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SPEAKERS

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

Jamie 00:10
Welcome to Two Bees in a Podcast brought to you by the Honey Bee Research Extension Laboratory at the University of Florida's Institute of Food and Agricultural Sciences. It is our goal to advance the understanding of honey bees and beekeeping, grow the beekeeping community and improve the health of honey bees everywhere. In this podcast, you'll hear research updates, beekeeping management practices discussed and advice on beekeeping from our resident experts, beekeepers, scientists and other program guests. Join us for today's program. And thank you for listening to Two Bees in a Podcast.

Amy 00:53
Hi, everyone, welcome to this episode of Two Bees in a Podcast. Today, we are speaking to Dr. Alex Walton, who is a postdoctoral research associate in the Department of Ecology, Evolution, and Organismal Biology at Iowa State University in Ames, Iowa. He's also co-advisor at Cornell University in the Department of Neurobiology and Behavior. So thank you so much for joining us today, Dr. Walton.

Guest 01:19
Glad to be here.

Amy 01:20
So a lot of people know that with honey bees, larval nutrition determines whether a female is going to be either a queen or a worker. There has been a lot of research going on with this. So you've looked at larval nutrition and whether this actually builds disease resilience in adult worker bees. Before we kind of get into that, can you tell us a little bit about yourself and how you got into honey bee work?

Guest 01:45
Sure, yeah. As you said, I'm a postdoctoral researcher, and I study social insects in general, that includes honey bees, and I currently work with paper wasps as well. I got my start as an undergraduate

at the University of Arizona where I started working in a laboratory that worked on ants and bumble bees. And from there, I was still an undergrad working at the USDA Honey Bee Research Facility that's in Tucson, that was where my first introduction to honey bees was. And then I was kind of hooked and there was really no going back. I think at that point, I learned a lot about honey bees and I knew that was the route that I wanted to go down. So when it came time for graduate school, I looked for advisors who studied honey bees and were interested in the evolution of social behavior and cooperation, and that's how I got started. And that's what I've been doing ever since, it's been studying bee evolution and maintenance of cooperation, among other things in social insects, including honey bees.

Jamie 02:46
So, Alex, Amy really hit the nail on the head here. When beekeepers and bee scientists think about the importance of nutrition in honey bees, one of the things they think about is as larvae develop, especially within the female phenotype, you can get queens or workers. A lot of this is dictated by nutrition. You and your colleagues looked at not necessarily how nutrition leads to caste differentiation, but rather how nutrition availability and nutritional quality as developing bees downstream impacts their ability to handle viruses. So if you don't mind, for our listeners, if you could set the stage about this, about how nutritional environments in general in developing animals can shape their adult phenotypes? What does all of this mean? And then could you introduce us a little bit to the research that you did, using this particular premise to jump from?

Guest 03:42
Sure. Well, in lots of living organisms, early life environment have these long-reaching effects. We know that from humans. Certain diets that we have, or various stresses that we may experience while we're really, really young can affect our development, can affect our behavior for our lives, and can affect our health, and this is true in most organisms. But in honey bees, as you pointed out, we really know just how important larval nutrition is to the entire organization of the colony. As you both pointed out larval nutrition is what determines whether you wind up with a queen or a worker. So that's one really drastic way that early life nutrition has these long-lasting effects. But it's sort of stood to reason that more subtle differences in larval nutrition would also have lifelong effects on adult phenotype, including the various things that I study, which include behavior and also health. So that was right when we wanted to ask questions about, how do we wind up with differences in adult health. Well, nutrition at the larval stage seemed like a really good place to start looking because everybody who studies honey bees already understands that nutrition is so important to adult phenotype because of our queen/worker differences. So what we went about investigating was these more subtle differences, ones where you will wind up with differences in nutrition at the larval stage where the adults don't actually look that different. Those differences in the nutrition they received as larvae are somewhat subtle, so you wind up with pretty healthy-looking adult honey bees and normal-looking honey bees, but what's happened is there were some sub-lethal effects that differences in nutrition caused that will then be more obvious when those honey bee adults are faced with other kinds of stressors, including the ones that we looked at, which were viral infection. When faced with viral infection, the honey bees that had a somewhat less good of a larval diet, were less set up to be able to fight off that infection as an adult.

