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SPEAKERS

Stump The Chump, Serra Sowers, Guest, Jamie, Amy

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 00:48
Hello, everybody. Welcome to this segment of Two Bees in a Podcast. Today, I am joined by Dr. Evan Palmer-Young, who is a USDA NIFA Postdoctoral Fellow and also, USDA ARS at the Bee Research Laboratory in Beltsville, Maryland. Dr. Evan, I'm really excited for you to join us today.

Guest 01:08
Oh, thanks for having me. Amy. I can just be Evan for you. That's good.

Amy 01:13
Sounds good. So today, we brought you on because you've recently published a paper called "Sunflower associated reductions in Varroa mite infestation of honey bee colonies." I'm really excited to talk to you about sunflowers and how they even are related to honey bee colonies. But before we get into that topic, can you tell our listeners just a little bit about yourself and how you got into honey bee research?

Guest 01:39
Sure, yes. As you said, I am working at the USDA Agricultural Research Service Bee Research Laboratory here in Beltsville, Maryland. For your international listeners, that's pretty close to

Washington, DC, about 15 kilometers outside of our United States Capitol. I have been here for the past three years. My primary research is on honey bee gut parasites and my graduate research was on a bumble bee gut protozoans that are related to gut cortisol found in honey bees. So mainly, I have been studying the effects of temperature and the gut microbial communities, as well as plant-derived compounds like those found in nectar and pollen on the growth and infectivity of these parasites. But this was a bit of a surprise project for me, the research on sunflowers. So yeah, I came into this project very late in the game. The project was the birthchild of my former adviser Lynn Adler at University of Massachusetts Amherst and her longtime collaborator, Becky Irwin. Pretty big collaboration, this sunflower grant, to study how sunflower affects different pathogens of honey bees and bumble bees.

Jamie 03:24
Yeah, that's, I think, really interesting because when beekeepers think about controlling pests and pathogens, they almost always think about applying something to colonies, rather than how the environment might contribute or anything in the environment might contribute to the health and well-being of colonies. In this particular study, you and your colleagues tested the impacts of sunflower cropland as well as pollen supplementation on honey bee resistance to macro and microparasites. So we're going to get very deep into the weeds with this, but before we do that, for our listeners' sake, could you describe what a macro or microparasite is, what they are and how do they and their populations relate to nutrition in honey bee colonies?

Guest 04:07
Yeah, I didn't mean to confuse anybody with jargon there. Macroparasite just means big, something that you could see with your eyes and not any assistive equipment. Well, I can hardly see Varroa mites but they are a lot bigger than, say, viruses or single-celled protozoa, or say, Nosema spores. So studying the effects of sunflower on macro and microparasites, basically. The macroparasite here is the Varroa mite, which is probably a more familiar term to most of your listeners, and microparasites being some of the viruses that are associated with Varroa mites. We did also have some measurements of Nosema spore counts in this article. I think it's fairly well established that the dietary factors and the host's nutritional status can influence the progression and the effects of infectious diseases. So, there are a lot of medicines that are used clinically that are derived from plants or even old plant extracts. For example, quinine as a treatment for malaria, salicylic acid, there are derivatives for inflammation and pain, or Taxol for treatment of cancer. So, the same can be true for honey bee diseases. There are some plant compounds that can influence the resistance to disease. Our lab has been studying, for a long time, the trypanosomatid parasites, as well as the viruses, looking for possible nutritional therapies for those things. Varroa mites are targeted right now. One of the treatments is by application of thymol for example, which is an essential oil from the thyme plant, and there are also other candidate treatments like clove oil and its main constituent, Eugenol. Varroa mites are one parasite that is controlled by plant extracts and plant-associated or plant-derived compounds really, but there's not really any established dietary therapy for those mites. So we were investigating how sunflower in the diet might influence mite levels, as well as levels of some of these other parasites.

Amy 06:51

I think that's really cool, Evan, and I think that you did a great job just describing and explaining the macroparasites and microparasites because of course, we know Varroa transmits viruses. So thanks for explaining that. I was interested, you're talking about thymol and how that is plant-derived. And so, we are talking about sunflowers and I love sunflowers. I'm from Kansas, we have so many sunflowers in Kansas, and I'm wondering, why sunflowers? Where did this stem from? Are you all trying to link a sunflower-related compound to Varroa reduction? What is the purpose of using sunflowers in this study?

