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EPISODE 192 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, I am joined by one of our very own Dr. Kaitlin Deutsch, who is a Postdoctoral Research Scientist here at the Honey Bee Research and Extension Laboratory in the Entomology and Nematology Department at the University of Florida. So, Kaitlin, thank you so much for joining us today.

Dr. Kaitlin Deutsch

I'm so excited to be here.

Amy

I know that you've done so much research. There's a lot that we'll cover in this episode. But today, we brought you in specifically to talk about pathogen spillover between honey bees and native bees. I'm excited to discuss that with you. But, of course, since this is the first time that you've been on our podcast, what we like to do is we like to ask our guests to tell us a little bit about yourself and how you got into the beekeeping world.

Dr. Kaitlin Deutsch

Yeah, thank you so much for having me. I'm really excited to have this opportunity to talk about my research and what I've been up to the past few years. So, I first started in the bee world as a high school intern at the USDA Entomology lab right here in Gainesville. I had the chance to run my own little research project as a high schooler looking at the effects of queenlessness on hormone expression in honey bees, and I just was so mesmerized by the complexity of honey bees. As I learned more and more, I realized all of these questions that we still didn't have answers to. So, I really kind of fell in love hard from the beginning. As I learned about different bee species, all of the diverse pollinators that we have, I saw myself having a career in this field.

After high school, I did my degree at the University of South Florida where I did a bunch of research on wildlife disease ecology and how pathogens were shared between amphibian species.

And then I did my master's at the University of Oxford where I went back to pollinators and started thinking about how these honey bee-associated viruses were showing up in a lot more than just honey bees and were really showing up in a number of different non-honey bee pollinators. And from there, I really jumped into the pollinator disease ecology world. Last December, I finished up my PhD with Dr. Scott McArt at Cornell University where I really got interested in how beekeeping practices can impact this virus sharing between honey bees and the wild pollinator community and the effects these viruses are having on those non-honey bee pollinators.

Jamie

So, Kaitlin, you're really the right person, then, to bring onto this podcast to talk specifically about pathogen spillover between or among honey bees and native bees. So, that's the topic. You're an expert on this topic. So, could you share a little bit about what this means conceptually? What is pathogen spillover, specifically as it relates to honey bees and native bees?

Dr. Kaitlin Deutsch

Yeah, definitely. So, pathogen spillover refers to the way pathogens are shared between species and specifically with species that have a really high pathogen load that drives the transmission of that pathogen into other species in that community. So, in the context of pollinators and honey bees and wild bees, we think a lot about pathogen spillover from honey bees to non-honey bee wild pollinators. And that's often because as a eusocial insect, honey bees live in very close quarters with each other, and that can facilitate the sharing of diseases and really amplifies the pathogen load compared to some of the other solitary wild pollinators that have far fewer opportunities to share pathogens with others. A lot of this pathogen transmission is thought to occur across shared flowers where an infected bee will poop on a flower, leave behind pathogen particles, and that will be picked up by the next visitor to that flower.

I'm specifically focused on viral pathogens, which include really common viruses like deformed wing virus, sacbrood virus, and others. It can be really difficult to establish the directionality of pathogen transmission. So, that means, are pathogens actually spilling over from honey bees to wild bees or is this pathogen transmission happening in the other direction from wild bees to honey bees? There are obviously a lot of strong opinions on this topic. And for most viruses, the answer is we just don't have enough information to establish that directionality of transmission or spillover. But in the case of deformed wing virus, there is growing evidence that deformed wing virus is a pathogen that is spilling over from honey bees to wild bees.

Amy

So, Kaitlin, it's basically asking that question of which came first, the chicken or the egg. So, yeah, you're absolutely right, there is a lot of research that's looking at pathogens between honey bees and native bees. Can you tell our audience why this topic is so important?

Dr. Kaitlin Deutsch

Yeah, definitely. So, when we talk about wild bees, we're really talking about a huge diversity of different species. There are over 4000 native bee species in North America and many other non-bee pollinators that can also be impacted by viruses. So, to have healthy and productive agricultural and natural ecosystem systems, we really need both honey bees and wild bees to function in the environment and be healthy. So, I think it's really important to think about this incredible opportunity that beekeepers have to be good stewards, not only of their own honey bees, but also really safeguard the entire community of pollinators around their apiary. And this idea that beekeeping practices and this management of pests and pathogens can have downstream impacts on the wild pollinator community.

