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SPEAKERS

Amy, Jamie, Stump The Chump, Honey Bee, 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, and welcome to Two Bees in a Podcast. It is a new year for our podcast. We've just completed our first season. Now, we're releasing episodes for our second season. And in between the two of those seasons, we put out a survey for our listeners to tell us what it is you'd like to see and hear in our new podcast. And as a result of the feedback that we receive from you, we've made some modifications. One of the things we're going to do is try a slightly revised format. In this format, we'll have a standard guest that will be someone we interview, maybe a scientist who's found out something really cool about honey bees we want to share with you, maybe a beekeeper who can give us a perspective of beekeeping from his or her view -- we will always have that interview. It'll be the meat, the big part of our podcast. And then, we're going to introduce a second segment that we call Five Minute Management. In that section or segment, Amy and I are going to discuss, very specifically, different aspects of bee management. Maybe today it's clipping and marking queens, maybe tomorrow it's how to take supers off of colonies or how to control Varroa, but we're going to do our best to give you management advice that you can follow to keep your hives healthier and make you better beekeepers. And of course, we'll finish every episode of Two Bees in a Podcast with our segment of questions and answers that we affectionately call Stump The Chump. So thank you for joining us on another season of Two Bees in a Podcast. In this episode of Two Bees in a Podcast, we'll be interviewing Ben Powell who's from Clemson University, and he's going to be joining us to talk about pesticides and their impacts on honey bees. He's going to be giving a fresh look, a new perspective on this relationship between pesticides and honey bees. In our first Five Minute Management section, we're going to talk about properly storing equipment, specifically equipment that has pulled comb. How do you store it to keep those wax moths away from it? Of course, we're going to finish today's episode

with a question and answer segment. I'm excited about this segment of Two Bees in a Podcast because we're going to be visiting, or revisiting, one of those very controversial subjects. Amy, you know what I'm talking about, right?

Amy 03:12
Dun, dun, dun... the pesticides.

Jamie 03:14
That's right. Yeah, jinx, by the way. You're not allowed to talk until I say your name three times.

Amy 03:18
You owe me a Coke.

Jamie 03:20
But, pesticides. Beekeepers always want to know what potential impacts pesticides have on their bees. We've already discussed different perspectives of pesticides' impacts on bees in the podcast, and we have a new fresh look, a fresh take at pesticides and how we should perhaps think about them slightly differently than we have in the past. And we're going to be discussing this with Ben Powell who is the Apicultural and Pollinator Program Coordinator at Clemson University. He's part of the horticulture program team at the Baruch Institute of Coastal Ecology and Forest Science. So joining us from South Carolina in the United States of America, I'd like to welcome Ben to the program. Ben, thank you so much for joining us on Two Bees in a Podcast.

Guest 04:01
Excellent. Thanks, Jamie. I appreciate the opportunity.

Jamie 04:06
Now, we were talking a little bit behind the scenes before we started recording, and for the benefit of the listeners, I was talking to you about the fact that I did a lot of work at the University of Georgia. That's where I did my undergraduate degree. And of course, you work for Clemson University, and Clemson's main campus, Clemson there, it's only about an hour and 15 minutes, an hour and a half from the University of Georgia in Athens, Georgia. So I spent a lot of time in South Carolina, specifically at Clemson, during my formative bee research years doing a lot of work with your predecessor, Dr. Mike Hood. So it's neat to see you sport in your Clemson shirt there and calling you in from Clemson. It's really neat to have you on this podcast. So thanks again. Now, when we were talking with you earlier, you mentioned about some fresh take on pesticides. But before we get there, I want our listeners to hear a little bit about how you became the Apiculture Specialist at Clemson University. How did you get into bees and beekeeping? And how did you end up where you are now?