Guest 07:35
Alright, so you're getting a little bit ahead of me with these sunflower-related compound for Varroa reduction. But why sunflowers for this project was it was really a follow-up on the strong effects of sunflower, on improving resistance to the bumble bee gut protozoan, Crithidia bombi, which our lab at UMass had been studying for a number of years. And our student there, Jonathan Giacomini, had found that bumble bees fed sunflower pollen had developed very low levels of infection with this bumble bee got parasite. And this big project on sunflower and bumble bees and honey bees and different parasites was a follow-up on that. Where does the magic of sunflower end as a potential medicinal plant for bees? We are not at the stage of knowing any specific chemical mechanisms for these associations and possibly positive effects of sunflower that we measured in this study, but that is on our horizons of exploring how these effects might occur and at what levels they are achieved and how that might be implemented in a practical context, whether it's land use or supplementation of colonies.

Jamie 09:19
So before we get there, this is really a neat premise for the study again, like I said earlier, this idea that there could be compounds, these secondary plant metabolites or whatever the other compounds are in plants that could make it possible for honey bees to combat some of these pests or pathogens they've had. I've been seeing a lot of talks at a lot of bee research meetings where people are talking about bee self-medication and this idea that compounds out in the environment might allow them to combat some of the problems that they have. You've seen it now, you said, in bumble bees, which led partly to the motivation for the study. Well, could you tell us a little bit about the study? How did you design it? What are the methods that you used to test the hypotheses that you and your colleagues developed?

Guest 10:05
Sure, and I don't pretend to take credit for developing any of these studies myself. This was a big project involving labs at University of Massachusetts and North Carolina State University, the USDA Agricultural Research Service Lab here in Beltsville and our colleagues at the University of Illinois. It is a long list of co-authors. I don't think I can name everybody right now. But I do appreciate their hard work on this project. And also, they're sharing the data with me so I could write it up and share their findings with the world. So this study had four different parts. There was, first, landscape survey that used data from the National Honey Bee Health Survey or the National Honey Bee Disease survey, if you're a pessimist, I guess, that's administered by the Animal and Plant Health Inspection Service, the APHIS agency and is carried out then by our colleagues at the University of Maryland. Anyway, the first part of this study was correlating the sunflower crop area with the levels of mites in honey bee colonies

across four different years of this colony survey. So our colleagues at University of Illinois were able to merge these colony disease datasets with the landscape cover data sets that showed how much cultivated sunflower there was within two miles of these apiaries. A bit of software gymnastics there, and I should mention that this study only takes into account the sunflower cropland and not, for example, sunflower that's planted in people's gardens, or that is growing wild, even in, say, conservation lands that are grown with specific seed mixes. So that's the first part of the study, analyzing whether the amount of sunflower cropland around apiaries, within two miles, was correlated, then, with levels of Varroa mites. Then, we had a small lab study that used bees reared in groups of 30, feeding them sunflower pollen or other pollens including a substitute pollen, and measuring after the fact, after a week of these diets, their parasite levels. There was no controlled inoculation in those studies, so it was a bit of a noisy data set. And then we had two colony supplementation studies where colonies were fed these cakes or patties of sunflower pollen, or artificial pollen. And in one instance, we also had a wildflower pollen diet. So these colonies are fed these fabricated pollen patties containing different pollens, real and substitute. Their mite levels were measured, then, after a period of supplementation. So, you've got the landscape correlation between sunflower cropland and mite levels, we have a lab trial on sunflower pollen consumption and levels of some different viruses, and we have two field studies where colonies are supplemented with sunflower pollen, or other things, to see how that affects their subsequent levels of mites.

Amy 10:32
Evan, it's really funny -- it's not funny -- but we've had grad students work on nutritional research projects and just you describing the different methods, there's so much that goes on behind nutrition. There are so many challenges that you have when you're studying nutrition, especially when you're just letting the bees go and forage and each step just takes so much time. So I really appreciate you going through each method and each step of what you did, because I really, truly appreciate all the work that goes into it. And so, just kudos to you and your team for being able to come together to pull this off. I do know that it is a lot of work.

Guest 14:30
I mean, it was a big project. I was lucky to inherit the datasets. I did not sustain any stings as part of this project. So I will lose a lot of credibility with your audience for that.

