Episode 68_Mixdown

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SPEAKERS

Amy, Stump The Chump, Jamie, Guest

Jamie 00:10
Welcome to Two Bees in a Podcast brought to you by the Honey Bee Research Extension Laboratory at the University of Florida's Institute of Food and Agricultural Sciences. It is our goal to advance the understanding of honey bees and beekeeping, grow the beekeeping community and improve the health of honey bees everywhere. In this podcast, you'll hear research updates, beekeeping management practices discussed and advice on beekeeping from our resident experts, beekeepers, scientists and other program guests. Join us for today's program. And thank you for listening to Two Bees in a Podcast. Hello, everyone, welcome to another episode of Two Bees in a Podcast. Today, we'll be talking with Dr. Christelle Guédot, talking with us about the repellency of some fungicides to honey bees. In our Five Minute Management, we'll be talking about how we can protect ourselves from bee stings. And we'll finish the episode with the Stump the Chump segment where Amy reads questions from you, our listeners, to me, and then I do my best to answer them. Hello, everyone, and welcome to another episode of Two Bees in a Podcast. We've got a treat today, because we are going to be talking about the impacts of pesticides on honey bees, very specifically, we are talking about the impacts of fungicides on honey bees. A lot of beekeepers out there are worried about how pesticides impact your bees in general. But we're looking at the specific class, the fungicides. And here with us today to discuss that is Christelle Guédot, an Associate Professor and fruit crop entomologist and Extension Specialist from the Department of Entomology at the University of Wisconsin in Madison. Christelle, thank you so much for joining us on Two Bees in a Podcast.

Guest 02:24
Thank you so much for having me.

Jamie 02:26
Absolutely. You recently published a paper about the effects of fungicides on pollen foraging by honey bees and cranberry. And we're going to talk all about that, Christelle, but before we do, our listeners really get a kick out of hearing how our guests got into bees and bee research in the first place. So, could you tell us a little bit about yourself and how you got into research with honey bees?

Guest 02:47
Sure, sure. It's my pleasure to be here, and I'm happy to share this, how I got into into this work. So, as you can probably tell from my accent, I'm originally from France. And it's interesting because I was working on human physiology and neurobiology, and I was very fascinated by insects. And when I moved to the US to do my PhD, I really was going into this thinking I was going to work on social insects and ants in particular. And then I ended up at the USDA bee lab in Logan, Utah, and started working with solitary bees. So, I went from social ants to solitary bees, and just got completely fascinated by solitary bees and their behavior and how they orient to find their nest. So, it's very different than honey bees, of course. But that's kind of what led me into the bee world. The position I have now is really looking at pollination services and pest management and how we can integrate both of those. And most of our growers, here in Wisconsin, use honey bees. And so that's how I ended up switching to honey bees because really, that's the main pollinators that people are using here. Whereas back in the Pacific Northwest, it was more of the solitary bees that were -- the people were trying to use them as alternate pollinators to honey bees.

Jamie 04:13
You know, one of the things that you said I think is absolutely critical. You mentioned that you're looking at pollination services and pest management, you know, that is a growing field of research at the moment, right? We need pollination, but bees are being used to pollinate crops, right, that also need pest management. And so it's really nice to know that you're out there doing research that is so applicable to beekeepers, as well as growers, because it's incredibly important to both groups to be able to address this topic. Is this a passion of yours, something you feel like you fell into? Or is it something that you're just amazed at the number of research opportunities that are available in this field?

Guest 04:49
Well, that's a great question. So what I bypassed in my little short biography here is that after my PhD was so turbid, I ended up working in a postdoc where I looked at pest insects. And what I was interested in at the time was the chemical ecology, so how pest insects communicate with each other or with the host plant. And the position I got here in Wisconsin was really integrating those two aspects. So, the pollination services, which related to a little bit of what I did during my PhD, and the pest insect, so it kind of was the, the best position I could ever hope for, because it combined what I did for my PhD and what I did for my postdoc. So, it was a match made in heaven that I worked on two different aspects, the bees and pest management, and then have a position that combine both.

Amy 05:41
So, speaking of pest management, you know, fungus is considered a pest, yes? So that's something. Yeah, so we use fungicides in the cranberry fields and other agricultural commodities. And I know that in the past, you know, really, people were focusing on insecticides. And, you know, how detrimental that could be to honey bees. But today, we're talking about fungicides. So, our topic is about repellency of fungicides to honey bees. So, what is, first of all, I guess, what does that mean? And then can you tell us a little bit about the process of the fungicide applications? And how is that related to honey bees?