Guest 05:03
Sure. Well, I appreciate it Jamie. This would be the first time for me to get to speak to a larger crowd in the bee world. I come at it from a slightly different direction and perspective, I think, from a lot of the other colleagues that are in this line of work. I actually studied entomology for purposes of biodiversity. I

was actually studying under Dr. John Morse at Clemson, who is a caddisflies specialist. And my interest really was in how insects interact with invasive species. And we're looking at aquatic insects and their association with invasive aquatic plants. But I was hired on as an extension agent before I even finished the graduate degree. In the work of being an extension agent, you get exposed to all kinds of different things. And being one of the extension agents that had an entomology background, it wasn't long before I had a beekeeper come into the office and strike up a conversation, and I actually developed a really strong relationship with this particular beekeeper. And over the years, we started to develop a local bee club for my region of the state. So I kind of got moved into beekeeping from the public, the need from the beekeepers' side. But really, that's not the whole story because while I was a graduate student on campus, I struck up a friendship and working relationship with Dr. Hood. As a graduate student in the entomology club, he would let us harvest the honey from the research apiaries and sell it and we could go to conferences and maybe generate a little money for our club. So I got to know Dr. Hood pretty well and actually got to understand bees as a graduate student. So I wasn't totally blindsided when I became an extension agent and started working with these local bee clubs. And then last year, the position opened up as the extension apiculture specialist and so I jumped on it, because, I gotta tell you, of all the constituencies that I've worked with, and I've worked with forest landowners and pond managers and growers and agricultural folks, the beekeepers are, hands down, the best audience to work with.

Amy 07:24
I agree with that. And I feel like you just made so many new friends and so many new enemies by saying that. But I'm just kidding. So you've been in your position as Apiculture Program Coordinator for about a year now. Right? Okay, so probably right before COVID hit. And so you had mentioned that this is the first time you've been speaking to a broader audience. So have you been able to do any programming for apiculture education, and what do you have planned for the Clemson apiculture and pollinator program?

Guest 07:57
Yeah, it's been a weird year, right? Gosh, I can't imagine what stranger circumstances to try to get a program started. Luckily enough, I was actually in place before the whole virus thing happened, and so I was able to get a few things off the ground and had some real, significant strides that had to be done. We gotta get websites going, newsletters, a variety of extension publications needed to get updated, there's a lot of just basic extension work that needed to be done. And we've been doing that. We've got a new website, I've got a newsletter, a monthly newsletter I call Cappings, which stands for the Clemson Apiculture and Pollinator Program. The happenings of the Clemson Apiculture Program.

Amy 08:41
That is so creative. Jamie and I always joke around about all the acronyms in the honey bee world. Capping is a pretty good one.

Guest 08:48
Yeah, thanks. I appreciate it. And so we've got a lot of that off the ground, and then trying to do virtual trainings has been a crash course for me and for our beekeepers across the state. But I think we've

gotten to a place now where we've been able to do some intermediate-level trainings for beekeepers and also attend and get presentations for local and state associations.

Amy 09:12
Sure. If you don't mind, how many beekeepers do you all have in the state?

Guest 09:15
Oh, gosh, I wish I knew. That's actually one of the primary initiatives I got in this first year is to survey the beekeepers, one, to kind of get a feel of the inertia that's out there, and also, to understand what their major issues are. So I've been doing a risk assessment survey. You can actually access it. If you are a South Carolina beekeeper and you've not taken the survey you can go to the Clemson apiculture website and reach that survey there. But I've also been distributing it to local clubs as I've been speaking with them.

Jamie 09:49
Well, Ben, I tell you, I remember, very freshly, moving down to Florida and starting the program here. Those first few years of program development are so, so important. If I have any advice, and I'm old enough now to start giving advice, make sure you're very strategic. I think that's important. One of the things that my program did is it grew fast. And as a result of it growing fast, I felt like I was super stretched all over the place. So I love the fact that your surveying beekeepers, you're working with them directly and finding out what it is they want, what it is they need, and the drivers in the industry. That's great. So I'm really excited to talk to you about the topic of pesticides and their impacts on bees. Now, we can have about 50,000 podcasts on this, we can interview everybody, because when I tell people I'm a bee scientist, they instantly have an opinion about pesticide impacts on bees, whether or not they're beekeepers or toxicologists themselves. This is just something that people gravitate towards when they hear that bee populations are suffering in many ways. And I feel like I've heard just about everything everyone could possibly say about pesticide impacts on bees. And when we were talking a little bit ago before we started, you were giving some fresh ideas about a way to think about pesticides. And I agree with you, these are great biological things to consider. So let's just kind of start from the beginning. And I'll just ask a very basic question to you as we kind of get down into your expertise in this regard. What is your general take on pesticides?