Amy 15:30
That's okay. So I'm interested, you've gone through the different methods that you used, what did you end up finding?

Guest 15:39
Ah, yes. So in the landscape study, we found a correlation between the levels of mites that were in colonies and the amount of sunflowers that were around a colony, or we found that the more sunflowers were surrounding these apiaries, the lower their levels of Varroa mites. This effect was highly statistically significant. So, unlikely to be something we just found by chance. Also, personally, I was surprised to see it, Amy, because we had very few sites that even had as much as 1% sunflower

coverage within two miles. So it's not like this was comparing sunflower-free sites to sites that were just surrounded by sunflower for as far as a bee could fly. It was more like we had most sites, less than 1% sunflower coverage, only a handful of sites more than that. So it was not what I would envision as a perfectly designed lab experiment where you feed bees a pure sunflower diet versus a completely sunflower-free diet. These were effects which seemed to be achieved at quite low levels of sunflower coverage, so I was surprised that their relationship was so striking there. And then we had one field study that didn't have very high levels of mites. So I'll gloss over that one. I mentioned we had our trials, we didn't really have a controlled inoculation for those, so we didn't have very inclusive results there, either. But in our full supplementation study, we had the Bee Informed Partnership here, affiliated with the University of Maryland. They did a good job conducting that study on our behalf here in Maryland. That study I used colonies that were all in the same apiary. So it's a bit more controlled than the study in Massachusetts as well as having more mites to be analyzed there. And it also had fumigation treatment at the beginning of the study to more or less equalize mite levels across the different colonies. So that was probably our most controlled experiment in terms of having similar levels at the start and having similar environments for all the colonies. We found that the sunflower pollen-fed colonies had less than half the mite infection intensities than did the artificial pollen-fed colonies. And I should mention that there was a group that was fed a mixed wildflower pollen. This was some good stuff. This was high desert organic pollen. That group had intermediate mite levels between the sunflower-fed colonies and artificial pollen-fed colonies. So we have a correlation at the landscape level, which was striking for me because the effects of sunflower seem to appear at such low levels in the landscape. So it wasn't like bees were eating sunflower at the exclusion of all other resources, or even if they were eating sunflower at all. It would just be there so far was there around the colonies, and most of these sites were in North Dakota. My previous contacts with folks in North Dakota was with Dr. Jerry Prasifka who was trying to study how honey bees affect the pollination of sunflower. He claimed that he could not get honey bee colonies to visit sunflower even when he placed the colony right in the middle of a sunflower field. So, there, I was double surprised. But a skeptic could say, "Well, that's just a correlation. You can't prove that sunflower is behind that effect. For example, you could have beekeepers that are more on top of their colonies, might be more likely to treat for Varroa mites as well as more likely to place their colonies in environments that are surrounded by bee-friendly crops like sunflowers," which is fair enough. But our, then, experimental supplementation indicates some sort of possible causative role for sunflower pollen in those reductions in mites. So that was promising, anyway, to have consistent results across those two different studies, one being an experimental manipulation and the second one being more of a real-world natural experiment at the landscape level.

Jamie 21:23
It's interesting to hear you talk about this evidence. I hear, in your voice, this strong discovery, this strong correlation between sunflower and mite loads, and then you guys, in your study, where you were feeding that, but also here you opening it up to the possibility that there's a lot of work that still needs to be done. We talked a little earlier about the mechanism behind this, and you suggested that it's unknown at the moment. I'm sure you guys are following up with it. So I wonder, then, kind of with your findings and this really neat series of studies that you and your colleagues conducted to get to the heart of this, what are some recommendations you could see making to beekeepers regarding this? And

maybe there aren't any yet but maybe you're working towards illuminating things, so that someday soon, there could be recommendations to beekeepers. What are some of your thoughts regarding application from your research?