Guest 06:16

Sure. So, as you mentioned, you know, when we talk about bees, of course, they're insects. So, the first thing that we're interested in is looking at the impact that when we talk about management, pest management practices, how insecticides can affect insects, because bees are insects. And, of course, insecticides are meant to kill insects. When you talk about fungicides, it's different because they're meant to kill pathogens. So they are used for, you know, they can be used for fungi, they can be used for, like, bacteria, or things like that, micro organisms. And so in the end, we don't think so much about the impact that fungicide may have on bees, because they're from different kingdoms, right? So we're not thinking about that. But in research, a lot of people have been looking at the impact of fungicides on bees for a long time. And there's a growing body of research in the last two decades that has been really, really extensive. And so, when you're talking about pesticides, in general, what we tend to think about is really what goes into the toxicity of the pesticide, and how toxic is a pesticide? And that's really -- there's a metric for that, that's called the LD 50. That's the lethal dose to kill 50% of the population. And that's calculated for every chemical, but then there's also the exposure and how much exposure the insects or, you know, whatever organism we're looking at, it could be mice, it could be, you know, fish or any kind of organism that could be exposed, we're looking at the exposure and how much is being applied at the time where they would be present. And so, when you look at fungicides, because they have what we call that LD 50 is really high compared to insecticides for bees, I'm talking about specifically here. So, we never thought, for a long time, that fungicide would have an impact. They have a high LD 50 for bees, they are not in the same kingdom, so why would they affect bees? And so, there's been a lot more work into this, because we learned, also at the same time that there are things that kill insects, but there's also things that have sub lethal effects. And by that, that could be any range of effect that they could have that could be on their behavior, or their reproduction, or their memory, or their orientation. There's a lot of impacts that have been documented, now, on the sub lethal effects. And so, that's kind of what we were interested in, because the fact that those fungicides do not have a high toxicity, growers tend to apply them often at a very critical time, which is bloom time. There's a lot of pathogens that happen around bloom time. And so, it's a common thing to do. Growers are very self-aware that insecticide, you have really have to to spray very few, if any, during bloom, and if you're spraying any, they have to have a very low toxicity so that you're not killing the bees. But the fungicide is kind of like, well, it doesn't impact the bees, so why shouldn't we spray them at this time when it's the most critical time for cranberry, for example, fruit rots are very big during around June time, and that's the time where they will apply those fungicides. So that's kind of the idea is that they don't kill the bees. But they're applied at a time where we don't think they have an impact on bees, and yet there are studies that are now showing that there are impacts, first of all, of the fungicides, sub lethal effects on bees, but also that there's interactions between insecticides and fungicides that can also increase that toxicity and the impact that they can have on the bees. So, all of that kind of got together and in us being interested in looking at the fungicides.

Jamie 10:01
So Christelle, you and your team, specifically, were looking at the effects of fungicides during cranberry blooms. So, Amy and I are based here in Florida, we have listeners from all around the world. I don't, I don't know that everybody knows exactly how cranberries are grown. I was in the Northeast at one point and watched, saw the cranberry bogs and how they flood those things out. And when I think about fungicide use and cranberries, it seems like the cranberry bog's a wonderful environment for the growth of fungal pathogens, because it's wet, and, you know, damp all the time. And so, you guys specifically

published a paper, we'll make sure to link the paper in the show notes, but you published a paper, where you looked at how fungicide applications during cranberry bloom affected honey bee foraging behavior? Can you tell us a bit about that study, how you did the work and what you and your team ultimately found?

Guest 10:50
Sure, I'll be happy to do that. So, this was work, as you can see on the paper, that was led by my postdoc, Benjamin Jaffe, and a technician in my lab, Abby Loise. And so what we were interested in looking at here is, so as you mentioned in cranberry, there's a lot of water, there are pathogen, which actually, interestingly enough, in Wisconsin, we don't have a lot of pathogens. We have some and we have consistently some pathogens, we even have viruses now that have shown up and some phytoplasma, there's different type of pathogens. But for the most part, growers don't spray a lot of fungicides. But as I just mentioned before, when they do spray fungicides, it tends to be at bloom time. That's the best timing for managing those pathogens. And one of them that -- it's not one pathogen, it's a complex of pathogens, but it's a fruit rots. So they're dealing with a decent amount of fruit rots in some places more than others, as always, and so they apply those different fungicides around at bloom time. And so, there's two types of fungicides that are being applied. It's interesting because there's one that's applied by itself, and that's Prothioconazole, that's called Proline, and that's one that they apply by themselves. And then there's also, how that came about, I can't tell you the history, but they mix two of them, and that would be a bound in Indore, so that Azoxystrobin and Fenbuconazole, those they apply as a combination. And that's really the most common type of fungicide applications that they do. They either do that Proline or they do the bound plus indoor. And so, we were interested in looking at that, because we had observed from, actually, another study that we were seeing very little bees foraging back with pollen, when actually, at that time, it was fertilizer, a fish fertilizer that was applied. So, we were interested in looking at the impact of those applications during bloom, and how that could affect what they're foraging on. Are they really foraging on cranberry, or are they foraging on other flowers? And are they decreasing their foraging on cranberry when a product is applied, and we didn't look at insecticide, just at the fungicides here. And so what we've been doing for a while with our research on honey bees is we use pollen traps. So, I'm sure people here are familiar with pollen traps, but we set them up at the entrance of the hive, and then we let the bees come in. And for 24 hours at a time, we closed the trap, which means that it scrapes off the pollen baskets that are on the bees as they walk into the hive. We only do it for 24 hours at a time, because we don't want to deprive the level of pollen. But we want to be able to collect the pollen that they're bringing back to the nest. And so, what we were interested in looking at, and all that research is really done on the farm with the growers, it's a very intricate collaboration that we have with the growers, and we wait for them to apply the fungicide. Whatever one they were applying, so we knew, at least, that they were all applying either Abound Indar or Proline. And we collected pollen before they applied it, and then again 24 hours after they applied it, and then again 48 hours after they applied whatever product they applied. We couldn't go any longer because then they might apply an insecticide or they might apply a fertilizer or something else that could confound the fact, the results. So, we really could only go for 48 hours to be consistent with all the marshes that we worked at, and really, when they apply, and it's applied on the whole marsh and you cannot use different hives on the same marsh, so we only had one hive we looked at at each marsh and we had, originally, something like 17 marshes where we did this work. So, we were really looking at the marsh level. What are the bees doing when they're applying a fungicide as far as