Amy 05:52

Yeah. That's really interesting. I'm trying to think of how you set up your research project and what that actually looked like. Can you discuss the method for, I guess, what you were feeding the bees? And then, how did you infect them? Was this all done in the laboratory? What was your overall method in looking at viral or disease resistance and these adult workers?

Guest 06:14
Sure, well, we looked at two different ways of examining differences in nutritional input that the larvae received. One was we cut off their access to nurse bees for a small amount of time -- well, small to us, but probably pretty large to a honey bee. What we did was we took frames of brood that were all the same age, and I just brushed all the nurse bees off the frame, and then I used wire mesh cages to just push into the wax. And what that does is prevents nurses from being able to get their heads into those cells and feed those larvae. But it doesn't prevent them from still getting any other kinds of signals that might be floating around to the colonies such as pheromones or thermoregulatory type of things. But what it does do is prevent nurses from accessing those developing larvae. And so we just cut them off from nurse input for 10 hours right before they close, right before they start pupating. And so this was like a temporary starvation period that these bees experienced. And then after those 10 hours, we removed the cages. And this is right at their life stage where they're about to start pupating. So at the end of these 10 hours, they wouldn't accept food anyway. So nurses couldn't come in and compensate for the 10 hours that those larvae didn't receive food. So they begin to pupate, and then we just come back later when those bees are going to emerge as adults and remove those frames from the hive once more and let them emerge in an incubator in the lab. And then we have these adult bees now that had experienced nutritional restriction when they were larvae. Then, we, of course, take regular normal bees that on those same frames I only blocked access to nurses from half the size of that frame. So the other half of the developing larvae had normal regular larvae life. And then we put those in cages. Those adult bees now are in plexiglass cages in the laboratory. And in the laboratory, we are able to inoculate them with viruses we have. We have the viruses, and we just feed it to them in sugar water, and then we measure mortality, we measured whether the infection took, we measured the actual amount of virus that was in the adult workers after this experiment, and we also looked at the expression of various genes that we know are related to immune function.

Amy 08:39
So can I ask you what viruses you guys looked at specifically, and how you looked at the viruses?

Guest 08:45
Yeah, for this particular study, we were interested in IAPV, the Israeli acute paralysis virus. And the way that we measured the virus amount is you take the adult bees at the end of the experiment, you sample them, you put them in the freezer, and then, what we do is we take a pool of those bees, now dead bees, and we grind them up in liquid nitrogen, and that turns them into this like bee dust, bee powder. Then from that bee powder, we can extract all the genomic material out of that bee powder that includes all the transcripted expression of the honey bee, but also anything else that's living on or in that bee, which includes viruses. So we use molecular techniques in the lab to quantify the actual number of virus genomes that were present in the bees. So we have an actual count, essentially, of

how many viruses were present in the bees. And as you might expect, the ones that we artificially infected with IAPV had a whole lot more virus than the ones that we didn't infect with IAPV.

Jamie 09:50
So yeah, I mean, you just mentioned a little bit of a result that you've got there. Could you elaborate and tell us what did you guys find with this design? I mean, you looked at mortality, you looked at all of these types of parameters. So, what did you end up publishing about in your paper?