Guest 22:14
Oh, boy, I'm getting a little bit of a chuckle out of this because this paper spent two years in review and every time it would go through review, it would it would get comments like, "I don't believe this. You need to have a lot more caveats in your discussion of these findings." And then coming on your podcast and having you ask me, how can we change land use and management based on the results of this study? So I should emphasize that we do have our experimental study. It was fairly small with 10 colonies for treatment and it was just under one experimental context and we did not have super-controlled measurements of the bee brood production, which is something that can be a concern, mainly in bees that are fed exclusively sunflower pollen. Generalist bees, bumble bees, and honey bees tend not to survive so well on these asteraceae-only diets or sunflower-only diets, so may not be a great nutrition source on their own. We're still not really clear on what the specific effects of this compound are on Varroa mites and whether sunflower pollen is for sure harder on Varroa mites than it is on bee colonies. But that said, we do have two promising findings here at the landscape level and with supplemented colonies that we're looking to build on to measure, in particular, those possible trade-offs between production of honey bee brood, for example, and the mite reproduction under more controlled conditions. And then to investigate, as well, the different compounds in sunflower that might be more deleterious against these Varroa than against honey bees or basically, a potential medicinal substance here that would specifically target the Varroa mites. For example, sunflower and related plants have kind of a funky composition of sterols. Sterols are compounds like cholesterol that are an integral component of cell membranes and have a particular importance in insects because insects can't make their own sterol, so they need to get them from the diet. And hence, they're at the mercy of the sterols that are provided by their diets, whereas mammals are able to synthesize their own cholesterol and humans don't need cholesterol from diet. But insects are a bit different. They can't make their own sterols from scratch, but sterols are necessary for development and for every cell in their bodies. So sunflower and related plants has kind of a wacky sterol content that tends to make these plants resistant to herbivores, for example. Maybe one explanation for why sunflower pollen may or may not well support the development of non-specialist bees. So if we can identify a compound, such as a sterol that is interfering with the development of mites, but not harmful to bees, that would be promising something that might find application in beekeeping. Or not, and it may be that sunflower in the landscape is the simplest way of achieving these effects against mites. That could be something that would be addressed by having colonies in sunflower-rich areas, or seeding of hedgerows or wildflower strips or big parcels of conservation land with sunflower or its relatives. Now, we don't know how generalizable effects on mites could be and whether the same effects are achieved with wild sunflowers and relatives that are in that same family. We may get a little insight into that by studying the sterol composition of sunflowers and its effects on mites. If we do find effects of such compounds, how widespread they are across sunflower and related plants. Even in terms of potential breeding of sunflower, there are some US Department of Agriculture labs that are specifically influenced in breeding sunflowers in a pollinator friendly manner to improve the honey bee-mediated pollination.

Who's to say that breeding couldn't include some targeted work on the chemical composition of the pollen? Of course, we need some more long-term studies that measure hard endpoints, I think, like colony survival, rather than kind of a soft, short-term endpoint and mite levels are highly correlated with colony survival. But we did not measure colony survival itself in these studies. So those are potential applications. I should also mention that I was intrigued to find, in some of my follow-up reading, after analyzing these data that sunflower cropland seems to be becoming quite scarce in the US, that sunflower crops have been displaced by predominantly corn and soybeans in the regions where most of the US sunflower is grown, which is in the northern Great Plains. So it's actually been about an 80% reduction in the amount of sunflower cropland nationwide, over the past four years or so, which would indicate that honey bee colonies may be losing access to this resource, as would be wild bees for which sunflower is an important pollen source. Sunflowers are native to North America, so they're not something that honey bees have evolved with for a long time. But there are quite a few specialist bees that develop very well on sunflower and related plants. This sunflower cropland and wild sunflowers are very valuable food sources for them.

Amy 30:28
Well, thank you so much, Evan. I've learned so much from you just about sunflowers, the potential for sunflowers, and related to Varroa with nutrition with the honey bees. So I really, truly appreciate you being on today. Is there anything else that you wanted to share with our listeners?

Guest 30:45
I'd like to acknowledge all of the generous funding we've gotten for this project. I know I've been very privileged in my science career to have the generous support of the US Department of Agriculture and the National Science Foundation, as well as some smaller organizations like the Garden Club of America, the Eva Crane Trust, the North American Pollinator Protection Campaign and Project Apis m. So, thank you to all of our generous funders that make this research possible. And I should also point out that anything I've said represents my own opinions here, and I don't pretend to represent the USDA or any of our funders with the opinions expressed in this podcast. Thank you, though, for having me on. I'm grateful that somebody's interested in this research that we spend a lot of time and effort doing.

Amy 31:59
Yeah, absolutely. Well, we look forward to seeing more publications coming out in the future. I'm excited for your work in the future, and we really appreciate you being on the podcast today.

Guest 32:11
Thanks for having me, Amy and Jamie.