Jamie

So, Kaitlin, the reason you're here is because you know a lot about this topic, and you said something a minute ago that is so true. There are very strong opinions about pathogen spillover, directionality, etc. I just want, if you don't mind, to share with us some of the research you've done. I know you've done a lot. So, if you could talk a little bit about that as well as what have you found in that research?

Dr. Kaitlin Deutsch

Yeah, definitely. And I do want to be really clear that a lot of what we know is really specific to deformed wing virus and isn't applicable to all of these other viruses where we don't really know what's going on.

But I became really interested in whether beekeeping practices could influence the risk of virus spillover. So, deformed wing virus, which I might refer to as DWV, and how the role of Varroa mites might be driving pathogen spillover. I don't think I need to convince anyone listening to this podcast of just how nasty Varroa mites are. They're one of the best predictors of colony losses, in part because they are capable of transmitting these viral pathogens when they feed on bees. And mites, in particular, have a very close association with deformed wing virus. Controlling Varroa in the colony can lead to healthier bees.

So, when I started thinking about pathogen spillover, I was really interested in thinking about how controlling Varroa mites might actually limit the intensity of deformed wing virus spillover. So, it's really important when we're thinking about these downstream effects of Varroa mites on wild pollinators. It's important to note that Varroa mites actually can't parasitize these other non-honey bee species. The mites themselves are not spilling over to other species, but the viruses they transmit are found broadly within the pollinator community. And as we've talked about, they can spill over from honey bees to wild bees, and depending on the pollinator species, that can cause harmful infections.

So, to really answer this question of what role the Varroa mites are playing in pathogen spillover, we headed out into the field. This was at Cornell, so we were tromping around New York State, and we collected samples from 27 apiaries along a gradient of Varroa infestation levels. The most common treatment threshold for mites is 3 mites per 100 bees, and half our sites were above this threshold and half were below this threshold. At each apiary, we sampled honey bees, wild bees, and pollinating flies as well as flowers from the surrounding apiary.

And what we found at first, unsurprisingly, when mite levels exceeded the treatment threshold, that 3 mites per 100 bees, deformed wing virus loads, and honey bees were 100 times higher than honey bees where Varroa levels were controlled. So that makes sense. If you are able to control Varroa, your honey bees are healthier. But what was really interesting is that we found a similar trend for wild pollinators and flowers. So, the greater the Varroa load in the apiary, the higher the prevalence of deformed wing virus in wild pollinators and on shared flowers was. So, for example, we found that controlling Varroa in honey bee colonies reduced deformed wing virus prevalence in wild bumble bees by 35%. Certain pollinating flies had actually 90% lower deformed wing virus prevalence when Varroa was controlled.

So, there is this really clear downstream impact where controlling Varroa can lead to a reduced risk of pathogen spillover. And this was likely occurring across shared floral resources. So, at apiaries where Varroa was controlled, deformed wing virus prevalence was reduced by 45%. So, we see that reducing deformed wing virus loads in honey bees appears to actually reduce the deposition of deformed wing virus on the shared flowers surrounding the apiary, and that's reducing the prevalence of this virus in wild pollinators.

Jamie

So, Kaitlin, I know one of the questions that our audience members are going to think about, having just heard about all the work that you've done in this area kind of as a follow-up to that idea, you've seen flies, you've seen other things that for example have this association with deformed wing virus. Do we have reason to believe, do we have evidence for any of the suite of honey bee pathogens actually impacting these other organisms? For example, you specifically looked at deformed wing virus. But there's a lot of viruses, there's multiple bacterial species, fungal species, etc., that make honey bees sick. Is there a reason to believe that some of these same things could actually make other pollinators sick?

Dr. Kaitlin Deutsch

Yeah. So, that's really the next step that this work is going in. There are a lot of studies that show mixed results. And I think a lot of this is going to depend on specific -- species by species will differ in their ability to be infected. We talk about quote, unquote honey bee viruses, because we've described these viruses from honey bees, but we don't actually know where they originated from. And it's very likely that they are, in fact, more generalized insect viruses that are going to

be capable of infecting multiple species, including wild pollinators like bumble bees, like flies. And there's a lot of great work being done on this topic now that is showing that, yes, some species of bees, in particular, a lot of this work has been done, are negatively impacted by certain viruses. But, sometimes, those negative effects are only seen in combination with an additional stressor.