Guest 10:04
Sure. So what we found was that nutrition and viruses are these two stressors that can affect honey bees. And when they're working in tandem with each other, they can really be a problem for the honey bee. And so what we found was that there was an effect on mortality of getting a poor diet, and there was an effect of mortality of being artificially inoculated with viruses. But there was a real high increase in the workers that had both of these happen, if they were, as larvae, set up for failure by having been temporarily starved when they were adults, and they were then challenged with this new stressor, which is larval infection, then they died at an even higher rate. And so as we had expected, and as you might expect as well, the interaction of these two stressors can make mortality risk much higher. These bees are, like I said, set up for failure when they've gone through this period of nutritional deprivation. Yeah, so that was what happens with temporary starvation, which is something that can happen in the field as well. I mean, honey bee colonies can experience droughts, or they can experience being moved around and going through periods where the colony isn't getting good nutrition, and that can wind up downstream affecting the larvae in the colony. We also looked at another method I didn't mention earlier in the same experiment, in addition to looking at this cut off from access to nurses, which created this temporary starvation, we also were interested in, what about just if a honey bee colony only gets one type of pollen, or they have a limited amount of diversity, and the sort of pollen that is being brought into the colony, maybe they're getting poor-quality pollen, or they're not having a very round meal over a long amount of time versus that temporary period of starvation. What about if there was this chronic low-quality pollen that was coming into a hive? How would that affect the developing larvae? And so that was a little bit more complicated of an experiment in which we had experimental nuc colonies that were cut off from access to bringing in their own pollen because we put pollen traps on the entrances, and then I just artificially put set amounts of one species of pollen directly into the comb. And so that way, the colony was only receiving a single type of pollen, and they either received, depending on which group in the experiment the colonies were in, they either got a low-quality pollen, or they got sort of a high-quality pollen. So larvae then existed their whole lives, their whole larval lives within colonies that were just receiving one type of pollen. And then we waited again till those larvae grew to adults, and did the same sorts of stuff where we put them in cages, and we inoculated them with viruses. And we saw somewhat similar results as with the temporary starvation with the chronic larval diet changes in quality. We saw that mortality was really affected by this combination, again, a virus and poor quality. That wasn't necessarily obvious if we just looked at bees that were reared in these two environments, but they weren't challenged with viruses. We didn't necessarily see a big difference in their mortality. But once they were faced with a second challenge of viral infection, the ones who had been in this poor quality environment suddenly had a much less chance of survival.

Amy 13:27
I feel like I have so many questions for you because something that Dr. Ellis and I discuss pretty often is the Bee Informed Partnership and all of the stressors that honey bees have, and of course, Varroa and the viruses that they spread as well as poor nutrition. Those are kind of the two, I would say, along with queen stressors, they're kind of the top stressors of honey bee colonies. And so I think it's really neat that you're studying both of those things. So you're talking about low-quality pollen or high-quality pollen and putting that pollen directly into the comb. So were you actually collecting actual pollen? How did you decide what low-quality or high-quality pollen was and what was it actual pollen? Or was it like a pollen substitute?

Guest 14:13
Yeah, we used actual pollen that we bought from France. And this is just bee-collected pollen. We happened to buy it from France but there are people around the world who sell pollen that is specific to specific plants because the bees are all going and foraging on a single monoculture, some sort of bloom at that time. And so the pollen that they're bringing in is all from one species, and we just selected quality based on previous research. So previous studies had examined the nutritional content of various pollens, including like amino acid content and other aspects. We just used the previous research to inform which pollens we selected as our high quality and our low quality and so the pollens that we use were chestnut as our high-quality pollen and rock rose as our low-quality pollen. That was, again, just based on other people's previous research about the nutritional value of those pollens and then yeah, we just buy it from a store. It's bee pollen, it's in those little pellets that come from the corbicula of bees as they walk through pollen traps when entering the hive. And so I just took that pollen, which is pure, which is real pollen, not a pollen substitute, and I measured out specific amounts and I just shoved it right into the comb. So it was as if I had been a forager myself and I was bringing back pollen to the colony and unloading it right into the wax cells.

Jamie 15:35
So, Alex, it's really neat to hear this because when we think about nutrition, let's just think about it from a human perspective, right? When we eat poorly, etc, we tend to have a lot of problems ourselves. And I know as someone who educates folks about bees quite a bit, I'm always talking about how important diet is to adult bees, etc. But we also did a lot of tox work in the lab, and I have some sneaky suspicions that as bees develop in environments that have pesticides in them, it likely impacts their behavior or virus susceptibility, etc, as adult bees. And so you guys essentially took another route, but kind of under the same mindset that during development, if there are nutritional issues, maybe there are downstream issues of longevity for the adults or virus handling capacity of the adults. We've had people on the podcast who talked about temperature stress, while bees are developing and how that might impact them. So I really think you guys and others are really here at the tip of the iceberg where we start understanding how incredibly important larval nutrition is to the health of the colony, combating all kinds of stressors downstream. So kind of with that summary statement, Alex, I'm wondering, what do you guys think that your research means for beekeepers? What are some take-home messages from them? And what are some management applications that might come out of what you guys found?