Amy 32:34
Well, I thought that was a fun interview. Jamie, I really enjoyed reading the publication. It's always fun to see new ideas that I didn't think about before and to test sunflowers is so specific, right?

Jamie 32:46

I do think it's, first of all, a really good idea. And I love this idea that they've got all of this information from the National Disease and Pest urvey, they've got all of this information from the Bee Informed Partnership's surveys, and then they're just able to use GIS technology and geological surveys, landscape, land use cover, all of this stuff and roll it all together and look for correlations. "Hey, colonies that are located near this or far from this do better or worse," and then they can look even further down. "Hey, because we've got this disease and pest survey, we know the Varroa load. So let's look at Varroa load correlation with whatever." It's a really interesting study. Obviously, it's outside of my field. It's not what I've done before, but I will say, there's so many scientists around the world right now thinking of so many creative ways to study bee health. And to me, this is just, yet again, another one of those ways.

Guest 33:37
Yeah, and Evan was saying, "Well, some of this is my own opinion. It's still early." But, just the possibility, I think, is really fun.

Jamie 33:47
Spot on. I mean, he's clearly a scientist, right? That's what we would all say. Well, all we have is the information related to the way we did the project right here and right now. So he was very careful to point out all that, but it does open a broader discussion on the importance of floral resources to honey bees, and it really goes beyond floral resources. I know there are folks out there who are talking about bees foraging on mushroom extracts and things like that. So there's growing evidence that the environment contains things that honey bees actually received benefit from, beyond just nutrition. Here, we're looking at just Varroa overloads, for example. But there's also the possibility that it impacts things like Nosema, Evan mentioned that, or viral loads they might look at in future studies. Like I said, there's this growing body of evidence that the environment might contain a lot of the compounds that honey bees need to combat diseases and pests. I think it's a fascinating topic. I suspect it's going to grow in interest and focus in a lot of research labs moving forward. There's really no telling where this is all heading. But I think it's going to make really great discussions and really great findings for beekeepers and bee health in the future.

Stump The Chump 35:06
it's everybody's favorite game show, Stump The Chump.

Amy 35:16
All right, welcome back. We are at that question and answer time. Jamie is still in South Africa as we record this. This is our segment two from South Africa. I'm not in South Africa, but Jamie, you are. Also, I was cracking up because I think in our last Q&A, I said, you went all the way across the world, but you're not that far across the world. But you're still far enough for me to believe that you're halfway across the world.

Jamie 35:45
it's almost on the other side. It's about a 14 and a half hour plane flight from Atlanta to Johannesburg. We're pretty far away from Gainesville right now.

Amy 35:55
Yeah. All right. So we are going to continue with the questions that we received during the at-home beekeeping series that Jeff Williams presented that with the Bee Informed Partnership. So these are very specific to Varroa and I think we'll do that for the next couple of Q&A segments. But, Jamie, the first question we have, someone mentioned that some states in the United States require that beekeepers must register their hives, as well as develop a mite treatment plan for the year for their hives. I've actually never heard of this. So I'm interested to know, what are your thoughts about this approach?

Jamie 36:38
This is a difficult question for me because I feel like my answer is going to dabble in politics. I'm going to be very careful not to take a side, at least I think I'm going to be very careful not to take a side. So to answer this question, I will say, in the United States, this again, for our international listeners, the rules and regulations governing beekeeping differ by state. States are free to do whatever they want do with regard to rules and regulations for beekeeping. So for example, here in Florida, by law, if a beekeeper keeps colonies, he or she must register their bees with the state of Florida. That's if they keep one colony of bees or keep 100,000 colonies of bees, they have to register their bees with the Florida Department of Agriculture and Consumer Services. So this is where apiary inspection section is. And conceivably, states next door might have an entirely different policy where registration is not necessary, or annual inspections are necessary, or this thing has to happen, or that thing has to happen. So I am very aware that some states require registration, it's mandatory registration. I have not heard, however, that some states require a mite treatment plan for the year for their hives. So again, I live and work in Florida. So I'm most familiar with Florida's rules and regulations. So I'm not making the argument that there aren't states out there that don't have this requirement. I'm just not familiar with the mite treatment plan required in any of our states' rules and regulations. So I can't speak to whether or not that's true. All I can say is I've not heard that that's the case. But it is conceivably possible because as I stated earlier, each state has the ability to set their own rules and regulations. I know, for example, here in Florida, we are not allowed to keep what they define as unwanted stocks or unwanted subspecies of honey bees. So for example, by law, we are not allowed to keep African-derived honey bees. We have the Africanized honey bee here in the state, we're not allowed to keep it or manage it, whereas other states may not have that policy as an example. So whether or not the Varroa thing is true, I don't know. But I do know that every state is different. So the question, then, is what do I think about this approach? Well, that is a political question. So beekeepers in each state are free to kind of lobby their own state government for these regulations or against these regulations or suggest more regulation or suggest fewer regulations. I guess what I'm saying is my opinion on whether or not a state should have regulations regarding registering colonies is irrelevant, I guess, because as someone who works for a state, I usually shy away from such opinions. But I will say the reason it is done in Florida is because a lot of state inspection programs in the US were born out of the discovery of American foulbrood some decades ago. And so a lot of states developed their apiary inspection programs so that apiary inspectors could inspect colonies for American foulbrood, and if they found it, they would burn the colonies or destroy the colonies in some other way. And I will say at least here in Florida, the state

