might get 50% survival. So, you could say aha, it's definitely the vaccinations, it's definitely working. It was. It was reducing the incidence rate of American foulbrood in that population. However, like in Florida, if a single cell of American foulbrood is found, then the colony is supposed to be euthanized and the hive burned. So, the question is would the vaccination in a field level setting pass that threshold of having no diseased individuals? Because, remember, here in Florida, just one diseased individual. So, if 1000 are sick and the vaccinations 50% effective, then 500 are still going to be sick.

So, what I would argue in this context is I think the research is very promising. I don't think there are any, to date, evident side effects. Now, obviously side effects can be found in the future, but I would say with the current data, it's definitely worth giving it a try. There's no evidence that it hurts and it looks like it can only help, right? Any reduction of American foulbrood is better than no reduction of American foulbrood. That might be enough to keep a colony or two or five or eight or 100 from getting it at all. So, I feel like it's going to be tested more and kind of colony level research. So, we still need more data in that regard. But I think any reduction is a good reduction. And, you know, I don't know what the difference between vaccinated queen cost versus regular queen cost happens to be, but I certainly think it's worth a try.

Amy

Definitely. You know what's crazy, Jamie, it's 2025 as we're recording this. I remember when – it must have been in 2023. It's been a couple of years. Do you remember when they first even said or mentioned the term, like vaccinated queen? There's been so much research from then until now and it's interesting just to kind of see that progression through just even a couple of years.

Jamie

Yeah, I agree. It is fascinating research, and I was able to speak to one of the company representatives in great detail and ask a lot of these questions. And I happen to know someone who did some research on this as well. I'm not making the proclamation because I just don't think we know at this level yet that if you use it, you'll never get American foulbrood. I just feel like it's kind of like, if it helps at all, isn't it good to use it, especially if there's no side effects? Now, again, I want to point out side effects could manifest. You just can't know all the side effects until stuff like this is widely, you know, out in the environment. You see that with human medications, right? We know some of the side effects, but then people go, oh, this one happens to also cause this. I don't think those are going to be overwhelmingly negative. There's no evidence of negative at the moment. And I would use it. If it was available in the stocks that I want, I would definitely consider using it.

Amy

So, just as a follow up, Jamie, I've heard that there may be a possibility of it being, I don't know, effective towards viruses. What are your thoughts? Have you heard this?

Jamie

Yeah, this is one of the funny things in the research world where you create something and you do it for purpose X, and while you're measuring its effect on purpose X, you discover that it also has an effect on Y.

Amy

But you have to be looking for that, right?

Jamie

You do. And the scientist obviously created this with American foulbrood in mind. However, they did discover, I believe, in some of their field trials, don't hold me to that, but I think it was field trials, that colonies that had this level of vaccination also had reduced viral loads of a particular virus. I'm a little afraid to commit to it because I'm not sure if it's been published yet or not, but there was one virus that I believe they found reduced levels. Now, the vaccine was very specifically created for American foulbrood. So, how it would influence virus levels of this particular virus is still a bit mechanistically unknown. In other words, they wouldn't know the mechanism of how this would happen, but it seems to be happening. So, I know the company is going to do some follow-up research on that and determine its virus efficacy as well. So, the point is you could definitely get a boost from the American foulbrood perspective, but you may also get a boost in other ways that they seem to be discovering even as I talk.

Amy

So, for the second question, this beekeeper is considering transitioning to a more natural beekeeping approach. They're wanting to use foundationless frames and they've done that. They've used a few foundationless frames and say that they've had good success. They're considering transitioning all the frames over to completely foundationless. So, I guess, my first question is, is that considered a more natural beekeeping approach, just using foundationless frames? And then what are your thoughts on someone using completely foundationless frames in their entire hive?

Jamie

Yeah, just as a disclaimer, anytime I talk about management, it's mainly just my opinion, right? There are 35+ years of experience in that opinion and keeping bees around the world, but it's still just opinion. So, my waffle-y answer to that is there's a huge spectrum of beekeepers today, from the hyper-managed beekeepers to the “we want to be as natural as possible and not do anything at all.” The older I get, the more I get to be mischievous, I will say. And the concept of natural

beekeeping is a difficult one for me because the moment you take bees out of something they want and put them into something we want, it ceases to be natural. So, you know, this question is, well, I'm essentially still using a box that I put them in, but not the frames. And so, I would say, well, why would you use the box and not the frames? You know what I'm saying?