So, for example, nutritional stress can cause a benign virus infection to actually become very harmful to a bee species. So, there's a lot of yes and no that's dependent on environmental factors and specific species by species susceptibility to these viruses. There's a lot of work to be done, but there is reason to believe that these pathogens can have and do have negative impacts on other species.

Amy

So, Kaitlin, you kind of alluded to this, but how can beekeepers use this information? And also, I wanted to mention that we'll take your publications and add it to the additional notes and resources in our podcast and on our website.

Dr. Kaitlin Deutsch

So, I think the best way beekeepers can use this information is to monitor for mites. I think this is something that's good for not only wild pollinators, but honey bees as well. And I think that's what's really exciting about a lot of my research is that it's a win-win for honey bees and for wild bees. So, really carefully considering how treatment-free beekeeping is being done to avoid untreated honey bees sharing viruses with wild pollinators as well as just keeping those honey bees healthy and productive in and of themselves. And something else that we found really interesting when we were looking at virus deposition on flowers is that we were less likely to find deformed wing virus on flowers with increasing distance from the apiary. So that is, flowers that are farther away from honey bee colonies had a lower prevalence of virus than flowers that were close to the honey bee colonies. And beyond a distance of about 600 meters, which is about 1/3 of a mile, the risk of deformed wing virus spillover onto flowers was effectively 0.

So, I think for beekeepers, using this information to think carefully about the placement of hives being at least 1/3 of a mile from sensitive habitats or imperiled pollinator species can really make a huge difference in terms of this risk of pathogen spillover into maybe sensitive ecosystems and protected pollinators.

Jamie

So, I'm not going to lie, that's absolutely fascinating to me. I don't know if you and I've had a lot of discussion about this or maybe I've forgotten, but I think that's really interesting. There are so many directions we could take this, but I'm thinking specifically about this idea. And I'm not going to put you in a corner because I know this is going to be out there on the public airways.

But this idea that, maybe, Kaitlin, we have a responsibility to control Varroa in our colonies, not just for the sake of our honey bee health, but also for unmanaged bees that are out there in the wild.

And I think it's interesting that when Varroa was controlled, you didn't see deformed wing virus as much in the wild bee and other critter population, and also, that when you're 1/3 of a mile or more from an apiary, you don't see it on flowers. And so that does have management implications. It's really fascinating. That's really interesting. As we segue from that topic, I think our listeners are going to want to know what you're up to now. What are you studying these days?

Dr. Kaitlin Deutsch

Yeah, well, I'm really lucky to work with one of the best teams out there, the UF Honey Bee Lab. So right now, I'm working on the potential of using environmental DNA and environmental RNA as tools to detect new or emerging pests and pathogens. So, this is just DNA and or RNA that's collected from the hive environment rather than from an organism itself and can be a really effective rapid detection tool that doesn't require observation of some of these pests and pathogens, which can be cryptic in order to confirm that they're present or not.

So, we're testing this out with a yellow-legged hornet in Savannah, GA. This pest just recently arrived in August 2023. So, we're trying to see if we can monitor the spread of this hornet by using just environmental DNA rather than relying just on visual observations. And then, we are also going to be headed to Thailand in a couple weeks actually to see if we can use these DNA tools to detect pathogens and pests they have over there, such as Tropilaelaps and other hornet species, sort of as a proof of concept. If these things show up here in the US, we want to know if we'd be able to detect them with this method.

Amy

So related to this topic, Kaitlin, with pathogen spillover, what other research needs to happen? I mean, how does the research move forward-looking at the pathogen spillover between honey bees and native bees?

Dr. Kaitlin Deutsch

Yeah, that's a great question, and I think I talked about this a little bit in the beginning.

We know a lot about deformed wing virus, but we know very little about the directionality of many other important viruses and non-virus pathogens that are able to infect both honey bees and wild bees. And secondly, we actually don't know the effect of most pathogens on wild bee species. So, I think there is a lot of work that's being done showing pathogen spillover, which does not necessarily translate to disease being caused in these wild pollinators. So, I think really digging down and seeing well, what is deformed wing virus doing in these bumble bees? What is

it doing to these pollinating flies? Are they causing harmful infections? I think that's really the next stage that we have to focus on to understand the impact of pathogen spillover and what management steps are necessary moving from here.