Guest 11:18
Alright, so pesticides, if you go looking at the definition of what a pesticide is, depending upon who wrote the definition, you get an entirely different take. I like to go back to the regulatory agency and their definition. So that's the EPA, correct? So they're in charge of Pesticide Regulation for the nation. And they basically define pesticides as any substance that affects negatively a target organism. It's not necessarily specifically to agriculture. And it's a very loose and very amorphous definition. And really, in all honesty, any substance that negatively affects an organism, well, gosh, I could put water in that category. Because if I put enough water on some living things, it's going to kill them. Right? So that means, well, what in the world is a pesticide if something like water can be a pesticide? And really what it boils down to, it's all about intent. If you've got a compound, whatever that compound is, and it has the potential to kill a pest organism, then it's a pesticide. The funny thing is, though, we're not new to

this game. In fact, we're kind of Johnny Come Lately, if you look at nature, she is wrought with examples of natural pesticides of chemical warfare. The plants are the perfect example. If you look at plants, that's an organism that once it establishes itself in a location, it can't flee a pest or predator problem. It's got to defend itself. So plants have diversified a lot of different chemical defenses. And there's all these essential oils and secondary metabolites that they produce to defend themselves from insect herbivores.

Amy 13:18
I just want to tell the audience that you had quotations around essential oils, because they won't be able to see.

Jamie 13:23
I will say, Ben, you're making an interesting point. One of the things that I tell people, especially around the 2006 to 2010 years when everybody was freaking out about bee losses and blaming pesticides, one of the things that I pointed out to them regularly, "Humans invented pesticides in the 1940s. That's when bees started dying!" I'm like, "Dude, humans did not invent pesticides. Pesticides have been around before there have been humans to debate whether they're good or bad, right?" And so that's kind of the point that you're making here.

Guest 13:55
That's right. Yeah, actually, if you look at, I don't know, primitive is not the right word to use, some of the earliest organisms to inhabit the planet, the cyanobacteria, they actually have some of the most complex allelochemical systems where they try to kill each other and try to keep fish from eating them with a variety of really toxic compounds.

Amy 14:17
On that note, you said the word toxic. So Jamie and I, we actually had a podcast where we did talk about toxicity and exposure and what that actually meant. So my next question is why should beekeepers avoid using the word toxic when discussing pesticides?

Guest 14:34
Yeah, so toxic is only part of the conversation. Really, in all honesty, beekeepers need to avoid using toxicity because there are products underneath my sink downstairs that are way more toxic to bees and to us than many of the pesticides that we use in agriculture. In fact, if you want to kill a beehive, get a tablespoon of Dawn dish soap and put it in a gallon of water. You can depopulate a whole bunch of hives in a short matter of time. So toxic is only part of it because, really, the other component is whether or not that compound is available to the bees. So what I hope beekeepers will start doing is instead of using the words, "a compound's toxic," they need to say, "a compound is risky," because risky means that not only does it have a toxic component, but it's also available to the bees. And it doesn't matter how toxic a compound is, if the bees can't get it, then it's not a threat. It's not risky.

Jamie 15:36

I think, Ben, that point is so incredibly important. I learned this from a former postdoc of mine, Dan Schmell, who was working in the lab here doing toxicity work and then moved on to work elsewhere. I saw him give a presentation some years after he left my program, and he talked about toxicity and exposure and risk. And really, you hit the nail on the head. Everybody is so hung up on toxicity. In fact, what happens is all these people will do research on pesticide impacts on bees, they'll do some toxicity research, they'll publish their papers and go, "Aha! Look at how toxic this pesticide is to bees. We should ban its use. There should be no use of this thing ever." And they've completely ignored, yeah, it's toxic. But do bees get exposed to it at a high enough level to where the risk is correspondingly high? And that's a concept that's been really hard to teach to the industry that's quickly looking to make sure pesticides kind of go down in flames, right?