what pollen they're collecting? So, that was the premise of this study. So in the end, it's a very simple study. We just call in the pollen, pollen baskets. We collect them in that pollen trap for 24 hours, and then we look at them under a microscope. And cranberry is not unique, in that sense, but it's, it's a Vaccinium species. And in the Ericaceae, so it's similar to blueberry, in that they have what are called pollen tetrads. So each pollen grain is not really a pollen grain. It's a group of four pollen grains together, it's a tetrad of four pollen grains. So they're very easy to separate from other pollen, pollen grains. And also by color, they have this tan color, it makes it very easy to sort out cranberry versus non cranberry in the, in the agro ecosystems that we have in the landscape, we have around, they're pretty characteristic. So we just looked at the pollen. And what we did is we weighed the amount of pollen that the bees were collecting, and what we found is that whether it was before the application, 24 hours after the application, or 48 hours after the application, the weight of the pollen was the same. They were still collecting pollen, no problem, there was no difference in the weight of the pollen, the total pollen in the -- in those drawers that we're collecting. But when we went and looked in more detail at the pollen itself, what we found is that, when Proline was applied, there was a shift in what the composition of that pollen and the percentage of pollen 24 hours after application, as was 48 hours after, switched from cranberry pollen to non-cranberry pollen, even though you had the same amount of pollen that was collected, you had much fewer pollen tetrads from cranberry after the fungicides were applied, the Proline. And interestingly enough, when we had the Indar plus Abound, we did not see that switch. They were still collecting the same proportion of cranberry pollen versus non-cranberry pollen. So, that's where the repellency for us came into play is that when you apply the Proline, they still collect pollen, but they switched and were into non cranberry flowers. They made up for that by going to non-cranberry flowers. And so, that's, that's really the gist of the study was very simple, very clear. And you know, very simple study, in the end a lot of work, my postdoc would argue, but still really simple way of looking at it. And so, what we have is this repellency that was still holding true after 48 hours, they did not recover yet from the Proline, but we couldn't go any further because then some marshes might be spraying, and then we couldn't have that 72 hours or 86 hours, something like that, to follow up with.

Amy 17:44
That's so interesting. So, is there, you know, what is the reason for that? I mean, why was it, why did that happen with one chemical, but not the other mixture of chemicals?

Guest 17:55
It's a very good question. And unfortunately, I don't have the answer to that. So, we can speculate on how that could be. There's different, you know, different compounds and that's the main one that I think is at play here. But there's also the fact that those are done at different application rates. And so, there could be different concentrations that are present. Though, if you look at it this way, it seems like we would have potentially more in the Abound plus Indar than we do with the Proline that is applied because you have two of those that are together, and there's a little bit more of that that's being applied. But in the concentration, per se, it's very similar. So, what it could be, I don't have an answer. We didn't go into the follow up of knowing why that could be. There's, you know, different things that you can think about, the different mode of actions, what those active ingredients are, is there any kind of, you know, smell to it in a way, right? Is there something in there that smells different to a bee? We don't know. We didn't go into the explanation of that yet. So that's something we're really interested in looking at but haven't done yet.

Jamie 19:07
So a couple things come to mind, Christelle, when you mentioned that. Number one, you know, I'm not claiming that this particular fungicide is a problem for bees, maybe it doesn't impact bees at all, but if something is going to be a problem, you almost want it to be a repellent, right? So the bees will stay away from it during the time it's applied. But on the other hand, if growers are applying a fungicide during bloom that repels honey bees, you could see for growers where that would be a problem for them because that's when they need the bees on the flowers, right? So it's an interesting paradigm that you have going on here during this interaction between the bees and the fungicides.