Amy

So, Kaitlin, yeah, thank you so much for sharing with us the research that you did, your plans moving forward. Are there any last parting words that you would like to share with our audience?

Dr. Kaitlin Deutsch

Yeah, I think just reiterating that beekeepers play a really key role in reducing the risk of virus spillover and safeguarding the health of the entire pollinator community, not just their own honey bees.

Amy

I think that there's going to be more and more research that comes out. That is an up-and-coming hot topic is just looking at honey bees versus native bees. So, I'm excited to see what the future holds. Thank you so much for joining us today and sharing your research with everybody on the podcast.

Dr. Kaitlin Deutsch

Thank you so much for inviting me, I had a wonderful time.

Amy

So, Jamie, that topic of honey bees versus native bees, we get so many questions on that, and there's just such little research at this point. So, I'm glad that there's some research that's being done that's going to be published here soon. But what are your thoughts? And I think our audience doesn't know this, but when you first started here at the University of Florida, you were not just a honey bee person. You were the bee person, right? Like, you did everything bees, wild, native, honey bees, all the above.

Jamie

Well, it's a bit of a mix, like, I got hired to be the honey bee person. But what happened is there was a great need for native bee research here. And at the time, there was a gentleman named Glenn Hall who was also here, a faculty member and he was also a honey bee person who was branching out in native bees. So, both of us were kind of quasi forced into native bee research.

So, actually, we had done some work with a former PhD student of mine, Jason Graham, who collected a lot of bees and wasps from the environment, screened those for honey bee associated pathogens to see if those pathogens could be found with honey bees and native bees and wasps,

and oddly enough, Kaitlin is the one who put that data set together for us in a refereed manuscript. So, I was pretty familiar with this topic and met Kaitlin that way before we brought her on board to study it. And for her PhD, she was doing very important work in Scott McArt's lab there at Cornell because she was looking at all that stuff she mentioned, specifically deformed wing virus, pathogen spillover from honey bees to flies and other pollinators, and then looking at those extra data, like when you control Varroa, you don't see nearly as much in the native bee or native pollinator population. When you control Varroa or when you keep your colonies away from patches of flowers, once you're about 1/3 of a mile away, you don't see those viruses showing up at flowers. So, Kaitlin really has a lot of background, even though I experienced that background mainly through putting together the data set that Jason had left. She had a lot of that training already by virtue of her PhD.

Amy

So, what's the take-home message?

Jamie

I love the fact that she kind of spoon fed us that take-home message, which is beekeepers, through proper Varroa control, not only benefit their honey bees, but reduce the potential for viral pathogen spillover to native bees or pollinator communities. I thought that was well said. And Kaitlin's research is kind of right there at the beginning of finding this type of information and a lot of management strategies. And I don't know if you noticed, she kind of cryptically said through there, this idea of natural beekeeping. Well, I'm not going for or against it here. I'll just make the point that, in natural beekeeping, a lot of people won't treat and let the honey bees sort it out, the fittest survive. Well, if that's your strategy for honey bees, so be it. But just know that that same idea can bleed these pathogens over into the environment where it could be affecting other pollinators. And I think Kaitlin's work is really a step in understanding that.

Amy

Yeah, it makes me laugh. It's like, okay, so the take-home message for beekeepers is monitor and treat for mites. Like, surprise, surprise. What else do we have to say on the podcast?

Jamie

I think, Amy, one of the beauties of that is just the residual impact that we didn't anticipate. We think killing Varroa in honey bee colonies is to make honey bees healthy. Well, Kaitlin's like no, no, no, no, kill Varroa in honey bee colonies to keep honey bees healthy, but also keep our pollinator communities at low risk from honey bee associated pathogens. I think, again, this is a new data set, a new idea, but I think we might continue to see, long story short, you're right. Kill Varroa. Kill Varroa. Kill Varroa.

Stump the Chump 22:20

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

Amy

All right, welcome back to the question-and-answer segment. Jamie, the first question that we have today is how do bees deal with fungal or bacterial infestations in the hive?

Jamie

I really like this question because I love talking about bee biology. Honey bees fascinate me and how they deal with these things, it's just one of those fascinating ways. So, honey bees have two levels of defense against bacterial infections, fungal infections, etc. They have individual bee defense. So, when a bee gets a fungus or a bacterium in it, it initiates a very typical response that you would see in other insects, right? Just a typical insect immune response that the bees themselves are capable of producing. But they also have a colony level series of defenses against fungal and bacterial infections. So, the individual bee defenses might be less appealing to talk about, but it includes things like when these cells get inside of their bodies, these bacterial fungal cells, the bees might have the ability to sequester them or encapsulate them with various cells in their own body, things like that. Just the standard things that you would see in an insect.

