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SPEAKERS

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

Jamie 00:10
Welcome to Two Bees in a Podcast brought to you by the Honey Bee Research Extension Laboratory at the University of Florida's Institute of Food and Agricultural Sciences. It is our goal to advance the understanding of honey bees and beekeeping, grow the beekeeping community and improve the health of honey bees everywhere. In this podcast, you'll hear research updates, beekeeping management practices discussed and advice on beekeeping from our resident experts, beekeepers, scientists and other program guests. Join us for today's program. And thank you for listening to Two Bees in a Podcast. Hello, everyone and welcome to another segment of Two Bees in a Podcast. We are honored to be joined in this episode by Dr. Reed Johnson. Reed's been with us before. He's an associate professor in the Department of Entomology at The Ohio State University. Anytime I have difficult questions about pesticides and their impacts on bees, I will pass them to Reed. Reed is here to talk to us about a paper that he and his team recently published, we'll make sure to link the manuscript in our show notes. But the title of the paper is "Pollen Treated with a Combination of Agro-Chemicals Commonly Applied During Almond Bloom Reduces the Emergence Rate and Longevity of Honey Bee Queen." So essentially, we're going to be chatting with Reed about how pesticide impacts could affect downstream emergence of queens, maybe even some other parameters associated with their productivity, etc. So Reed, thank you so much for joining us on Two Bees in a Podcast.

Guest 01:44
Thanks, Jamie. Glad to be with you, again, here.

Jamie 01:46
So, Reed, I know we had you before and the last time we had you we asked you to introduce yourself a little bit about your background. Maybe, you don't have to go into super detail, but just could you remind the readers how you got into bees and what you do at The Ohio State University?

Guest 02:01
So I got started in bees back in the late 1990s. I grew up in Montana and got a summer undergrad research job working for Dr. Jerry Bromenshenk at the University of Montana, just doing bee stuff. It

was a bee wrangler, was what he called us being in Montana. And then I went on to University of Illinois where I got a PhD working on the honey bee genome and kind of bee toxicogenomics and ended up here at Ohio State in 2011. And I teach a course in beekeeping here, do honey bee research. And I also teach a course in or co-teach a course in pesticide science. So pesticides and bees are a real main interest of mine.

Amy 02:43
Yeah, I'm really excited to discuss the paper of the manuscript that you all published just recently. Jamie and I, we've started a little luncheon. So our graduate students, postdocs, and other members of the lab are able to go through and read publications. And so you all looked at pollen treated with chemicals. So these are chemicals that are normally applied during the almond blooms in California. Of course, many of our commercial beekeepers bring their bees out to almonds. And so can you tell us just a little bit more about the history and background of this project.

Guest 03:17
So I first got into concerns about the effects of pesticides applied to almonds during bloom, really through Project Apis M. and the California queen breeders group. This was back in 2012, just after I started here at Ohio State. They were seeing problems with queen development, a lot of queen cell failure right, during, and really immediately after almond bloom. And they connected that with some sort of pesticide application that was going on during almond bloom and that was somehow harming the development of the queens and their cell builders. And they didn't know what it was, there were a lot of people pointing fingers at various different pesticides but I was brought in and did an experiment with an undergrad here at Ohio State. We went out to California, worked with the Coenens and we identified that the pristine, the fungicide that many were blaming on these queen developmental failures was not actually, we couldn't find that it caused queens to fail to develop even at very high concentrations. It was actually an insecticide, Diflubenzuron, or Dimilin, which surprising to everybody, was actually being applied to almonds during bloom. And that it's actually this insecticide that was probably responsible for much of the queen failure or queen cell failure that they were observing at that time. So this was quite a while ago, and we were concerned so we had a nice answer there Dimilin was a likely culprit for causing these queen developmental problems. But we, there's a lot of other pesticides that are applied to almonds and we certainly did not answer the question if other pesticides or particularly pesticide combinations might be having, you know, causing some of these queen developmental effects that were being observed, so that that's really where this study came in. We decided we could do this here in Ohio and didn't have to travel to California anymore to do our queen-rearing. And we tested some different pesticides that we had not previously tested, we use the Diflubenzuron again as a positive control because it really has profound effects on queen development when delivered in pollen, but we also were interested in the insecticide Altacor, which has the active ingredient chlorantraniliprole, and the fungicide, propiconazole, which is in, Tilt is the trade name. And then as well as the adjuvants, we found one spray adjuvant that we've included in this study called Dynamic. It's one of the most widely used spray adjuvants, which is adjuvants are just to improve the handling characteristics and efficacy of the pesticides when they're applied. So we mix these all together and tested them on on our queen assay just to see if together or alone, these other other compounds would have effects on queen development, like we had found previously with Diflubenzuron or Dimilin.