Guest 17:05
Yeah, well, first, to quickly comment on what you said about the importance of these early life nutritional effects as having these multiple effects on adult phenotype, not just health, but also behavior, I also study how larval nutrition affects adult behavior. I did these using these bees from the same experiments. I also looked at some other behaviors in a different study. And interestingly, I found that when honey bees faced larval starvation when they're temporarily removed from access to nurse bees, they grow up to be adults, that again, look somewhat normal, they have higher susceptibility of viruses. Another thing that they have is they have a higher response to queen pheromone. The larvally stressed workers are more responsive to queen pheromone. And that's one of the interesting findings I found because I'm interested in what are some of the things that maintain the extremely cooperative behaviors that honey bee workers do. And one of the real most cooperative behaviors they do is take care of the queen at the behest of their own health, they'll respond to the queen and her needs as primary. And so we found that larval nutritional environment determines, in part, how responsive they are to the queen herself once they're adults. So that was a really interesting finding. As far as implications for beekeepers, it's really to not forget about the importance of what the larvae are experiencing, as well as the adults. I think we often think about nutrition when we're thinking about adult survival. We're thinking about overwintering, we're making sure they have enough food that they can survive the winter, those are all adult bees. So it's important not to forget that the larvae, during the times of year when larvae are being produced, they're extra sensitive to nutritional differences and nutritional challenges and to be aware it's important that just like humans and other animals, honey bees get high-quality and diverse diets to make sure that they're getting all the essential amino acids and micronutrients and macronutrients that they need to be healthy adult bees. And just because we would expect that a colony that got really, really poor nutrition, you'd see massive die-offs or you would have really poor larval survival, you'd have shotgun patterning or something and that would be really obvious to you that larvae were dying. But what we're showing here is that might not be obvious. They may be getting poor nutrition, and you can't tell because it's not killing the bees. What will kill the bees is if they're then faced with additional stressors, such as viral infection, and the way that beekeeping is these days, there's no way to avoid a lot of these extra stressors like pesticides, like viral infection. Thanks to the Varroa mite, they have all these added challenges to their immune system. And so it's really just important to remember that the larvae are really, potentially, the most susceptible individuals in the colony.

Amy 20:06
Yeah, it seems. That's a lot of great, great, great information. Thank you so much. Is there anything else that you wanted to add, anything that you wanted to share with our listeners?

Guest 20:16
Yeah, well, I have a little plug for another insect. I know that people who listen to this podcast are mostly people who are interested in honey bees. But I also want to shout out paper wasps, which is another organism that I study and I think that they don't get enough love. But I think if anyone could give them love it would be beekeepers, and people interested in bees already have gotten over the fear of being stung by insects. And so I just want to promote the paper wasp as an organism to think about. They have really interesting social lives, and they have facial recognition, the species I study anyway,

they recognize each other's faces, and they remember who each individual in their colony is based on their face. And so when it comes to that time of year when you see those wasp nests being built around your house, I would say think about it twice before you knock it over because that's a nice little family of wasps that are just trying to make their way through the world.

Amy 21:10
That is something I will take into consideration. We have lots of paper wasps around our house. So nice. I may call you the next time we think we have an issue and maybe you can calm me down a little bit.

Guest 21:21
Okay, yeah, gladly.

Amy 21:22
All right. Well, everyone that was Dr. Alex Walton, a postdoctoral research associate in the Department of Ecology, Evolution, and Organismal Biology at Iowa State University in Ames, Iowa. He's also co-advised at Cornell University in the Department of Neurobiology and Behavior. Thank you so much for listening to this episode of Two Bees in a Podcast.

Stump The Chump 21:52
It's everybody's favorite game show, Stump the Chump.

Amy 22:05
Hello, everybody. Welcome back to the question and answer segment. Jaime, the first question that I have for you today, someone is asking about raising queens. And so they're wanting to know which colonies they should graft from. So it's a two-part question. The first part is which colonies should they graft from? And then what are some advantages and disadvantages of raising your own queen?