Guest 19:47
You're totally right, Jamie. And that's exactly what happens when you work at the intersection of pest and pollinator management, right? When you integrate both, you always are, you know, at those trade offs. What is -- when is it beneficial to both? When do we get to have, you know, something that's going to be good for the bees and for the pests? And how do we approach that, right? And that's a tricky one, when you're talking, you know, you're not wearing the same hat, when you're talking to beekeepers than when you're talking to growers, yet, we all are working for the common good, right? We all are going in that direction of let's do pest management, grow a crop as sustainably and environmentally sound ways, but yet getting, you know, getting that management and protecting the bees. And you could talk to any growers, and everybody, it has the wellbeing of the bees at the core of their, of their time when they're -- they have bloom, because they need those bees to pollinate their flowers. So, you're totally right. And, and this one is actually, you know, you can spin it whichever way you want. You can spin it in a way in saying, "These are affecting bees in a way we don't know." But they are affecting bees, because they're switching, they're not going to those flowers. So maybe it's, you know, whatever is, could be negative to them they're avoiding. So we're protecting the bees by having a chemical that is, somewhat, you know, I'm going to use the term scented, in a way, that they're avoiding it. But at the same time, then you're not pollinating those flowers and 48 hours during full bloom is a long time when you're thinking about bees avoiding, and you're talking about, you know, two to three hives per acre and marshes that can be 100, 200, 300 acres. So, that's a lot of bees out there. So yeah, having lost at least 48 hours of your pollination services, because you apply that Proline was really puzzling to the growers. And so, I think that several of them, the thing is that I don't get those phone calls, they have consultants, so they're talking to the consultants, but I heard from the consultants that they were, you know, thinking about switching to Abound Indar instead of Proline even though Proline is very effective at controlling their, their pathogens there. So it is, it is interesting, and it's, you know, it makes, makes it fun. Sometimes, when you show like you're killing the bees, that's not as fun to tell that to the growers. But in this case, it's, you know, it's positive that the bees are repelled, but then how do we mitigate that lack of pollination services that we're trying to get during that time?

Amy 22:26
So I'm also interested in, you know, what you suggest, as far as future research goes, because it seems like, you know, this is a very, you know, of course, we were talking about how there's a lot of research that can happen and come from this. But I think the one thing that I think about sometimes is when I'm speaking to either growers or beekeepers, they're worried about, you know, like tank

contamination, or the mixture between those insecticides and fungicides. So, is that something that, you know, has been looked at before?

Guest 22:56
Oh, there's been some research, I think, even in cranberry, where people looked at how the impact of two pesticides, insecticide and fungicide, can have what we call synergistic effect. And an insecticide that might not be toxic can become more toxic to bees in the presence of a tank mix, like you're talking about, when you have a fungicide as well. So, that's something that growers are very, I mean, I don't know, I've told them many times, so I'm hoping they're very aware of. But it's, you know, it's one of those questions like people always want to extrapolate how would that happen in another crop, but as soon as you go to another crop, you're using different, not necessarily different active ingredients, but it might be a different product with the same active ingredient, the timing might be different, the concentration might be different, the rate of the pesticide might be different. So everything is so different, that it's really different in every crop you're going to go into. So that's where, you know, it gets to -- people get to do more of the lab research, because you can kind of try to translate that to what would happen in other cropping systems. But there's, there's a lot of research on those different chemicals, but each one is different. Each active ingredient is going to have a different impact. And so, one thing that we could think about as far as future research would be potentially something like that proboscis extension response. Right? Would you have something like that with that Proline? Is that repellency due to the fact that the bees are averse to that chemical, that there's something in there that's, you know, like I mentioned the scent, but I mean, really, it's not necessarily a scent, but something that they detect, status receptors, that they're able to detect that we could do in the lab and really try to get to the answer of what is going on with that. But that's, you know, that's always the same when you go to the lab or to the field, you get different responses. So how do you translate that after?

Jamie 24:58
Actually, one of the cool things about your project is you guys really went straight to the field, and so you're seeing a really realistic, right, response that bees are giving to you in the field, which I think is incredibly useful to beekeepers, which segues kind of to my next question. Ultimately, and I know, you know, beekeepers are always wanting us to do one study and be able to make huge pronouncements based on this study and radically change the beekeeping management paradigm out there. But, so, realistically, that's not the case. Right? But what do you think are some take home messages from your study that beekeepers can use directly? What are some things that you see benefiting beekeepers coming from this work and some of your other work?