apiary inspection program and their collective efforts have significantly reduced the prevalence and occurrence of American foulbrood in our colonies. So to that end, it's been very good. They've also been incredibly proactive when we had the introduction of Africanized honey bees into the state. They're amazing educators for beekeepers, they're health and sustainability ambassadors for our bee colonies. So I think our state inspection program here in Florida is top notch and really amazing and contributes significant benefit to our beekeepers in the state. So yeah, that's basically a long spiel of me dancing around the issue of whether or not they should exist. I will tell you here in Florida, they have tremendous benefit to beekeepers and I am definitely aware that each state is kind of free to set up their apiary inspection program however they see fit.

Amy 40:40
Yeah, absolutely. The other thing, too, is, even if beekeepers don't have to develop a treatment plan for the year, for the state legally, I think it would be good to even at least maybe consider a mite treatment plan for when you do have to treat for mites. So I'll just end it with that, Jamie.

Jamie 40:57
That's very well said. I'm glad you were here to clean up my -- whether or not the state requires it is almost irrelevant. Right? You should have a plan to control Varroa, you should have a treatment strategy. As we said now, maybe 1000 times, maybe this is 1001, the Honey Bee Health Coalition Varroa website really has a good way that you can set up to do that, to develop a treatment plan.

Amy 41:20
Alright, so for the second question, this person is asking, is the drone frame plastic? And if so, they've had little success getting bees, and I've heard this multiple times that they have little success getting the bees to use plastic. The bees just won't draw out comb on plastic for some reason. So have you heard of this? And what are your thoughts on it?

Jamie 41:45
So the drone foundation of which I am aware is plastic. I don't think I've ever seen pure beeswax drone foundation. It might be out there, and if it is in your equipment manufacturer, I apologize if I've missed that, but I would say the vast majority of drone foundation, so that would be foundation whose cells are sized for the production of drone cells. Most that I have seen is plastic. In fact, I'll go a step further. Most of that foundation is already part of a single piece that is fused into a plastic frame. So essentially, a plastic frame with plastic drone-sized cell foundation is made as a single piece. So the frame and the foundation are all just molded together as plastic and so that is how I see it most often sold. Yes, bees much prefer to build comb on beeswax than they do hard plastic foundation. However, they will build on plastic foundation. A lot of the manufacturers will coat a thin layer of beeswax on the plastic foundation to encourage the bees to use it. I know that, for example, here in our lab, and even in operations in the past, a lot of commercial operations here in the US for that matter, they use plastic foundation in their honey supers and that plastic foundation is coated with a little bit of beeswax. A lot of commercial beekeepers may paint another layer of molten beeswax on top of that plastic foundation to get bees to accept it even quicker. I have had no problems getting bees to build out plastic foundation when that is