Jamie 06:23
One of the things, Reed, that I was listening to you talk, all of those active ingredients just kind of roll off your tongue, you're like really good at saying all those things. To me, the longer, more complicated, the active ingredient name, the more I butcher it, but you just sound like a pro there.

Guest 06:36
Oh, I practice in the mirror.

Jamie 06:38
You nailed it, buddy, so good job. So I want to talk specifically, so that's a great background for this project, and what I'd love to hear is about your experimental design. So you've got these compounds, you want to look at their effects on these queen-related parameters. I know that you administered these compounds to honey bees via pollen, and then you look kind of downstream at how that affected cell, queen cell growth and development, all these things. Could you tell our listeners how the project was set up? And kind of about the methods that you use to to address the questions that you're asking?

Guest 07:14
Yeah, so how do you get a pesticide to a developing queen is really the question. And basically, how do you get it to a queen in a way that kind of mimics what's happening out in the field and in an almond orchard? And we arrived at a method where we contaminate pollen that's fed to one of these swarm boxes, that's building queen cells. We don't apply it to the queen larvae directly. It is an indirect treatment, we provide the nurse bees that are in those boxes, and these are closed boxes. So these nurse bees have no access with outside forage, if they want to eat pollen, they're going to have to eat the pollen that we're providing. And these nurse bees feed on the contaminated pollen process that pollen and feed the queens that are in their royal jelly. Presumably with any sort of filtering or whatever effect is going on inside those nurse bees is occurring. And then some of this pesticide will end up in that royal jelly that is fed to the queens. And so we've locked these bees and these queen cells in these boxes for four days, which is about as long as you can get away with and still get good, I mean, that's how long queen development takes before they're capped anyway. But that's as long as we can keep them in there. And then we just looked at the queen, survival, how many of these queens actually made it to capping? And then we followed them after adult emergence looking to see how many of those, how long did those adult queens survive over the subsequent week or seven days?

Amy 08:51
So this is like, this is the big question. So what were the results of this study?

Guest 08:56
Well, number one, I guess getting back to this question of, how do you treat a queen larva? So we did a chemical analysis on the pollen, on the nurse bees themselves, and on the royal jelly that those nurse bees were producing. And you get a really great decrease in the concentration of the pesticide moving from pollen to nurse bee to royal jelly. It's just a fraction of a percent of the original concentration that's present by the time you get to the royal jelly, but it is present and it is detectable. And then the effects of that exposure: we found again that Diflubenzuron, or the active ingredient in this Dimilin product had a really profound effect on development of the queen cells and their survival to seven days after

emergence. And we also found that a comb- one of these combination treatments, the combination of Altacor as the insecticide, Tilt as the fungicide, and this spray adjuvant dynamic, that combination together also decreased the cell capping and eventual adult emergence in these shaker boxes were fed with pollen treated with those three compounds.

Amy 10:14
Okay, so Reed, I was just wondering, so do you think that the residues in the royal jelly, do you think that account for the impacts that you're seeing on the developing queens? Or what else could be happening?

Guest 10:28
Well, I mean, I think that's the simplest explanation. I mean, there is pesticide in the royal jelly that these nurseries are producing. The concentrations are low or greatly lower than was in the pollen to begin with. And, I mean, the simplest explanation is that even that low level of pesticide exposure is having direct effects on the development of these queens. I think that's particularly true with Diflubenzuron, which has a known toxicity to developing insects. So it makes a lot of sense that that's direct toxicity there to the developing queens for the Dimilin product. But for the combination of Tilt, Altacor, and Dynamic, we don't really have a good understanding of why that would be harming queens, we just observed that it does in this study. And it certainly could be from the concentrations that are present in that royal jelly. It also could be indirect effect because the nurse bees are consuming this contaminated pollen, and the nurse bees actually have a fairly substantial concentration of these, these pesticides in them. And it could be that by consuming these pesticides, it's changing the physiology or the behavior of these nurse bees in some way so that they're not as able to rear healthy queen larvae, and the real effect is on the nurses and not necessarily on the queens. We can't really disentangle that with the study that we've done so far.

Amy 11:55
Right. I was about to say, it's really quite amazing what they figured out to make sure that the queen is just as healthy as she could be. I mean, it's the nurse bees just taking one for the team basically, at that point, which is kind of cool to see.