Jamie 22:29
Sure. So I'll take the first question. First, how do you choose which colony from which to graft to make queens? So it's all the stuff that you might imagine, right? You would pick a colony that's productive, right? You don't want an underperformer because you might bring those traits into the queens that you're grafting. So you want a colony that's very productive, that really had a good season, made a lot of honey, was a strong colony, etc. You also want to make sure it has some of the behavioral attributes that you like, for example, are they really defensive? In other words, are you going to get stung a lot? Or do they have a pleasant demeanor, quite docile, in which case, they won't be nearly as bad to work? And I would also focus heavily on disease and pest resistance. Do they show evidence of being disease and pest resistant? Let me broaden that just a little bit to tell you how to accomplish this. Yyou can't just do this based on, quote, how good things looked last year. To me, if you are producing queens, you must measure these colony attributes so that you know that what you think you're seeing is actually real. Let me give you an example. Let's just say you have 50 colonies and you're trying to choose the one from which to graft. You would measure honey productivity in all 50 so that you actually have some concrete number to compare. Colonies 1, 17, and 50 were the best producers. So that

might be one criterion. You could also do defensive tests. When I work these colonies, I'm always getting stung, I've kept notes about that, I don't want to bring that stock further into my operation. With disease and pest resistance, you need to do assays to determine that they are in fact disease and pest resistant. The most notable of those, of course, is the hygienic assay. You could do hygienic behavior testing on colonies relatively simply to see what their hygienic score is. And so you do things like how productive were they, did they swarm a lot, how nice were they, and do they have hygienic behavior? And again, you don't want to do these subjectively. You want to measure these things, score your colonies, and then move forward the subset from which to graft. I mean, if you've only got 10 colonies, you might feel comfortable eyeballing it, but I wouldn't do that. I would score these things with actual numbers that you can put on paper. And how I would do that is, you and I are recording this podcast here at the beginning of 2022, so I would go all the way through 2022 and see how the colonies that I have performed. I'd take notes on them, and then the winning colonies are the colonies from which I would graft at the beginning of 2023. So the questioner also asked, what are some advantages and disadvantages of raising your own queen? Well, some of the advantages over the long term are cost. You're not having to buy $30 to $40 to $50 queens. On the other hand, it's not necessarily free, because you have to take the time to do it, you have to have mating nucs and do the starter colonies and all the stuff involved with making the process happen. But another advantage is better control. You control the stock, you control the mother queen from what you're grafting, you control the colonies that are producing drones, and you control the attributes that you want. And if you do it well, another advantage is you can make surplus money if you produce extra queens every year because you can sell those queens to beekeepers in your area. But there are, of course, some disadvantages. It can take lots of time and work, right? It's not a process that you just flip the switch and out come queens. You have to graft, you have to move them between colonies of different types, the queens have to mate successfully, etc. Secondly, the process isn't foolproof. It takes time to learn how to graft and be successful with it. It takes time to learn how to set up the operation and manage it appropriately so that you're predictably getting a known number of queens. For every 100 cells you graft, how many successfully mated queens do you get out of that? So the process isn't foolproof. And I would ask, what is your backup plan, finally, if the system melts down? What do I mean by meltdown? Well, I'm from Georgia in the US, and I started working with commercial beekeepers a lot around 1996 to 2000 when small hive beetles had come into the US and were a really big deal. So a lot of queen breeders in Georgia and in the southeastern US where small hive beetles were, were significantly struggling with beetles taking out their mating nucs and things like that. So if you have a meltdown, you got 100 mating nucs out there, and all the nucs cash in their chips, so there's a beetle problem that runs through them, what is your backup plan? I think when I retire from academia someday I plan to dabble in making my own queens, because I love the idea, the art of it. But it comes with some drawbacks as well. So I hope everything I've said helps point you in the right direction. It's fun for a lot of beekeepers to try but there's work involved. But it can be very rewarding.

Amy 27:40
I was actually at the American Beekeeping Federation in Vegas, just last month, in January 2022. There was a lot of talk about queen breeding and there were quite a few queen breeders there. So it's just really interesting to hear the whole process and what they need to do in order to acknowledge some of the challenges that they have.

Jamie 28:01
Yeah, I mean, Amy, if you're going to do it on a small scale, like, as a hobbyist, there are easier ways to do it than maybe some of the ways I've described in the past. But if you're going to do it meaningfully and right, it takes skill and time, but it could pay big dividends. If you're doing it only to requeen your colonies and you've got 10 or 12 colonies, you may not go into formal queen production, but if you're doing it with a nod towards, "Hey, I only need 20 but if I produce 50 or 100, maybe I can sell some," then it starts to get attractive, like producing honey, pollinating crops, it's got some value.