Guest 25:40
The main thing I would say is that the relationship between the beekeepers and the growers is essential. And really having those conversations, and those, you know, like I told the cranberry growers and I could, I could send you a link to that, I talked to the cranberry growers, I talked to the beekeepers and we put together best pollination practices for cranberry. And in there, we also have, like, sample contracts. And I'm not talking about a contract that would be binding by law, you know, just a contract between beekeepers and growers to really have that conversation, to really know what's going on, to really be informed of what's being applied. What kind of bees are you getting on your marsh? When do they show up? When do they leave, you know, all those kinds of practical aspects, because that

relationship is essential for both parties. And so, my main thing would be that continuing to foster those relationships between the beekeepers and the growers, so that beekeepers know what's being applied during bloom, and growers know what what bees they're getting, is going to be essential in making those bees be thriving within the crop that they're being delivered to. And so, I think that having those conversations on, "What fungicides are you applying during bloom?" You know, "Are there any pesticides that are applied during bloom? How do you try to mitigate, you know, like by, do you spray at night, if you have to spray something?" or, you know, all those kind of practices we know and growers know about, making sure that those are being -- are being used directly from the study we did. I think growers could definitely -- beekeepers, I'm sorry, could definitely ask growers, "What fungicide are you applying? Are you applying Proline? Or are you applying the other mix of insect -- fungicide?" I'm sorry. You know, those kind of questions to be more informed about what products are being applied and what, you know, how satisfied are our growers with those products that you're applying and the impact they may have on the bees, right? And I think the growers should spend time looking in their farm. And I think they do, I'm not saying they don't, but some might not. But go in the bed and look at the bees because I would suspect that something like we documented, you could see right after you apply that Proline, that there's fewer bees out there. If we have such a decrease, it was a 40 something percent decrease, you would have fewer bees visiting flowers. So, I think those kinds of, you know, recommendations in having those great relationships and fostering them even more would be very beneficial. Absolutely. And you are an Extension Specialist, right? So, do you focus primarily on -- do you split it between growers and beekeepers? Or do you have, you know, what does your program look like? And is there anything else that you'd like to, you know, talk to us about or let our audience know about your program? Well, that's a great question. I work primarily with commercial growers. So, I'm really -- that's my position is working with fruit growers. I've worked with beekeepers, but from the standpoint of -- at this time, that doesn't mean that it's not going to change -- at this time, it was when we put those pollination practices together, I really wanted to have everybody at the table so that we could all talk together about how best to manage those, those bees when they're on the farm. So we had beekeepers at the table, we had growers, etc. I haven't worked directly with beekeepers, I've spoken with them, but I haven't worked directly with them. I think that there's a lot to be done to look at with what are the bees that are coming into cranberry. There's a lot of thinking out there that the bees that are going into cranberries are maybe not doing as well when they come out of cranberries. And I'm not convinced about that. And so, I think that that would be the kind of study that I would be interested in looking at because I don't think that's true. I think I've talked to enough beekeepers that say that's not true. So, those are the kinds of questions that I'm interested in looking at. But, the focus really is primarily on the crop growing. And I don't know if people know that, but Wisconsin produces about 60% of the world's cranberry. So, we are a major leader in cranberry production in the world.

Amy 30:17
I don't think I knew that, thank you.

Jamie 30:19
I didn't know that, yeah. Well, Christelle, thank you so much for the important work that you do. I really appreciate you taking some time to share about your research and some other perspectives with our listeners here on Two Bees in a Podcast.

Guest 30:31
Thank you so much for having me. I really appreciated it. And thank you, Jamie and Amy, for inviting me in for the great conversation.

Jamie 30:39
Thanks. Everyone, that was Dr. Christelle Guédot, an Associate Professor, fruit crop entomologist and Extension Specialist with the Department of Entomology at the University of Wisconsin Madison. We'll make sure and link to her faculty profile as well as some other documents that we referenced in the show notes so that you'll be able to follow up and look at more information on this topic.

Amy 31:05
Have questions or comments? Don't forget to like and follow us on Facebook, Instagram and Twitter @UFhoneybeelab. For the past couple of Five Minute Managements, Five Minute Management, we have been talking about sting management. So, the first one we were talking about how stings work. The second one, we discussed how our body responds to stings. And so, in this third Five Minute Management, we are going to wrap it up and actually discuss how to protect yourself from stings. So, Jamie, I'm going to go ahead and start the timer, and you have five minutes to discuss how to protect yourself from stings.