Guest 12:10
Yeah I mean, those nurse bees, I mean, what's really amazing is that these nurse bees are acting as filters and appeared to be removing a large amount of the pesticide that is in their bodies. They are not secreting that concentration of pesticide into the royal jelly. So they are taking one for the team. And it's probably true for worker larvae as well, that they may be getting this filtered food provided by the nurse bees that are filtering out these toxic constituents that might be in the pollen to protect these larvae, queen or, potentially, worker as well.

Jamie 12:46
Reed, every time I interview scientists on our podcast, it gives me 1000 more questions. I mean, I'm just sitting here listening to you and Amy talk about that and the filtering. But it's interesting because workers and drones potentially have a high route of exposure because so much nectar and pollen ultimately get mixed into their diets in later days. I mean, they're getting it directly in their diet. Whereas

the queen, of course, feeds principally on the secretions of worker bees throughout their development. And I've always wondered, well, why is it that two of the bees get pollen and nectar but the queens don't? Who knows what the reason is, but part of it could just be that it's an added layer of buffer for queens to get their diet exclusively from workers' secretions as that filter. I mean, obviously, that's just speculation, but it just leads to, gosh, so many questions, that would be fun to study. Well, great comments, great research. What I want to ask now, of course, is we've got beekeepers listening to us from all around the world. What are some take-home messages that you have for beekeepers, and in this particular case, you have an example of bees being moved to almonds for pollination purposes. And of course, almonds aren't grown all around the world. So, there are broader implications that your research may have, especially with regard to beekeeper-grower dynamics. Anytime beekeepers are moving their bees for the purposes of pollination, maybe what are some things that they need to think about, based on the type of research that you published in this manuscript with your colleagues?

Guest 14:14
Well, I mean, pesticides are a concern, and particularly combinations of pesticides might have toxicity that is not exhibited by individual pesticides. So I think this mixture toxicity remains a serious concern. But that being said, I mean, particularly in almonds, and probably in many other crops, I think the focus really should remain on the insecticides. I mean, the insecticides are known to affect insects like honey bees. So it's no surprise to see that that you know the mixture that included an insecticide, this Altacor as well as the Diflubenzuron, another insecticide, those both had effects on bee developments. Not to exonerate the fungicides and other agro chemicals that might be applied but I think when you're concerned about pesticide application, I think insecticides should be top of mind. And these others, while they may have negative effects, it's unlikely that they're going to be as profound in their effects on bees as the insecticides have the potential to be.

Amy 15:25
So it seems like there are many, many questions and many ways that we could move forward with research. So what specifically what follow-up research do you have planned next, what is the next step?

Guest 15:37
We're especially interested in the adjuvants and the role or the presence of different spray adjuvants can play in the toxicity of these pesticides to bees. So we're looking at a range of other adjuvants outside of just Dynamic and trying to see if they have effects on queens. We're planning that for the summer, but also on adult workers. And hopefully, we'll get some larval-rearing assays to work as well to test the effect of kind of a broader suite of these adjuvants and their ability to interact with other pesticides and cause bee toxicity.

Amy 16:17
Can you tell us just real quickly what adjuvants are?

Guest 16:20
So adjuvants, Dynamic is the adjuvant that we used in the study that we just talked about here. These are a broad class of agrochemicals that are added to a spray or to improve the spray characteristics,

the sticking, the spreading, the penetration of that spray application. And there's a huge, huge number of them that are used in almonds, and presumably, you know, at all of agriculture, they're relatively lightly regulated. So there's not a great, I mean, there's essentially no testing that goes on for these compounds regarding bee safety. I mean, as a result, there's a whole bunch of different products out there that are very widely used and included in tank mixes that are applied on all number of crops.

Jamie 17:13
Reed, I want to follow up a little bit about adjuvant, surfactants, things like that. So I'm assuming you're using, essentially, the formulation, because a lot of these might be mixtures that maybe you're not allowed to even know what's what's in them, or how do you how do you approach adjuvant research, because I know especially with active ingredient research, you can just go purchase the active ingredient, you know what it is, you can calculate LC 50s, LD 50s, you can look at all these different things. But when you've got this adjuvant, it's oftentimes company privilege to know what's in it. So how do you kind of handle some of that?