Amy 28:33
Well, they were kind of joking around with each other because I think one of them had purchased queens from the other. And the one that was actually breeding queens, he was like, basically, "Pull all the strongest queens, I keep them for myself, and then I sell the rest of them off to you." And he's like, "Great, great. Now I'm stuck with these queens." They're still good, but they were joking around. Alright, for a second question, it actually is still related to queen breeding. And so this person's asking if it's possible that they don't have a drone congregation area nearby. This person's in a rural area. They have managed bees, but they're not sure if there are any other managed honey bees in that space. I guess, one, is it possible that someone could not have a drone congregation area? And then, two, maybe we can talk about what to do to have more drones in your area?

Jamie 29:30
Yeah, so the way that I would answer this question is if you have colonies with drones, then the drones from your colonies are at DCAs around your colonies. So I think a lot of motivation behind this question is if I'm the only show in town, though, is there a chance that my drone congregation areas are depleted or not as robust as they could otherwise be? So for the purposes of all listeners, for the benefit of all the listeners out there, drone congregation areas are areas out there, out in the wild, where drone honey bees congregate waiting for virgin queens to fly through so that they can mate with those queens. A DCA, a drone congregation area, inherits drones from all the colonies in the area, not just your colonies. So as your virgin queens are being produced, and they're flying through these DCAS, they're not just being exposed to drones from your colonies, they're also being exposed to drones from feral colonies, maybe other managed colonies, etc. But in this particular case, if you truly are the only show in town, there are no beekeepers anywhere around you and there's low or no density of feral colonies, then at the very least, your colonies are contributing drones to DCAs that they themselves are composing out there around your colonies. And long as you have a reasonable number of colonies, say 10 or more, then the DCAs are probably firmly established and absolutely okay. I wouldn't worry about it too much. The only time I'd worry about it is if I was allowing my colonies to requeen themselves and I noticed a significant decrease in queen quality. Maybe they were running out of semen earlier, maybe they were drone layers, there's some evidence that queens aren't adequately mating. If, though, your queens are adequately mating and colonies otherwise seem to be good, and you know your colonies are producing drones and you can feel reasonably good about there being DCAs of sufficient size out there for your virgin queens to mate with when the time comes.

Amy 31:32

Alright, so for our third question for the Q&A segment, this person is asking about how to recognize robbing. Honey bees rob each other, they rob for resources and so this person is asking what should they look for specifically to know if robbing is actually happening or if it's just some other behavior that the honey bees are doing?

Jamie 31:51
Amy, I love this question. I don't think I've ever given a talk on robbing. I've given talks on so many other things. We've written a document on robbing. In fact, Amy, we need to make sure to link that document in the show notes about honey bee robbing behavior. But the reason I like it is because every beekeeper is going to see robbing around his or her colonies at some point in their beekeeping career. So how do you know that it's robbing and not just normal bee behavior? So let me give you a couple of clues. Number one, generally speaking, if it's not robbing, it's a very purposeful flight. Let me zoom you in and paint a picture for a single colony. In this colony, if bees are going uninterrupted in and out the entrance of the hive, it looks purposeful, they're going in with no problem, they're being allowed to go in by guard bees, there doesn't appear to be any fighting at the nest entrance, it's just bees coming in, that is more likely than not normal foraging or homing behavior, normal flight behavior. Robbing, on the other hand, you'll start to see bees trying to get into the hive in areas that are not just the entrance. So when I see robbing, you'll see it a lot, first, at the entrance of the hive, but it's not uninterrupted flight, it's not uninterrupted access to the hive, there are scuffles at the nest entrance, there's a little bit of fighting, bees seem to be attacking one another, the flight is often not as straight as a foraging flight would be, they're kind of hovering around trying to pick their entrance. But I don't even use that as the sole indicator. That's almost always accompanied by bees also trying to find a way into the nest that's not the entrance. So you'll see bees hovering around the seams between two boxes between your brood box and the next honey super. You'll see them flying around just around where the lid of the hive meets the uppermost super. You'll see them kind of flying around underneath the hive all together. So anytime bees seem to be trying to get into a hive in an area that is not the entrance, and that is coupled with enhanced bee aggression or defensiveness at the nest entrance or fighting at the nest entrance, I think robbing is starting to happen. When it gets really big and really bad you'll actually have clusters of bees hanging on the joints of hives as if they're trying to get in and it's just like a feeding frenzy like what you would see in a documentary where sharks are attacking fish. Another good indicator of robbing is anytime you see lots and lots of bees on external hive feeders. For example, in the US, where we do this podcast, it's common for a lot of commercial beekeepers to feed their bees through the lid of their colony, the lid of their hive, so the lid will have a hole cut in it, that hole accommodates a glass jar that is inverted with its lid on into that hole. And anytime you see bees gathering on the jar or around that jar and that's coupled with bees trying to get in different joints around the hive, all of those are indicators of robbing. The last indicator of robbing, well two last indicators of robbing, are number one, is it happening at a time of the year when resources are otherwise scarce? So I don't see robbing as much in spring. I see it all the time in late summer, early fall. So is what I'm seeing coupled with normal resource scarcity? In other words, usually late summer or early fall. And finally, as I work colonies, do bees seem to be following me from colony to colony? Because in robbing season when you have a hive open, it attracts bees from all the other colonies. When you put that hive back together you see bees doing everything I just told you, trying to get into the cracks, trying to go up under the lid, trying to fly under the hive, and when I open the next colony, as