Jamie 31:50
I feel like, Amy, I can almost guarantee that it will not take me five minutes because this is the easiest one to point out to folks. The best way to protect yourself against things is to wear, what we call in the business, personal protective equipment, which, of course, beekeepers know as veils, bee suits, gloves, etc. So, there is often a macho image associated with, you know, the longer you keep bees, maybe the less you wear with gloves and bee suits. You could wear shorts and T-shirts, and I know a lot of folks who brag about not using smokers or not wearing veils, but I would suggest to you that you need to wear every bit of personal protective equipment that makes you comfortable working around bees. So, the first thing regarding personal protective equipment is a veil. I never work colonies without a veil. I don't care how wimpy it may or may not make me look. I know a lot of people feel like you need to work without a veil. I just do not like being stung around the face, the eyes, things like that. So, I always wear a veil when working bees. I strongly recommend that beekeepers wear veils when they're in apiaries. Secondly, bee suits. Bee suits are designed to cover your whole body, your arms, your legs, your torso, etc. and bee suits are really good at protecting your whole body from getting stung. Of course, the counterpoint there is that bee suits are incredibly hot. So, probably the second piece of equipment that beekeepers tend to shed is the bee suit. And they will often wear a jacket, right? But I will always tell folks, "If stings are an issue for you, if you don't like stings and you don't tolerate them well, you need to consider wearing a full suit, or at least pants and a bee suit jacket because that's very useful as well." Gloves are another piece of personal protective equipment that you should consider wearing. Of course, the gloves go over your hands and they run up your forearms almost to your elbows. Gloves are really good at protecting your hands. Of course, you lose a lot of dexterity when you're wearing gloves. It's hard to, you know, hold the queen or to remove frames. And gloves, though, are probably the first piece of equipment that people will remove as they get comfortable with bees. Again, I don't care if you wear gloves your whole beekeeping life. Whatever you are comfortable doing to minimize the impact of stings on you is perfectly okay. And then, of course, there are some other

basic things that folks like to do, wear boots, rather than flip flops or sandals or something like that, that way you're protecting your feet. And then when you think about gloves and boots, you'll know that there's almost always entry points through the top of the boots or through the end of the gloves. A lot of folks will buy velcro straps that they can strap those openings closed around the top of their gloves and the top of their boots. So, all of that is really good way of protecting your body from bee stings. I mean, that's what bee suits, gloves and veils are designed to do. And just FYI, the veils that zip to the suits or jackets are probably better than those that tie to the suits or jackets because bees can get underneath the drawstrings on the tied veils. So, if stings around the head and neck area really worry you, you might consider using a zipper veil that zips to the bee suit. Last two pieces of advice I have regarding minimizing stinging have nothing to do with personal protective equipment, with regard to suits, etc. but instead has to deal with do with how you keep bees. First, I always recommend that beekeepers use a smoker. Smokers are designed to help keep bees calm while you're working. And that's what smoke does. I know a lot of folks who brag about not using smoke, but I think not having a smoker lit when you're working bees is careless in many ways because there are times where bee colonies can respond quite defensively, and you have to be ready to use smoke to calm them. And then the final behavioral trait I'll tell folks is just work colonies calmly. No sudden movements, no jerky motions, no dropping boxes or dropping frames. Just work smoothly, methodically and calmly. And this usually minimizes bee defensive responses.

Amy 35:54
All right, you actually did it. You got it within five minutes. Good job.

Jamie 35:58
There you go. I knew I could do it.

Amy 36:01
Honestly, there's nothing worse than having a bee in your veil. It's one of the worst things to me, I think, when it comes to beekeeping, sometimes.

Jamie 36:08
It's so funny you mentioned that. So, I use the drawstring veil. I've done it my whole life, and I get bees in my veils, you know, quite a few times a year. I usually just close my eyes just to make sure I don't get stung on the eye, and I gently remove my veil, release the bee, and put the veil back on. But, a lot of people can't handle that if they get a bee in their veil. Off goes the veil, off the bee suit, off goes the shirt, off goes the pants, you know, people's response to a bee getting inside of something is usually pretty fun to watch. But again, you know, Amy, all this is designed to protect us from getting stung. Stings are a reality. You know, I've been stung tens of thousands of times, but you can still get stung, even with that background, you can get stung in a manner that can be life threatening. So, you really have to be careful.

Stump The Chump 36:57
It's everybody's favorite game show, Stump the Chump.

Amy 37:00

Welcome back to the question and answer time. Jamie, I've got three questions for you. I will do my best to read them and summarize them. Alright, I will do my best to answer them. Great. Okay, so the first question, actually, it's funny, I was speaking to one of my friends who's a beekeeper in Missouri, and she was talking to me about how she didn't even know that being honey bound in a colony was a thing. And so, coincidentally, we had an email that came that was also asking about honey bound frames. And so, this person has a hive that has all honey, you know, all the frames have honey, full frames of bee bread and nectar. But there's not a place for the queen to lay. And so, this person had no issues with moving frames around and they did switch some stuff out. But is this common? Is being honey bound a thing? And what do you do about it?