Guest 17:48
Oh, this is a real roadblock that you've identified to doing work in the adjuvants that you can't know what's in the actual product. I mean, they do list the principal functioning agents on the label. But those are just kind of broad categories for the constituents that are in these adjuvants. You don't know the actual compounds that are present in these products. So that is a real roadblock to testing. Our approach is just to use the formulated adjuvants, and to try to get a broad suite of adjuvants, with different principal functioning agents listed on the label and try to kind of sift through that to see if we can find if any particular class of principal functioning agents, like the origin of silicones, or the ethoxylates, or something might be associated with increased toxicity, because yeah, getting the pure compounds is just is essentially impossible.

Jamie 18:46
Well, Reed, thank you so much for joining us. It's been a great interview, and really fun to talk to you about your research, and the stuff that you are doing to help protect these. I really appreciate your time.

Guest 18:56
Yeah, it was great to talk about talking about this research with you.

Jamie 18:59
And everyone out there listening, we're going to make sure and link this article in our show notes for this particular podcast, you can go and read the article, it's open access, that means that you can just read it at your leisure, click on the link, follow it, see everything you want to see about it. And if you have questions, you can reach out to Dr. Johnson all about it. So that was Dr. Reed Johnson, who's an associate professor in the Department of Entomology at The Ohio State University talking a little bit with us about how pesticide residues and pollen ultimately can impact queen developmental parameters. So thank you so much for joining us for this segment of Two Bees in a Podcast.

Amy 19:57

So that was really cool. I really liked Dr. Johnson. He's just so full of information it was cracking me up, Jamie, because as soon as he started talking about all the chemicals, and saying all the chemicals, I'm like, "This guy knows what he's talking about."

Jamie 20:10
Well, he does have a big background in honey bee toxicology. And I think that's of great value to beekeepers because that's what they need. They need someone who has a lot of experience understanding pesticide impacts on bees, and being able to set up really clever studies to address those issues.

Amy 20:24
Yeah, I mean, I guess like, sometimes I don't think about the pollen being treated with the chemicals. I mean, I guess that makes sense, right? Like, if you're out on a farm, and if you're taking care of your crops, I mean, you're applying something, whether it's insecticides, fungicides, herbicides, and so it was just really interesting that they took pollen, and they wanted to examine that.

Jamie 20:49
Yeah, I think the thing that really intrigued me most about the pollen link is this idea that bees are bringing in pollen, potentially, they're feeding on it. And even though it's being filtered through the workers, as Reed's mentioned multiple times.

Amy 21:02
That was so cool.

Jamie 21:03
Yeah, by the time it gets, even in low concentrations to the developing queens in the royal jelly, it still may be enough to impact their development further downstream. And is this example, exacerbated? Like with workers and drones, since they are fed pollen directly or nectar directly mixing with their food. But the EPA has this bee-Rex model that accounts for these types of exposures when they're doing their risk assessment. So this idea of pesticide impacts on bees is a really broad topic that's difficult to do well, but it's great to have folks like Reed and others who are looking at how to address this better.

Amy 21:40
Yeah, what is Bee-REX? I have no idea what that is.

Jamie 21:43
Yeah so the EPA, as part of their risk assessment process, let me let me back up and start over; anytime a new compound is registered for use somewhere on something, say on corn or citrus or whatever, the registrant, the company that's making the compound or owns the license for that compound has to take it through a tiered risk assessment to determine how risky this stuff is, to whatever target organism. So that the tiered risk assessment will inform the label. So as an example, if something is shown through this risk assessment to be highly toxic to bees, that will be reflected in the label on the pesticide, if it's got low toxicity to bees, or no toxicity to bees, then bees won't even be mentioned necessarily, on the product label because there's an incredibly low risk. And Bee-REX is a