I go to colony to colony to colony, am I attracting more and more and more bees that are going around with me? All of these things collectively suggest to me that robbing is happening.

Amy 36:19
I receive emails all the time of people who say that they have hummingbird feeders out and there are just honey bees all over it. By putting a hummingbird feeder out there with sugar water in these feeders, do you feel like that actually increases the amount of robbing that happens or it teaches those honey bees to rob or what are your thoughts on that?

Jamie 36:42
So, Amy, what I would argue is in the non-resource season, again, let's think about that, in spring there are a lot of resources available to bees so robbing is pretty minimal, but in the non-resource season, a lot of things can trigger robbing. Opening weak colonies, putting out sugar substances that bees just start kind of getting into a worked-up frenzy over. Another thing that is a major no-no in robbing season is if you are feeding bees during robbing season, you can't spill any sugar syrup outside of the hive. If you're feeding with jars on the entrance of the hive or through the lid of the hive, that thing cannot be sticky. It cannot have sugar water dribbling down the side anywhere. So back to your bird feeder example, I've also seen bees at hummingbird feeders. A lot of hummingbird feeders are designed in a way that they're much too deep for the bees to access the sugar water. Their tongues aren't long enough but the hummingbird's beak is. So if you're seeing a lot of honey bees on hummingbird feeders, you probably got one that's allowing sugar water to come right to the edge or they've gotten sticky in the process of you filling them and bees are just attracted to that residual sticky. So in robbing season, you don't want anything sticky out there because once you get them going, they really get going.

Amy 38:06
Yeah, I've seen videos of bees all over the place when there are low resources.

Jamie 38:13
Yeah, Amy. I mean, I've seen it so bad that they're congregating on the joints of the hive. And since they don't have a lot to hold on to, the whole cluster will just fall off. A normal next question is, well, what do I do about robbing behavior? Well, you've got to close every gap in that hive and only leave a couple centimeter entrance to where one or two bees can go through that hive so that the bees in that hive can defend it. You've got to keep every colony as strong as possible so they can throw it off robbing. You've got to make sure there's no sticky anything. You don't throw out a piece of comb, you don't have sticky feeders, and you've got to make sure if colonies are weak that you condense them down so that the bees can protect themselves better. And I will tell you, you've got to really limit the amount of time you spend in colonies during robbing season because what happens is they'll pick on that weak colony and it will be relentless. And once they're done with it, they'll move on to the next one. So it can be quite bad.

Amy 39:07

Alright, so those are our questions and answers for today. Don't forget, if you have questions for us, feel free to contact us by emailing us or visiting our Facebook, Twitter, or Instagram. We'll, hopefully, be able to put it on our Q&A segment but we are excited to see your questions.

Serra Sowers 39:28
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.