Jamie 38:07
It is absolutely a thing. And I've seen it quite a lot, even in my own operation. So, I've never read a scientific explanation for it. But the way that I've kind of always treated it, and I'm always, it's always dangerous, because, you know, we're kind of walking that line between science and just anecdote, but the way that I've always seen it is that, oftentimes, or at least occasionally, the amount of nectar coming in can outpace the space available to store it. And in those cases, the bees will actually store that nectar in empty cells in the brood nest. And if nectar is just coming in and coming in and coming in and coming in, your entire brood nest can be absolutely plugged with honey. The term for it is just what you said, Amy, it's called honey bound. There's now no place for the queen to lay eggs. So, a lot of folks deal with this by rotating out some of those frames from the brood nest and rotating in some pulled combs that are empty so the queen now has a place to lay. Now, that begs the question, just because you're putting in empty space doesn't mean you solved the problem. If the queen's not laying quickly, then they can make those four or five or six frames honey bound as well. So, you know, it might be best done by adding an empty super right above the brood nest, as well as rotating in some empty combs into the brood nest. So, hopefully some of that new nectar will go into that empty super, and still leave those empty combs in the brood nest available for the queen to lay. A lot of beekeepers -- and that's if you use a standard single deep brood nest with honey supers above it. A lot of folks will use things like double deeps as their standard brood nest, two deep boxes, their brood box, and what they'll see is the queen tends to lay in the lower most box and that box is the one that gets honey bound. So, how they'll deal with it is they'll just often swap places between the two boxes. The one that's on top that has more empty comb will go to the bottom, the one that's honey bound will move to the top, and you'll make sure and find your queen and put her in that bottom box, so that she has a lot more empty cells. But, you know, this always happened to me. When I lived in Georgia, we would always move bees to the mountains to try to make sourwood honey, and sourwood blooms in late June, July, early July, which is a time of the year the bees otherwise aren't making a lot of honey. And so, my colonies would get honey bound a lot. I'd take the strong hives up to the mountains, think everything was going to be okay, and then when I'd go check on them, I had all that sourwood honey stored in the brood box really kind of inaccessible to me. So it is a pain when it happens. And the ways around it, or ways to try to mitigate, is to provide space in the brood box manually by adding some pulled combs that are empty, and perhaps, adding an empty super or two to those hives so that hopefully new nectar coming in will go there.

Amy 41:03

Don't some people keep these, where they actually do the opposite, where they want the queen to lay in the upper box?

Jamie 41:09
You know, it can happen, but what happens is a lot of folks don't use queen excluders. And so over time, that queen might just migrate up and have brood up there. So that can certainly happen. And that's one of the reasons I like to use excluders, but everybody's different, you know, on that standpoint. But certainly, if you don't use excluders, the queens can technically be in any box she wants to be in, laying eggs anywhere she wants to lay eggs, so.

Amy 41:31
Yep, that's fair. All right. So, for the second question that we have, I'm going to try to do my best to summarize this. So, I apologize to whoever emailed us. And I totally butchered your question. But, this person had a hive that they split too heavily. And they did three splits in the spring and noticed that it was queenless for over 28 days. So they ended up adding a new queen a couple of weeks ago and the queenless hive, well, basically one of the colonies had killed the new queen. And so this colony, this person would probably consider rogue, they weren't making any honey, they were basically just bearding at the front of the hive. And so they took that colony and they moved it further away from the entire apiary. And so, I guess those bees, they think, are going back to the original hives. And so, what's, what's going on? And what do you think is happening here?

Jamie 42:23
Yeah, so I've said it maybe once, said it 1000 times in this podcast, biology is incredibly messy. And sometimes, bees, even on their own best efforts, simply fail to reclaim themselves. So, it looks like the background story here is that they had a really strong colony that they split into three splits. And I take it, from the way the questions asked, that the three splits are doing fine, that it's the parent colony that failed to requeen itself. And they put a queen in there, you know, a couple, a week or two after that, and they killed that queen. Well, they could have killed that queen because maybe they have successfully requeened themselves, and now that queen has to go on a mating flight, which, the whole process can take, you know, if you, if you count from the time you dequeen that hive to the time they have a mated and laying queen can take up to a month. So, the questioner's time period about this colony going rogue is still within the month that it may take them to produce a new queen, for her to mate and start laying eggs. But, let's assume for a second that, in fact, they did fail to requeen themselves. And for whatever weird reason, they released that new queen that they gave them and killed her. So, the colony then has become hopelessly queenless. And what they've done is they've taken that colony, after reading in the books, carried it, you know, 200 feet away, dumped out all the bees in hopes that the bees would just, you know, fly back to these other hives. And what they've noticed is that some are going to the other hives in the apiary, but moreso, they're congregating at the old nest site. And so, what I always tell folks is rather than shaking bees, you can just take frames of bees or whole supers of those bees and just combine them instantly with your weaker hives or weaker colonies in the apiary. So, imagine for a second that this parental colony that was split was composed of two boxes: a brood box full of bees and a medium super full of bees. I would have just taken that medium super full of bees and put it directly on a weak colony in the apiary. I, then, would have taken that deep box full of bees and put it on a second colony in the apiary, and now, I would have done away with my queenless

colony. Now, you've got the issue, though, of the bees still might fly back to their original nest site. So, what I do is two different things here, potentially. Either I pick the weakest colony in the apiary and move to that old nest site, so that they can be the one to pick up the straggler bees from the first hive, or I move absolutely everything related to that original hive from that spot. The listener mentioned that there were still cinder blocks there, there were still whatever there. You've got to remove all appearances of the fact that there used to be a hive there. All cinder blocks have to go, all stand, whatever was there that the hive -- on which the high was sitting, it has to go. And then, eventually, those bees will have nowhere to land and they will, you know, combine with the other hives in the apiary. So, it wasn't really necessary to go shake them 200 feet away. You could have just moved the boxes directly to other hives in the apiary, completely disassembled the stand, so there's nothing there for the old bees to land on, and it would have sorted itself out in about, you know, two to 12 hours probably.