model that helps individuals calculate risk. And it's usually based on exposure data, how much of these compounds are bees being exposed to in the field, as well as the LC or LD 50 data. So LC is lethal concentration. With the 50, it's lethal concentration that kills 50% of the population. And LD is lethal dose, that kills 50%. And I know this sounds like a technicality, but a dose is something that, with certainty, the bee was exposed to the whole amount. Whereas a concentration is something that you can only say was available, but you're not sure how much of it they were exposed to. So with the LD and LC and the residue data, then you can calculate risk. And so it's interesting to hear kind of how his project might even inform that downstream. What do you think about some of the messages for beekeepers kind of coming out of this topic? Yeah, I mean, I think that part of my job is to connect growers and beekeepers just to help all of the above. I feel like our food system is just a very complex system of, there's a fine line of, yeah, we need to eat, right, and but also, we need to help the honey bees and try to make them healthy. I mean, if I was a beekeeper, and I was a commercial beekeeper specifically sending my bees out to almonds, I would want to make sure that my bees were healthy. And so I think that just that conversation between beekeepers, and growers, or even beekeepers, with their brokers with their growers, I think is a huge thing. And I do know, like the California Almond Board does a really great job merging those two industries together. And so I really definitely see this, I see this research as ever, I mean, it's going to keep growing. And I think that's something that beekeepers have been looking at as well as just the effects on the queen specifically because, as you've mentioned plenty of times, the queen is the one because she survives the longest, she's the one that's exposed to everything right for the longest amount of time. So, she essentially gets maximum exposure. I mean, you've hit the nail on the head. I will tell you there's one more quick thing that I really liked about this particular project was the fact that Reed was branching out into adjuvants. And so for the benefit of our listeners, I'll try to keep this short. I could talk about pesticide impacts for days, but essentially you heard me say it, I was talking to Reed about active ingredients versus formulation. Let me give an example. Roundup is how most of the general public knows Glyphosate. Glyphosate is the active ingredient in Roundup, but it's sold as the formulation Roundup. Now, Roundup is not 100% glyphosate, it'll have a percentage glyphosate. That's the active ingredient that kills the weeds as an example, and then a percentage, inert ingredients, and these inert ingredients are adjuvants, or surfactants, or other things that helped the active ingredient, do better. So a lot of toxicology research is on exclusively the active ingredient, rather than the formulation. And it's the formulation that bees get exposed to in the field. So it's really neat, that Reed and others now are beginning to look at adjuvants and surfactants. And things like that and how they might further the impact of the active or by themselves have an impact on bees.

Amy 26:03
Right? Well, I'm really excited to see what future research they come out with. Once they start bringing, publishing more papers and publishing a lot of their research full we'll have to bring him back in.

Stump The Chump 26:20
It's everybody's favorite game show, Stump the Chump.

Amy 26:32
We are at the question and answer time and Jamie, I believe the first person who asked us a question for today. She's from Sparta, Georgia, is that where you're from?

Jamie 26:42
So I am not from Sparta, but my wife Amanda is from Sparta, Georgia. So yes, I do know this individual, my wife used to babysit for her, and I can't wait to dive into this question.

Amy 26:52
Awesome. So her question is about lowering a swarm. So she said an older beekeeper tells her that when he sees a swarm, when it's forming, or starting to fly away, he grabs two pieces of metal. And it's usually two horseshoes, and he cleans them together near the swarm. He says that the noise of the two metals being together will cause the swarm to land on a low lying tree branch. Is that true? Have you heard of that?

Jamie 27:21
So yeah Amy, I actually have heard of this concept before. I've even seen pictures of it from magazines 100 years ago or longer, where it showed this kind of little cartoon man or woman banging pots, and there's a swarm behind them. Again, presumably, if you make this noise, you're banging this metal together, you can walk the swarm where you want it to go. And I've always got this picture of you're out, you work in your Apiary, all of a sudden one of your colonies tries to swarm, you run and grab two pots, you smash them together, and you basically take that swarm where you want it to go on a low lying branch. But first of all, I'll just say there's absolutely no scientific evidence at all that this works. Does that mean that it doesn't work? Well, there are folks who anecdotally believe it works. It's one of those things, it's hung around forever. I just personally don't feel that it's something that works. But I could be wrong. But I will say, every time I hear the story, I often wonder who is leading whom, right? If you think about it, this colony swarms. And you quickly go stand beside it, and you bang a pot, and you kind of follow that swarm, you think you're leading it, but in hindsight, it could just be leading you to where it's going!

Amy 28:30
Right, right.

Jamie 28:30
-and you feel like you've successfully gotten it low on a tree limb. My guess is that some of the time, it will look like it's working. And some of the time it looks like it's not working, and that's because it's not working at all. And some of the time you're following the swarm and don't know that's what you're doing.

Amy 28:45
But those are the only two options, you have.

Jamie 28:48
I know, but that's the point, the point being when you look at it from that perspective, it basically means it looks like it's working, just because you're following the swarm and subliminally you don't know that. But it's still not working. You're just walking with the swarm. So I've definitely heard that there are quite a few of those things in the world today. It's not the swarms, it's how to find water in a well, things like

that. There are lots of these things that kind of have these tales associated with them. I might just try it someday. I just have to make sure no one's around when I do it.