But I think the colony level defense against bacterial disease and fungal disease is far more interesting, and we call this social immunity rather than individual immunity. So, like in our case, if we're fighting off -- if I get the flu, my wife's not having to fight it off on my behalf. I am having to fight it off individually, right? But, in the case of bees, they do that. But I just think the social immunity is, is so much cooler. And how bees fight bacterial infections and fungal infections at that level is they do it through a handful of things that you'll be familiar with already.

For example, we know that bees use a lot of propolis in their nest. And historically, people have talked about propolis being a way that they weatherproof their hives. They fill the cracks and crevices and things like that. So that's true. That's true. But it also provides antimicrobial properties. And there's an ample body of growing research right now that shows that colonies have a lot of propolis, tend to have fewer, maybe, Nosema levels and other things like that. So clearly propolis use has an effect on bacterial levels and fungal levels in the hive.

But then we go from there to something that everybody's familiar with as well, which is hygienic behavior. When larvae or pupae die to fungal or bacterial pathogens, they will be removed from the nest. The worker bees can detect individuals that are dying to these things. They can uncap brood cells, if necessary. They can abort the dead or dying individual, remove that from the hive. Removal of disease or dead individuals, larval individuals, the term that we use as hygienic behavior, the removal of these individuals is social immunity. They are recognizing the disease, the bacterial disease, the fungal disease, and they're removing it from the nest. There are other social level immune responses.

We know when adult bees get heavily infected with certain things, maybe bacterial, fungal, but you see this especially a lot with viral diseases. They might wander away from the nest. This is kind of a form of self-sacrifice. Maybe they detect that they have a high pathogen load, so they wander away from the nest and take it away from the hive. We don't know exactly the motivation behind it, but it appears to be a social immune response.

There's some evidence that colonies can get fevers in response to having high pathogen loads where the normal temperature of a hive, somewhere around 94.5 degrees Fahrenheit, which is about 34ish Celsius, that degree temperature can go up if they are having heavy bacterial or fungal infection. So, there are a lot of these social immune responses that may not heal or protect the individual bee, but it heals or protects the entire colony. And so that's really one of the most fascinating things about honey bees is how they deal with these infections. They deal with it on an individual level, much the same way that you would see with a lot of other insects.

But what really adds strength is how they deal with it at that social level. And things like propolis use or hygienic behavior or the self-sacrifice, these are things that, historically, people have looked at and kind of explained away, but it seems like these things are very important to the handling of pathogens in honey bee colonies.

Amy

Right. It's just so crazy to think that they're able to do this, like they're able to detect or identify. It's like, are they making decisions to self-sacrifice or did a bee doctor tell them, oh, you've got it, you are not okay, like you need to go.

Jamie

Now you need to wander away.

Amy

Yeah, it's really fascinating to think about that.

Jamie

They're a never-ending source of amazement for me. Again, when I was a kid, people didn't want propolis. They talked about breeding it out of bees, and now we're like, oh, it looks like that was important. Look at what it's doing. It's just little things like that. I just love it. It's just great.

Amy

All right. So, the second question that we have. Here in Florida, we do have mosquito control, and I would say probably because we have large bodies of water here. And so, the questioner is asking, what do they do with bees before or after mosquito control performs any sort of spraying?

Jamie

Wow. You and I had to kind of take a pause and think about this before we actually got on the air, and I attempt to answer. So, a colleague of mine, Jerry Hayes, and I wrote a document years ago here at the University of Florida about this particular situation because I was getting lots of questions related to mosquito control. I'm sure those of you listening to us from around the world can kind of sympathize with this idea. Florida's, I don't know, temperate in the north and subtropical in the South. Mosquitoes are a big problem. It's hot year-round. We have a lot of water. There's a lot of water. In the summertime, when it's particularly warm, we get hurricanes, which makes it even worse because that makes water everywhere.