Amy 45:34
That's fair. If you, let's say you had all the time in the world, would you be able to put just an empty box there and then collect them and dump them into another colony?

Jamie 45:42
You can, but you're gonna run back into the same problem, right? If you dump them into another colony, you might get some drift back tomorrow. But, if you have all the time in the world, you could do this daily, right, until it stops happening. And it would help, if you elect to do this, it would help to put a frame of something in that empty hive box, so that the bees that fly in there would have something to land on, a frame of honey, a frame of brood, something that they can land on. And so then, you move that frame with the straggler bees to a new hive, preferably late late late in the day, so they're less likely to drift back to their original hive stand.

Amy 46:15
Awesome. Okay, so our third question. This is a curiosity question. Why are there different locations on the frame for the different kinds of queen cells? Is there any reason for this? I mean, where's, where's the swarm cell and then the supersedure cell?

Jamie 46:32
Yeah, those are interesting questions. I don't know that I've ever had that asked. I always kind of teach that just like, "Oh, this is stuff that we all just know, because this what we do." It is what it is. But it is one of those things, it's what it is. And the truth is, is I don't know the biological reason for it. But, I can explain to you kind of the way that I teach on this concept. So, the listener is asking about two types of queen cells, one of those being swarm cells, the other being supersedure cells. And from the bees' perspective, you know, they don't call them that, right? They're just all cells in which they're trying to make new queens. Swarming is a planned event. The bees want to swarm. They begin making new queens in advance of the swarm season. So, they will construct queen cups, an egg will be in those queen cups, they will feed the larvae that emerges from that egg and they will grow those things out into queen cells that, since they are produced for the purpose of making a new queen during a swarm, we call them swarm cells. These cells tend to occur on the perimeter of the comb. So, you'll see them on the edges of the frame. They are planned events, so bees have time to make them, they're on the

edges of the frame. Now, supersedure cells are responses to an emergency. It is a bee colony's way of replacing a bad queen, or in an emergency situation, creating a queen when no queen is there at all. Maybe the queen's died, maybe you pinched her, whatever, there's no queen. So in this circumstance, the bee has to make an emergency queen. Either they're replacing a bad one or replacing a missing one. So, those bees have to go to the youngest available female larvae to begin pushing them in the direction of becoming a queen. Well, those female larvae were originally produced from eggs that were laid in worker size cells. So, the intent of those larvae deposited into those cells were, as eggs, were to become -- was to become workers, they were supposed to be workers. But, now the bees need a queen. So, they go to the comb where the workers are being produced, and they use the youngest available females, just try to push them in the direction of becoming a queen. So, as a result, supersedure or emergency queen cells tend to occur on the face of the comb, because that's where they have to go get bees. You could almost argue that if bees did it the way they quote, wanted to, all the time, they would start them in queen cups around the perimeter of the comb and pour a lot of attention into them and make these big old fat queen cells that lead to big old fat queens. Maybe that's the way it normally is done. But, in response to emergency, they have to go with what's available, and what's available is already somewhere in a worker bee cell that they now have to make a queen, and so those tend to be on the face of the comb. So, how we usually explain it is swarm cells usually are around the edges of the frame, whereas supersedure cells usually are on the face of the comb. Again, there are exceptions to both rules. But that is the generality associated with both types of queen cells. Like I said, from a bee's perspective, it's just a cell in which your queen's developing. We as beekeepers tend to assign them two different names based on what we think bees are trying to accomplish by the production of that queen, either swarming or replacing a problem. All right, well, those were really great questions. Thank you, everyone, so much for submitting your questions, and do not forget to send us an email with your questions. Honeybee@IFAS.ufl.edu. Or find us on social media, our Facebook, Instagram and Twitter @UFhoneybee.

Amy 50:39
Hi, everyone, thanks for listening today, we'd like to give an extra special thank you to our podcast coordinator, Megan Winfrey and to our audio engineer, James Weaver. Without their hard work, Two Bees in a Podcast would not be possible.

Jamie 51:04
For more information and additional resources for today's episode, don't forget to visit the UF/IFAS Honey Bee Research Extension Laboratory's website ufhoneybee.com Do you have questions you want answered on air? If so, email them to honeybee@ifas.ufl.edu or message us on Twitter, Instagram or Facebook @UFhoneybeelab. While there don't forget to follow us. Thank you for listening to Two Bees in a Podcast!