Amy 29:18
Yeah, I was just about to say, I bet the department would think that we were a little, they would wonder if there was something wrong if there was a swarm and we ran out there.

Jamie 29:30
I think they already wonder if something's wrong. I think banging pots in the backyard would give them no doubt that there is something wrong upstairs.

Amy 29:38
All right. Okay. So the second question and this question, we actually receive this one pretty often. And so this person is asking, they want to move their hive, they want to move it 40 meters, but then they heard that you should only move the hive a greater distance of three kilometers. And so the question really is when you're moving a hive, how far or how close do you need to have it? And then do you need to wait a certain amount of time to move colony? I mean, it's, is there a such thing as like the GPS resetting? Or what do you do when you move a colony? I'll just yeah, there are there lots of questions. And I think a long conversation, so maybe you have an answer to this.

Jamie 30:22
So, Amy, I've been around a lot of beekeepers all around the world. And I'll tell you, everywhere I go, they have a variation of this saying that I'm about to share with you with regard to moving colony, some say, you know, two feet, or two miles or three feet or three miles. And basically, what they're saying is you either move the colony, a very small distance, you know, two or three feet, or you move them a larger distance, two or three miles because the distances between those are enough to confuse the bees. And so let's just unpack this. Essentially, a colony of bees, the bees figure out where their nest is in relation to landmarks outside of their hive. And so if you are the lone white box, right here by this tree, if you move it three feet to the right, or three feet to the left, maybe four feet to the right, or four feet to the left, you're still the lone white box under that tree. And you're still the thing that I'm likely to fly to, even if you're even if it's moved just a few feet one way or the other. Now, if you move that same white box 20 feet away, now you're no longer in the vicinity of where I had placed you. And so that's led a lot of beekeepers to say that if you move these two or three feet, it's not enough to disturb them. But if you move 20 feet, 30 feet, 40 feet. In this case, they're asking you about 40 meters, which is roughly 120 feet, that's enough to throw them off. So what I'll say there are multiple answers to that question. It is generally best to move bees really small distances, and a lot of people will say you walk your hives away from where you won't want them where they are to where you want them to be. So imagine, for example, Amy, I want to move my hive from one side of the yard to the other, and the distance is, let's just say 50 feet. What I might do is every couple of days, I move the feet, the hive three or four feet, in the direction of where I'm ultimately heading. So after a couple of weeks, the bees are where you want them to be anyway, because the concern is, is if you just move them straight up those 50 feet, then the foraging bees that come out of the hive, the next day are going to go back to where the hive was, not where it is. Now, in my own case, I've moved bees all around my yard with very little problem. But you do have to know that you are going to have a decent cohort of bees go back to the original stand. And

sometimes when that happens, what I'll do is set up a dummy hive, just an empty hive box in that place. And when bees go into it like at nighttime, I'll take that box with the with the bees that have flown back to the old hive stand and I'll dump those bees back into the new hive set. And over the course of a couple of days this usually it solves itself. You'll get fewer and fewer bees going back to the original hive stand. And more and more staying at the new. Now, I also don't like to do that though. I don't like those intermediate distances. So if I really wanted to move them 40 meters, which is what the questioner was actually asking, I would probably move them away, you know, a couple of miles for a week or so and then bring them back where I wanted to relocate them because 40 meters is definitely in that intermediate range, you're not moving them a few feet, they're not going to go back and get really close to where they were, but you're not moving them far enough away to where they don't know where they were. And I do think that that's one of those intermediate distances that you want to make sure that it's that they reset completely so you move away for a couple of days and moving back and that should do it. I will say in my own case, there are times where I will move them, say, 20, 30, 40 feet in a yard. But I will only ever do that if there's another hive nearby the original site. So imagine the situation where I've got two hives on the same stand, you know, within say three feet of each other, I don't mind moving one of those 40 meters away because the other one that remains on the stand will catch the drift from that one that is whose bees are going back to their original site. And I don't mind that at all. At least the bees are going into some colony and surviving and life is good. What I do mind is the complete absence of a hive and those bees are going to die there. So so I will move them 20, 30 40 feet or meters in this particular case if there's another hive located very close to where the one moved is and that way I know that the bees that might end up drifting back there go back to where they're supposed to be. At least into another hive to do something meaningful.

Amy 34:53
So would you say that maybe the time of day that you moved the colonies is equally or more important?