Guest 16:37
Sure, sure, right. And well, here's a really funny one. If you want to look at all the compounds that are in and around a beehive, what is one of the most toxic compounds that's there? It's actually the bee venom. The LD50 of like 2.8 milligrams per liter, right? You compare that to imidacloprid, which has an LD50, I think, in the five hundreds or something along those lines, which we know that imidacloprid is really toxic. But here we are as beekeepers, we're working with an animal that produces a compound that is extremely toxic and does not take a large volume of it to kill a lot of things.

Jamie 17:14
Yeah, and of course, we're not giving pesticides a free pass. People out there need to hear this. I tell people, bees die pesticides every year, they absolutely do. But I think it's important to remember and certainly, be grounded in this idea that risk is really what's important. And I know the EPA, for example, in the US, I know the European authorities have similar groups where they do a risk assessment. So that's why risk assessments are so important and not just toxicity. And I'll just put this out there so that we can get a lot of hate mail because we haven't had enough hate mail recently.

Amy 17:48
Really? Do that to me.

Jamie 17:52
We've had only good comments. And so I'm going to give people a reason to not like us for a second. I think that there's been a lot of governments making knee-jerk reactions to pesticides based solely on toxicity data and mass hysteria and not so much on risk data and science. We all know how governments love to follow science so closely. I'm going to get off my soapbox before I get us in trouble. But I think what you're saying is so important. Well, let's kind of shift gears here a little bit. I'm curious, can pesticides actually be beneficial to honey bees?

Guest 18:30
Oh, man, do we dive into this one? All right. Well, yeah, we got to. I mean, because we're doing it. We're actually using pesticides in and around hives for controlling pests of honey bees. And we know that there's a cost-benefit ratio there. Right? It is a compound that's designed to kill and has adverse effects, even on the bees. But the question is, is the compounds' adverse effects greater or lesser than

the pests' adverse effects? So if the pest is creating a bigger problem than compound, then obviously the compound is going to be a benefit, and it's going to be helpful. But then if we think about it, pesticides outside of the hive and in landscape management, my take on pesticides in landscape management, you need to think about them like medications for the land, right? In fact, many of the pesticides that we use in in pest management are also medications, like Warfarin. You look at that compound, it's a heart drug for us, but it's also a rodenticide. Whoa. But you know, you think about the intent. Alright, so let's talk about RoundUp or glyphosate. Let's stay away from the actual brand names. Glyphosate has gotten the pink finger pointed at it big time over the past few years because it's the most widely used herbicide, the volume of the product has increased steadily over the past few decades, and it has an impact on the plants that are around that bees are using. But let's think about this. If we have invasive plants that are displacing native productive forage plants for bees, is RoundUp use on that invasive plant actually a benefit to the bee? It now restores the diversity that supplies the nutrients necessary for the honey bee, as well as the native pollinators. So, again, pesticides, it's all about intent. It's all here, not in the spray nozzle.

Amy 20:37
So you want to hear something interesting? I was listening to a talk the other day on the science behind glyphosate. And they were saying that the risk that we are exposed to with glyphosate, the risk is actually higher if we eat bacon or if we drink hot beverages. And I was amazed by that fact. I had no idea. And so it was just really interesting to hear that side of glyphosate and the exposure.

Jamie 21:05
How dare you attack bacon?

Amy 21:07
I'm sorry.

Jamie 21:08
I think you might no longer be a co-host of Two Bees in a Podcast.

Amy 21:12
The world should know.

Jamie 21:12
It might just be one poor bee alone in a podcast.

Amy 21:15
Those were the two things that stuck. One lonely bee in the pod.