So, it's just a mosquito rich place. And as a result, there's a lot of effort to control mosquitoes chemically. There are mosquito control districts around the state. So, a lot of you listening to me and Amy from around the world can sympathize, right? I'm sure there are mosquito control efforts where you live. The public doesn't like mosquitoes. Mosquitoes are a nuisance. And beyond just simply being a nuisance, they are actually deadly. Okay. So, I wanted to say all that to say, we've got this potential interface between mosquito control and bees because mosquito control, it's often, though not always, broadcast spraying from overhead, from vehicles. It's often treating water. Mosquitoes reproduce, lay eggs in water and their larvae develop in water and all these things. So, treating the water is a possibility. So, it's not really hard to imagine how bees might get exposed to mosquito control pesticides or pesticides using mosquito control any number of ways from the water that they're collecting from thermoregulating to the drift that happens as the stuff's being applied and wafting its way to honey bee colonies.

So, what is the beekeeper to do in these situations? Well, first things first, mosquito control is necessary beyond just mosquitoes being a nuisance. They can be a public health threat. And that will always trump wishes of beekeepers. Rightly so, I would argue, but I don't want to chase that rabbit too far. So, given that it's a reality, what are we to do about it? Well, there are kind of two things you could do, things you can do as a beekeeper for your bees, and things you can do directly with mosquito control. First of all, mosquito control folks are not the enemies.

They're trying to protect public health, and they want your bees to survive. They don't want there to be a conflict between their applications of mosquito-cides and your bee colonies.

So, dialogue is a great first step, chatting with mosquito control operators. I know, here in Florida, there are some mosquito control districts that know where the bees are, and their delivery systems, their application systems are programmed to shut off when they pass an apiary or a beekeeper's house or something like that, and then cut back on when they go past it. So simply making mosquito control aware of where your bees are, asking them to cut the spray off once they pass your apiary, those kinds of things really go a long way to helping reduce the interactions of your bees with mosquito control products.

Also. knowing where your bees are means that mosquito control applicators, they can make very conscious efforts to try to get your bees out of the drift zone, as it were.

Furthermore, and again, these folks are trained, they know what they're doing, they're following the label with treatment application, etc. But mosquito control operators often have a number of things that they can use for a mosquito control application. For example, if there's three products to choose from that they want to fog out of the back of a truck, work with them, potentially, and say, hey, listen, of these three, it looks like these three are equally efficacious against mosquitoes. Of these three, this one seems to be safest for bees, so maybe use that one instead. So just talking about formulations, treatment options, those things might help. Remember, these guys and girls are professionals. They know what they're doing but helping them out in that regard will be good. So, communication, giving those pointers, all of that stuff is really good.

Now, from a beekeeper's perspective, what can you do with your bees? First, try to locate your bees in areas that aren't going to be sprayed routinely. Maybe if they're spraying urban areas because that's where people live, but not outside of town, maybe try to keep your bees and apiaries managed outside of town where there's not a lot of application being made. Don't put your bees on the roadside of your house where they might be more exposed to fogging from the road. Put them behind houses, behind hedges, behind sheds, things like that. Those things will all catch the drift of the compounds before they make it to your bees. Don't cover your colonies. A lot of people think maybe I need to wrap my colonies in plastic or some other covers when I know a spray is going to happen, but you can overheat your bees that way. If you're a hobbyist, you might be able to do something like get a sheet of plywood and put it on the top of your hive, one that just kind of telescopes at all directions. That might stop some of the drift from above, almost like an umbrella kind of perspective. But I'm not sure that's really necessary if you just try to keep your bees out of areas where mosquito treatments are applied or if you put them behind areas that would limit the drift. So, there's not a lot of great advice except for those things, but communication with mosquito control districts and keeping your bees away from areas where these applications are made go a long way.

Now, I will say before I conclude, there's a lot of complaints about mosquito control in Florida, but not a lot of data to support that the applications are actually impacting bees. Now, a lot of beekeepers claim that there are. We actually are looking at that right now in our lab. Other labs have looked at it as well, but we have a postdoc in our lab who's actually studying this very topic. So, knowing more about the realistic threat that these applications make to bees will help us make better and more informed recommendations.

Amy

Absolutely. I always tell people that I work with beekeepers, and beekeepers are my primary stakeholders, but I also work with those who work with beekeepers. And mosquito control is definitely one of those groups that I do work with in the state to provide beekeeping education to

try to minimize any harmful impacts that there are potentially out there. And so, all that to say that for those that are in areas that have mosquito control, I'd be happy to chat with you or just kind of run through ideas for educational opportunities as well so that we can all work together.