Jamie 35:00
Yeah, so if you move here, yeah, yeah, absolutely. If you move them in the middle of a day for sure, that's going to be a problem because you've got a lot of your field force out foraging. And so they're going to come back that day, maybe within minutes, to where there was a hive and it's no longer there. So if I were to do it, I would probably do it, you know, you know, late one evening, or super early one morning, before the sun comes up. And Amy, I've done this, I would often stuff like, old grass clippings in the entrance. I wouldn't completely close the entrance. But I would basically give the bees a pause, they're not just rushing out to go on their morning duty. They're having to work their way out of the hive a little bit, which kind of slows their escape. And hopefully, when they leave the hive, they're going now, wait a minute, we're not where we were, let me take a look at where we are and kind of reorient. So moving them at nighttime is always best. But remember, you are going to have a cohort of bees who've foraged for multiple days in that box, even if you move them at nighttime, and if they come rushing out of the hive in the morning, they are likely to go forage and go back to their old hive stand. Which is why people say, you know, two feet two miles, or in my particular case, if you have another hive there in the original location, and then I don't worry about it too much. But yeah, moving at night tends to be better and helps minimize some of the disturbance that you see.

Amy 36:16

Yeah, I'm thinking about a garden festival that I went to last week and how I left my car and I thought I knew where it was. And of course, it I could not find it anywhere. So I'm just imagining-

Jamie 36:28
That's a different problem, Amy.

Amy 36:29
I know, but I feel for the bees like where I thought it was here and it's not so now I have to roam around looking for it.

Jamie 36:38
But I will tell you one of the things that's amazing to me, though, Amy about bees and finding new nest sites. When I got my first time when I was 12. I remember we put them out there and I was thinking, well, it's gonna be a few days before they figure out where they are in the greater way. Within an hour or two bees were bringing back pollen. That was just utterly mind-boggling.

Amy 36:56
Yeah.

Jamie 36:57
We probably moved that hive, I don't know, 40 or 50 miles, and we put them out and within an hour or two, they'd already figured out where their hive was in context with the new landscape and found resources and were bringing them back. And that was pretty amazing to me. Bees are really amazing.

Amy 37:15
Yeah, yeah. All right. So the third question we have here, so in the past, I guess in a past Q&A that we had had, we mentioned that we use one deep brood box, and then we put a queen excluder down and then a honey super on top of that. And this is I feel like that's pretty common practice. And so this person is asking what are the pros and cons of using one brood box versus two. So I guess I'm assuming that this person's asking for maybe two brood boxes and then a queen excluder, and then maybe a honey super on top of that?

Jamie 37:49
Yeah, I do love this question. And it's important before I answer this question for me to tell the listeners, I'm going to answer this as a beekeeper and not as a bee scientist, because everything that's going to follow from my mouth is my opinion as a beekeeper and not factually driven as a scientist. And this is important to me because I'm a firm believer that beekeeping is, is a lot of art. It's the it's the way you want to do things. It's the way that you enjoy the most. So I've gone to plenty of bee meetings over my 30, 35 years of working in and around bee hives. And I will see people vehemently argue oh, you've got to use two deep brood boxes, or you've got to use a single box, or, "queen excluders? Don't you mean honey excluders?" And in reality, my official feeling about this is none of that matters. So the questioner is specifically asking for my take on using one brood box versus two and excluders versus none. And it's just I'm going to tell you my preference, they are both equally good. They are both perfectly fine ways of managing your hives. But there are some pros and cons with one or the other. I don't, frankly,