Jamie 21:20
Well, Ben, let me just say, you keep saying things that I wholeheartedly agree with. And so I guess that's dangerous for you. You got my endorsement. One of the things that I always say about Varroa treatments, you were talking about the whole idea, we have to weigh the risk of using a pesticide

against the risk associated with having the pest. This is just a statement, it's not a for better or for worse, but out there in the beekeeping community now, we have a lot of people who have a lot of anxiety about using some of the registered compounds against Varroa, and they will default to homemade remedies that they think are softer, etc. And they'll say, "We can't use this compound, we can't use that compound. It's a chemical. Its impact on bees is potentially bad." And my counter to that is, well, the impact of Varroa on your bees is death. So using these registered compounds is a lot safer for your bees than having a moderate control with something else that's going to lead to high Varroa infestations. I really think people think about pesticides really incorrectly. I think that there's not an appropriate mindset out there in the general public. Again, I'm not trying to suggest that they are always good, all the time and that there are absolutely no negative effects. I just think that there's a lot more that people can learn about them and use them appropriately with good stewardship, and it'll minimize the issues that we face.

Amy 22:50
So that's kind of what Ben was talking about, as far as intention goes. What is the intention of what we're using? And why are we using it?

Guest 22:57
Nature, she has checks and balances When an organism adapts a compound that has an effect on one of its predators or a competitor, that organism has a metabolic cost. To produce that compound, it's going to have an effect on that organism, just like having a pesticide used in a beehive is going to have a cost on that beehive. The question is, is the benefit better than that cost?

Amy 23:26
Sure, absolutely. So, I feel like part of our extension work is to educate beekeepers, for our jobs, specifically, to educate people that are just interested in bees. But I also feel like part of our job is to train and educate people who can talk about everything we want to talk about, pesticides Varroa, just honey bee health in general to the general public and everyone else who we probably don't have the opportunity to speak to. So my last question for you is how should beekeepers talk about pesticides with the public or with applicators because we live in Florida, and there are a lot of urban beekeepers also coming around and they do work with pesticide applicators. So how should these beekeepers talk about pesticides?

Guest 24:13
Well, the very first thing is come at any conversation, I don't care who you're talking to, with mutual respect. You've got to understand that there's a demand that's on that person to do the practice they're doing. Whether it be an agricultural producer, or somebody controlling pests in and around homes. There's a need there and that need is driven by a public demand. So understand that the applicator is trying to fill a demand and once you reach a moment of mutual respect, you can have a serious conversation. They don't want to kill bees any more than we want to kill bees. But sometimes, there are better ways to go about doing the practices they're doing. So, when a beekeeper or a bee club is engaging the applicators in their region, if you're coming at them with a very accusative tone, then they're going to shut down and they're not going to be open to conversation. The other part of it, too, is

that when we talk with them, don't say, "You can't be using that compound, you can't be doing that," because they only have so many tools in their toolbox. And if we restrict them to one tool, what's going to happen? We're going to get resistance, and then that tool is not going to work anymore. So then we're going to have to use something that's harsher, more toxic, riskier to bees at some point. So when we talk with them, we talk about risk and try to minimize the exposure to bees. So we teach them about bee behavior. Instead of demanding that they bow to us, we say, "Here's what bees are doing through the course of the day. Perhaps, we can do the applications when flowers aren't in bloom, later in the evening, this, that, and the other." And we've actually had a really good successful program here in my area near Myrtle Beach, where the bee club and the local mosquito control program interacts very well. They communicate very well through mutual respect. And we've had very few bee kills related to mosquito control, even though the past five years have had the highest rainfall amounts that we've experienced in the history of South Carolina. So with all that rainfall, you think mosquitoes are through the roof, they're spraying more, there ought to be more bee kills, right? It didn't play out because of good communication.

Jamie 26:41
Ben, I really appreciate all of your comments. I mean, this has been a fascinating discussion. So I want to kind of summarize it this way, given everything we've discussed, what are some basic take-home messages you'd like to share with our international audience? We have people listening from all around the world, we've talked a lot about pesticide, and you've given some great context from being in South Carolina, What are some basic take-home messages that you want to make sure and be able to share with the beekeepers who are listening to this podcast?