But my point is there's definitely a growing population of people who would consider themselves natural beekeepers. To a lot of people, that means a lot of different things. I think maybe the question being asked is really the more pertinent question here, which is what do I think about using foundation versus not, right? Whether or not that's linked to natural beekeeping or heavily managed beekeeping. What do I think about it? Well, again, this is just my opinion and it's beekeeping, and one of the beauties of beekeeping is you can make it your own. I think it's okay. It's a mindset that's okay. The bees are making all of the wax themselves, and maybe there's something you can take home from that. But one of my problems is they don't always put it where I want it. Especially, if you don't give them at least a starter strip and point them in the right direction. There's no reason that they'd build it in the frame. They could build it across the frames. Now, I know in frame development people can use these little wooden ridges to give bees, it triggers a biological function to want to put comb there. So, I know there's some tricks that you can use to get them to build wax on the frames that you want. So, you know, if you're wanting to do it for a pesticide or a diseased reduction approach, that's fine. Maybe you are starting the wax pure because we know that foundation has been found with pesticide residues and possible disease and transmission and things like that. So, maybe if you want to do it for those purposes, perfectly okay.

Now I'm going to hurt a lot of people's feelings with this next statement. However, to me, it is very difficult to manage. Now, I know all of our natural beekeepers are out there going to argue, “I manage mine just fine, blah, blah, blah, blah.” That's fine. But do you do that in 10,000 colonies that you're moving all around the country? Probably not, right? Natural beekeeping is usually kind of a hobbyist thing and less so a commercial thing. Of course, there can be natural beekeepers at the commercial level. I'm just making the point that it's more difficult to work foundationless combs than not. And it's just simply from a sheer sturdiness perspective. There’s no wiring. Even if you want to go the pure beeswax foundation route, it at least has wires. If you go the plastic route, then it's got that plastic infrastructure. So, there's just very little infrastructure. So, when you handle the combs, you can only spin them around in the same plane that they are in. You can't, in other words, flip a comb. It might burst out of the frame. I think about top bar hives that don't have any walls and bottom boards to a frame at all. It's just the top bar and they're suspending their comb from that. Well, you have to pick that thing up and hold it very specific ways. I have a colleague who manages on a commercial level exclusively top bar hives, says it's very doable, you can move the bees, etc.

But I just feel like, you know, you kind of have to be an exceptional beekeeper to be able to do those kinds of things. So, to me, there are pros and cons of foundationless frames. For me, there's

more cons than pros. If I only wanted a few colonies and I wanted to stick to, quote, as natural as possible, then I would totally consider it. But I'm okay with using wired beeswax foundation. It's kind of the lowest step that I will take towards, quote, unquote, natural beekeeping. I just don't like the management headache that I would have having to deal with combs that aren't supported.

Again, I know that you can do it. I know it's possible. I've seen talks on it, but it's just not going to be as easy. I'm not sure what benefit you're actually getting because, yes, you might not start with preloaded pesticides like you would within wax foundation, but there's pesticides in the environment. Those combs are going to get residues and diseases, etc. very quickly. So, you're only buying yourself a little bit of time. I think it's more of a mental thing, like you think it's what's important for natural, than it is a management thing and a healthy thing for bees.

Amy

For sure. And I will say, you know, I have a comment and a follow-up question. My comment is that I worked the bees here in the apiary that we've got and some of them are foundationless, and it's difficult when you lift up that frame, especially how hot it is here. I mean, some of that wax will just kind of bend and it's hard to read the frame, especially quickly. So, that's my comment. And then the follow-up question I have is that you had mentioned a starter strip. Can you tell our audience what a starter strip is and what that looks like?

Jamie

Yeah. So, imagine pulling out a frame that's empty, right? Just brand new, it's built. A sheet of foundation would completely fit in the inner walls of that frame. It's basically the foundation for the entire comb that will be built within that frame. A starter strip would be about one inch to two inches. So, that's about 2 1/2 to 3 centimeters strip of foundation that you just run across the top bar of the frame, and that just points the bees in the right direction. So, rather than give them an entire sheet of foundation, you're giving them basically 1/10th of a sheet of foundation, maybe 2 inches or so. That's about, you know, 5 centimeters or so, and that just makes sure to keep bees building in the direction that you want in that foundationless frame. And people who do starter strips usually use pure beeswax foundation. And again, when I said a little bit earlier that it's more of a mental thing than a bee thing, I really don't think the bees care and I don't know if it helps or hurts. So, what I would argue is if you want to do it, by all means do it. I'm just saying I'm not sure there's a management or a health pro. Again, as a scientist, I will happy to be overwhelmed by data someday. But yeah, it's just a personal preference thing.

Amy

Sounds good. You know that saying you ask ten beekeepers a question and you get 13 answers back?

Jamie

For sure. Yeah, one of the problems with being a bee educator is I try to be the one to give them all 13 answers. From a management setting, I'm not trying to make the person's decision for them. I'm just trying to say, well, you know, here's all the pros and cons, here's what I do, and here's why I do it. But you don't have to do it this way. Just grab it and make it your own.