think the bees care either way. So what I do is what I prefer to do most, and it's not based on science, it's just the way that I like to manage bees. In fact, the one I've chosen has a lot to do with my mentor. It's just the way that I was taught and I kind of grew up keeping bees this way, and it's just the way I like it. So I say all of that kind of prelude to say, if you hear me, you're out there and you vehemently are going to defend one side or another, really just remember it doesn't matter. What I call this Amy is hive configuration. We beekeepers need to figure out how we want our hive to be configured. I've got a document on this very topic. We'll make sure to link it in the show notes. And it basically runs down through some of you want to use Langstroth hives. Some of you want to use top bar hives, some of you want to use long box hives. Some of you want to use only mediums for all of your hives. Some of you only want to use shallows. Some of you want to use double deep, some of you single deeps. I don't care. I'm not going to argue one way or the other. But since the questioner asked this, what I will tell you is what I do and some of my pros and cons associated. Well, honey bee colonies need an area to produce and raise brood, right? To rear brood. We call that area the brood box, the brood chamber, whatever. It is traditionally composed of deep Langstroth-style hive bodies here in the U.S. So the bigger the biggest of the three box sizes that we have tends to be our brood box. My own preference for hive configuration is a single deep brood box with a queen excluder on top of that and a medium super on top of that queen excluder. And that is what I call standard configuration. If you were to see hives that I've managed over the years, a single deep brood box, a queen excluder, and a medium super. You could also have a standard configuration of three medium supers or four shallow supers or two deep which is what folks call double deeps. The questioner is asking me for me to compare and contrast, single-deep configurations and double deep so let me tell you about mine. And then we'll go into the Double Deeps. I like to put a single brood box in a hive because I like to only have to look through ten frames to manage my queen. which also was why I use and excluder. If I put the queen in the single brood box and throw on an excluder, I know where she's going to be, and I can manage her more actively. I cut queen cells for swarming as an example, I want to look through 10 frames, not 20 or 30. If I have to requeen the hive, I want to look through 10 frames and not 20 or 30. So I have a single deep brood box with an excluder simply to manage my queen and swarming and all that stuff better. I throw on the medium super, and no matter how nice the honey looks in it, I don't extract it. That medium super is what I call their food Super. It is what I leave on year-round for the bees to consume. It is that that is what they have. When I get go through winter. I want to make sure that medium supers are full of honey. And that configuration is what I prefer. Now, in the double deep system, you've got two deep brood boxes with no excluder usually, so the queen has free reign over two deep boxes, that takes up roughly the same footprint, a little bit more, but roughly the same footprint is a deep and a medium. Under the premise that the queen is going to use a lot of those two boxes for brood and the rest of it will be used for honey production or their own honey stores. And so you're getting kind of exactly what I would get out of a deep and a medium. The folks who like to do double deeps argue that it gives more space for queens to lay. That is true. A lot of folks who don't like to use excluders will say that they're not queen excluders, they're honey excluders, because if you're using an excluder, you make less honey. That is not true at all. So a lot of folks who do these double deep configurations basically boil it down to I just want to get my queen more space to lay eggs. That's fine! The catch 22 about that is if you were to take the queen's brood from both of those boxes and condense it down. You only ever get about one brood box full of brood. So while she has more space to lay eggs, her capacity to lay more eggs, it's not like she's capable of filling 20 frames of brood. You see what I'm saying?

Amy 43:57
Right? Right.

Jamie 43:58
So you think you're getting more brood because you see it scattered over two boxes, but if you squeeze it all together, you're getting about one box worth of brood. Of course, there are super queens that can do 20, and so maybe in a single brood configuration, you're reducing their capacity to do that. But what I've always argued as I can keep colonies is just as strong in singles and mediums as people can with double deeps.

Amy 44:18
Right.

Jamie 44:19
So the real benefit of double deeps is you just don't have to use an excluder necessarily in that setting. And it makes splitting the colony really easy, these walk-away splits, you just take the two halves apart, but I don't necessarily like to use them because I have to go through 20 frames instead of 10 to cut cells or find a queen. It's just, it's just my preference and I will you know make make the last point is it really doesn't matter to me if you want to use double deeps by all means do it. It's just you know, my preference is for a single deep, an excluder, and a medium. And again, the part of the beauty of beekeeping is you can make whatever configuration you want to make, and if it works for you, you know, by golly keep doing it. That's why we wrote that document. It's kind of freeing people from the burden of believing that they have to do one thing or another. It's completely up to the beekeeper.

Amy 45:10
Well, you know what they say sometimes, if you ask a beekeeper question, you'll come up- if you ask 10 beekeepers a question you'll have 15 different answers.

Jamie 45:18
Exactly. But it's funny, we talked about this, I've heard queen excluders called honey excluders, you're limiting the queen's ability to produce off, I'm just all kinds of things. And I just, personally have never really witnessed that. So, but I will tell you like in the double deep perspective, a lot of beekeepers just like to not have to buy an excluder, you just, you know, excluders, is one more thing you have to buy so why buy it, if you can use a double deep, maybe the aueen won't go into your honey supers. It's just, again, make it yours, make it yours. But what I stopped short of trying to do is convincing people that my way is the way that it needs to be done because it totally is flexible.

Amy 45:57
All right, sounds good. Well, those were our three questions for today and keep them coming. Start sending us messages. I think we have a ton of new questions, actually, Jamie so we've just been receiving emails from people left and right. So we're really excited. And so if you have any questions or if you need any follow-up for anything that we've discussed in the past, let us know. Thank you so much.

Serra Sowers 46:23
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.