their only option. So, for example, if you give them a frame of beeswax foundation, and then plastic and then beeswax and then plastic and the beeswax, they will tend to build on the beeswax frames quicker than the plastic that are interspersed. But when you give them a super of only plastic foundation that's coated in that thin layer of beeswax, they'll just get right to it because that's what they have. And so you may be seeing a few things if you're having difficulty getting bees to use the plastic drone foundation. Number one, maybe it doesn't have a thick enough layer of beeswax coated on top. So you might consider painting a little bit of molten beeswax to the surface of both sides of the foundation. That may speed up acceptance. You also may be giving it to them outside of a nectar flow. Bees need incoming sugar to construct and build comb. So if you give them foundation outside of a nectar flow, they are very unlikely to build comb on it and the major nectar flow is four to six weeks in spring. So if you're giving drone comb outside of that, they may not be touching it simply because they have no incoming resources with which to build wax. So you may have to supplementally feed colonies if you give them drone comb and it's made of plastic and you're trying to get them to produce it outside of honey flow. So coating it with a little bit thicker layer of wax and feeding them or ensuring that you put it in during a major nectar flow was a really good way to get them to build it. Maybe a third trick that I would have, if you're putting that foundation on the outside of the brood nest, they will be far less likely to pull it than if you just slam it somewhere in the middle of the brood nest. And so those three pieces of recommendation, either feed them or do it in a honey flow, coat it with more beeswax, or put it somewhere towards the middle of the nest. Those three things, hopefully, will help bees, in your case, turn their attention to constructing the comb on this plastic drone foundation.

Amy 45:24
Yeah, absolutely. You're giving me ideas for blogs, Jamie. Thank you.

Jamie 45:28
Good.

Amy 45:29
Okay, so for the last question that we have, apparently, this is like a politically charged Q&A section.

Jamie 45:36
I've seen the question, so I know what's coming. I've got a diplomatic answer.

Amy 45:40
Okay. So Randy Oliver, we've had him on the podcast before, I saw him speak at the American Beekeeping Federation in Jacksonville. So Randy Oliver has done oxalic acid extended use with sponges and its efficacy. So the question is, why don't the Honey Bee Health Coalition, BIP, and Apis m. get behind lobbying efforts to have the EPA change its position against the use of OA?

Jamie 46:08
Yeah, perfect, Amy, thanks. So for those of you are outside of the US, Randy Oliver is a commercial beekeeper here in the States, I think in the California area. He is also very scientifically minded. He

does a lot of research on behalf of beekeepers for beekeepers, and publishes his results, usually in the American Bee Journal, which is the national periodical here in the United States. Beekeepers just love this information. It's a beekeeper doing bee research to benefit beekeepers and, really, what's not to love about that scenario? So, in his particular case, he's done a lot of work with oxalic acid, extended release oxalic acid formulation or concoction that he's done with sponges. And he talks about its efficacy and his art. Okay, so the question then is, why aren't others getting on board with this? I would say a couple of things. Number one, a lot of folks have been unable to duplicate his level of success. I know some colleagues in the southeastern US have tried this particular method and can't get the same level of control that Randy's gotten. That doesn't mean it doesn't work. It just means, likely, that it doesn't work in all scenarios and all colony conditions everywhere. California is very different climatically than Georgia and Florida and Alabama, as an example. We have high humidity, they have less humidity, temperature is different, etc. So a lot of it may be that it's not really a universally good control. Randy seems to be very successful using it and some other people in his area who use it, but from the academic research side, researchers at universities haven't been able to duplicate the findings. And I think that's the short answer. The slightly longer answer is there are other oxalic acid treatment strategies that are currently before the EPA potential label changes. For example, Dr. Cameron Jack from our lab has shown that the labeled rate for sublimating or volatilizing, as it were, oxalic acid in colonies, the labeled rate doesn't really work. And Cameron has done some work to find doses that do seem to work. He and others have worked with the registrar and others behind the scenes, possibly to get a label rate increase, so that a useful level of oxalic acid can be used. And so there are people who are approaching the EPA for label modifications using oxalic acid. There might even be, that I'm unaware of, an effort to get this extended release sponge method out there. But I will tell you, even if it becomes labeled, doesn't mean it's going to be efficacious, as a lot of other labs, or quite a few, or at least a few labs have shown at this point. And so that was a very diplomatic answer. But I would say it's just because it's not universally efficacious. As a result, that kind of brings up the question, a lot of people may turn to it, rely on it, and think they're getting control when they're not getting adequate control. But there are other OA label modifications that may be in place soon. We're all hopeful, at least, for this.

Amy 49:21
Yeah, absolutely. All right. Well, thank you so much. So those are our three questions. Beekeepers, listeners out there, be sure to send us an email or send us a question on one of our social media pages.

Serra Sowers 49:35
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.