Guest 27:11
Sure. Well, in talking about pesticides, we're talking about an extremely complex subject here. The more knowledge you've got, the better you can discuss that subject. So review the regulatory agencies' websites. Most every agency that's involved in regulating pesticides has a wealth of information about how they regulate how labels and labeling is produced, how they review pesticides. Largely due to the pressure that the beekeeping community has placed on regulatory, there's new language that's being added to pesticide labels. And you can use that language to speak intelligently both with the regulators, the legislators, as well as your applicators. And then, the understanding is that chemistry and chemical warfare is a part of nature. And we as humans, use that in a different way. We've been able to isolate, concentrate, and formulate these compounds to make them more effective. And the general trend is to make them more specific, not less specific. So the general trend of pesticide use and in pesticide compounds is to make them have less impact on non-target organisms, and it's a constant process. So the more we learn, the better that process gets.

Jamie 28:43
Ben, thank you so much. I could not have said it better myself. I really appreciate your comments on pesticides and for you for joining us on Two Bees in a Podcast today.

Guest 28:53
I appreciate it, Jamie and Amy. Great time.

Jamie 28:57
Well, good. Everyone, that was Ben Powell. He's the Apiculture and Pollinator Program Coordinator. He's part of the horticulture program team for the Baruch Institute of Coastal Ecology and Forest Science at Clemson University. We've had a great discussion with Ben about having a fresh look at pesticides. Thank you for joining us for this segment.

Honey Bee 29:17
For more information about this podcast, check out our website at UFhoney bee.com.

Amy 29:33
Okay, so we are trying a new segment and it's called Five Minute Management. And we're going to focus on one management skill for our listeners. When we had our survey, we put our survey out, we'd receive a lot of feedback, and we actually have a ton of beginner beekeepers, and they said that they just wanted one simple segment that focuses on one thing. So what we thought would be fun is maybe to do Five Minute Management segment. And so we'll add this and we'll see if we start going over five minutes. And maybe we'll turn it into a seven minute management or a 10-minute management.

Jamie 30:07
Or I get a buzzer.

Amy 30:08
Or you get a buzzer. Well, so that's what I'm going to do, Jamie. I'm going to set my timer, and we have five minutes, and then we're going to go. If you don't answer the question, then sorry, everybody.

Jamie 30:19
Five minutes is like 100 years for me. So, I've got this.

Amy 30:23
That's fair. All right.

Jamie 30:24
It'd be more of a challenge if it was like a 10 second management, then you'd make me nervous. But five minutes? I got this.

Amy 30:29
Well, we'll work on that another day. But okay, so I'm going to press start.

Jamie 30:33
Hey, wait, your question goes with the start, or my answer goes with the start?

Amy 30:37
Well, I already pressed start. Now, you've got four minutes --

Jamie 30:39
We're cutting into my five minutes!

Amy 30:41
Four minutes and 50 seconds.

Jamie 30:42
Okay, you better ask your question.

Amy 30:43
Jamie, how do you properly store equipment when you're not using it?

Jamie 30:44
A couple of ways, or maybe three ways that I can recommend doing that. I'm assuming when they say, how do you store your equipment, I'm assuming they mean pulled combs, right? Because if it's not pulled combs, you can just store it in a shed, but they're probably implying that they've got all of these pulled combs that they want to protect. Alright, way number one, you can stack them up in a shed or some other enclosed area, one super on top of another. And every three to four supers, you will put a little piece of newspaper with some wax moth crystals on that newspaper. So four supers, wax moth crystals, four supers, wax moth crystals, and then you will check those wax moth crystals monthly to make sure they're in there because that's what you're trying to keep out of that wax is wax moths. That's way number one. You will also want to put a lid on that stack so that this stuff doesn't evaporate too quickly. Way number two, if you don't like using wax moth crystals, you can store those same supers under what I call open-air sheds, that would be a shed that maybe is just a pole barn or has two or three sides open so light and air kind of move through that area. If you're going to do that, you crisscross your supers. So you put one down, maybe long ways, and then you put one down on top of it turned. So it's kind of a crisscross pattern. And that way, light and air gets into those alternating supers and it helps limit wax moth damage in the combs. Way number three, you can freeze your combs, which is what I prefer. If you have a big walk-in freezer, you can throw all of your combs in there and keep the wax moths out. Or, if you've only got a few combs that you have to use, you can buy a chest freezer, put them in the freezer inside. Just don't tell your spouse that I said that this is okay.