Jamie

Yeah, and if you're listening out there and you have good recommendations, don't hesitate to drop them to us in our social media or e-mail accounts. We'll be happy to revisit this issue and elaborate more if it's necessary.

Amy

Yeah. All right. So, for the last question that we have for today, the question is, are Layens hives gaining popularity? So, I guess the first question is what is a Layens hive? And, I guess, are they gaining popularity?

Jamie

Okay, a Layens hive is a hive designed by a French beekeeper in the 19th century. Obviously, his surname or last name was Layens. Now, the central premise of a Layens hive is that they are horizontally oriented rather than vertically oriented. So, with the standard Langstroth hive, it's vertically oriented. You grow the hive volume by adding boxes to the top of that hive, right? You super upward. So, colonies grow upwards, and that's great, right? That's how they're naturally oriented in nests and tree trunks and things like that.

But on the other hand, to do any work in the brood bunch, you've got to go through a lot of supers. It's laborious, it's heavy, it's difficult, etc. So, when colonies are vertically oriented, up and down, it's a little trickier when they live in hives that are these vertically oriented hives.

So, Layens, then horizontally, so instead of going up and down, it goes left and right. So, the colony grows sideways, not up and down. And usually, what you'll see is the Layens hive is essentially a wide hive that's one story. And when you hive bees into it, let's just say you put a standard Langstroth deep frame into the Layens hive. And this standard Langstroth deep that you started with had 10 frames. So, you move 10 frames over. Typically, you would put those 10 frames up against one wall of the Layens hive, and right beside it would be what we call a divider board or a follower board that essentially closes off those combs from the rest of the box in that hive. And as that colony grows, you would slide that divider board over a frame or two and then put a couple of frames in that spot. And as it grows, you'd slide that divider board over a frame or two and put a couple of frames in that box. So, you're growing that colony sideways. And the idea is you're never having to pick up these heavy boxes. The bee colonies are growing sideways. So, you're causing them to produce and store honey on outer frames that are growing away from the nest where the brood is.

That was kind of a bad example, moving the Langstroth frames over, because typically Layens frames are much deeper than the standard deep Langstroth frame, maybe 50% or sometimes even twice as deep or twice as tall as a standard Langstroth frame. So, you've got these tall frames in these hives that are oriented horizontally, that grow horizontally. It's just a way to keep you from ever having to pick up these heavy boxes. Now, those folks who use Layens hives claim all of these other benefits as well, but a lot of the jury's still out on those kinds of things.

But for sure, it's an easier hive style to use if weight and things like that are important to you moving these heavy boxes. So, the question was, are they gaining in popularity? Well, let's just put it this way. A few years ago, I've never heard of one of these things. And now I hear about them all the time, and I see people talk about them. I've never seen polls to officially quantify how much more popular they were today than yesterday. But just anecdotally, I'm seeing these sold a lot more, seeing these talked about a lot more, and seeing these sold from the idea of all these great benefits that they're supposed to have. So yes, I guess they are becoming more popular.

Amy

Yeah, that's interesting. I've told you this over and over. I love working with beekeepers. I think they're the most creative people I know. I would be interested, for our listeners out there, I would love to hear if you are managing bees outside of a standard Langstroth. I would love to know how many colonies you have and what you quantify as a colony. Yeah, I would love that feedback from our listeners. So, if you are doing anything outside of Langstroth hives, let us know. I'd love to hear. I'd love to hear how it's working out for you as well. Jamie, I can't believe that we just sit here and talk about bees and it's like, I sit here and I'm thinking like all these questions that we receive, how many years we've been doing this, and there's still so much to talk about and so much that -- people are just so creative at working with different hives and it's just amazing.

Jamie

Amy, someone asked me not too awfully long ago, six months ago maybe, they said, "Jamie, I guess you guys are probably winding down your podcast because you've talked about kind of what you can talk about." And I'm like, "The guest who we bring on, there's always new research and new ways of doing things and new topics in the bee world. There will never be a shortage of those primary guests for us to have."

Now, for the Q&A. If we've been doing this for four or five years and we answer three questions each episode and we're nearing episode 200, we're close to 600 questions, and there's no end in sight. So, you are 100% right. It's a limitless well of things to talk about for the rest of our careers. So, we hope you guys enjoy this podcast.

Amy

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

Jamie

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