Amy

Yeah, people don't love it when we do that, I don't think.

Jamie

I know. But I feel like it's the correct way to do it because some things matter, some things don't, and this is one of those things that really doesn't matter. So, if you want to do it, do it.

Amy

Definitely, I agree. Okay, so for the third question that we have, so we are recording this episode at the end of April 2025, and I think it was probably February, Jamie, you can correct me if I'm wrong, February or March where there were reported losses on a very, very large scale nationally for the commercial beekeepers. It was winter, you know, almond season in January and February. Coming out of that, beekeepers were finding these losses. So, the questioner reached out to us and asked if we will interview anyone about the current losses. So, you know, you can talk about that a little bit, but what is the situation on any of this? So, I'm sure people around the world have seen it. I know that we received emails and inquiries from our colleagues around the world asking, what's going on with the United States as far as the commercial beekeeping industry goes and your losses. So, maybe you could give just a brief background about what was going on.

Jamie

Yeah, this is a difficult one because, you know, I say this a lot on this podcast, I'm a scientist, I need data. It’s really hard for me to wrap my mind around.

You're right, coming out of winter, kind of the last third of winter here in the US here in 2025, a lot of commercial beekeepers, especially those moving out West, were reporting elevated colony losses. Again, so much so that multiple organizations scrambled to go out and do quick surveys.

For example, Project Apis M. worked with a couple of different groups to do a national survey, and that survey is the one that suggested that 60% or more of the nation's managed honey bee colonies died in that time period in winter by the time that they had done the survey. Well, this reminds me of 2006, when in November, colony collapse disorder was born, and we heard similar reports. They claim now that the losses are greater than they were even back then. They still don't know what's caused it. The USDA and other scientists are scrambling to take samples and process samples to look at pesticides and Varroa resistance to miticides and Varroa levels and viruses and, and, and, and, and, and. So, there's not a pinpointed cause right now. And the

numbers that are being floated from a loss rate perspective are around 60%. That number will be refined in the coming months. Remember, it's survey based, for better or for worse. Surveys are what they are, but those are the data that we have. We do have a plan to bring someone who's very knowledgeable about the situation onto the podcast for an interview based on our, you know, backup of podcast recordings and things like that. I don't know for sure when that interview will air, but we do plan, in the next few weeks, to interview someone close to that.

So, what do I feel about it? Well, I feel like we're not quite sure what the loss rates are. 60% ish is what we're being told from these surveys, and we're not quite sure what's causing it. And CCD taught me a lot of lessons. One of the things that CCD taught me is that humans want an answer. They want the answer. They want to know the thing that's causing all of these losses. So, scientists started looking for the thing, and then they spun out and then started using words like multifactorial, meaning it's a lot of things. I mean, I'm not a betting man, but if I were, I would say that's probably going to be what comes out of this. Maybe through the sampling, people will find, quote, unquote, the smoking gun. I just feel like lots of things kill honey bee colonies. There's been rumors about Varroa resistance to miticides, so ineffective Varroa treatments before these things went into winter.

There's been rumors about it's mainly affecting colonies that went into cold storage. We've talked a lot about cold storage in our podcast in the past, Amy. It's kind of a mess. And the reason I hesitate to talk about it is like I feel like I don't have any concrete information to share. That's why this questioner is 100% right. We should bring on someone who's been working very closely with the situation. I completely agree. We do have a plan to do that, Amy. And I would argue maybe when we even interview this individual, we should probably move them up in our podcast episode list. We should make sure we get the information out.

Amy

Yeah, definitely. I guess I just wanted to mention, too, that I know that beekeepers don't love filling out all the surveys that we report, you know, and that we send out all the time and survey fatigue is definitely a thing. But I would like to emphasize filling out the surveys that come out because that's where we do collect this information and that's the only thing we really can do, right, Jamie? So, fill out those surveys when you get them, so we can try to make sense, I guess of everything and look at the bigger picture.

Jamie

Amy, what a great comment. Survey fatigue is real, but as you know better than most people, we make so many decisions from who we're going to hire to what we're going to study to what we are going to teach based on the data generated by beekeeper surveys. As annoying as those surveys are, I'm sure for all of you, they are so vital to shaping our program. But not just our program, other programs globally. It is so important that your voice be heard through these types

of data gathering opportunities. So, when I think about these losses, they'll talk about the loss rates. They'll no doubt ask beekeepers, well, what do you think's causing that? And that will give some stressors to hone in on. And thank you for that glowing endorsement of survey completion, because it is so important.

Amy

Hey everyone, thanks for listening today. We would like to give an extra special thank you to our podcast coordinator, Jeffrey Carmichael. Without his hard work, Two Bees in a Podcast would not be possible.

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.