Amy 32:36
That was good.

Jamie 32:36
The fourth one, no, the fourth way. I said three but I think there's a fourth. I know I'm not out of time. So I've got this. So the fourth way that I like to store supers of comb is I will store them directly on my colony. So for example, if I extract honey in June, my honey flows over, and I don't want to store in a shed and I don't have freezer space and I don't like wax moth crystals, then what I might actually consider doing is putting it right back on strong colonies because the strong colonies will keep it patrolled and make sure the wax moths are out. There's one caveat to everything that I'm saying.

Everything I've just told you works incredibly well with white combs, new combs. If comb has ever had brood reared in it, and they start to darken, then you can't do option number two. You can't keep them under that open-air shed. Because wax moths will brave light and airflow to eat black comb. But using moth crystals and freezing and storing on the hive, all gets wax smalls in dark comb. And then you can add that open-air shed method if the comb is all white. There you go, four possibilities for storing drawn comb. How much time do I have?

Amy 33:11
Well done. You have a minute and 38 seconds. And Jamie, almost, the extension team wanted to do a three minute management. And I was like no, I'll give him a couple more minutes. And now I feel like we should have just stuck with the three minute management.

Jamie 34:03
We can play around with this year. I bet I can do it in three minutes as long as the questions are succinct. Right? And it's just simple, how do you do this? And I'll do my best to see if I can't get it in under that amount of time.

Amy 34:15
Okay, well for listeners, if you would rather have a three minute management instead of the five minute management just to see, Jamie might just, I don't know, you might like fumble over your words a little bit.

Jamie 34:25
No way. Not possible.

Amy 34:26
Yeah, maybe. All right. Well, let us know what you think. If that was fun, we'll continue throughout the year. And if people don't like it, we'll ditch it and start fresh.

Jamie 34:34
Amy, we also need their questions too. They've got to give questions to be able to answer in such a short period of time so keep those questions coming.

Stump The Chump 34:47
It's everybody's favorite game show, Stump The Chump.

Amy 34:53
And welcome back to the question and answer time. Jamie, I've got three exciting questions for you.

Jamie 35:08
Good deal, looking forward to hearing them.

Amy 35:10

Great.

Jamie 35:11
Ok, I just lied. I've already heard them. I'm looking forward to you asking them for recording purposes.

Amy 35:15
You're looking forward to hearing them again. Okay, so the first question we have is from Quebec, Canada. All right. So his question was, most people are constrained by space. In an ideal world, what would the ultimate distance between hives to mitigate disease transmission, robbing, and drifting, what would that be? Has there been any research done on this subject?

Jamie 35:38
There has been some research on drifting but I will tell you, the short answer to the question is we don't know for sure. Because if you think about it, colonies that are even 100 yards apart for our friends outside of the US, 100 meters or so apart, if one of the two colonies is dwindling and another colony is 100 meters away, it can still go over there and rob. It can still rob that colony from some distance. So really, the only, quote, safe distance, would be multiple miles or kilometers apart. So I don't know that it's particularly practical to do that. So a lot of people will just try to keep their colonies, just maybe a couple of meters apart. In commercial apiaries, there'll be as close as four colonies on a pallet, so they're almost touching. But when you're talking about disease and pest transmission, they really kind of have to be far apart before they don't affect one another. So what I tend to say, is, I like to keep my colonies at least about three feet or about a meter apart, and then go from there. I know that someone had looked at spacing apiaries, maybe a mile or two miles, which would be a handful of kilometers apart as well. But even then, you can see the influence of one apiary on another. So really, it's just very difficult to pull off in a way that's actually beneficial to your colonies. And I'll just make a little comment about drifting too. We were doing a pilot study at the lab on drifting and we marked some newly emerged bees, that's the day they emerge, we mark them, and we put them in some observation hives in our bee lab. And within 24 hours, we were seeing marked bees in different colonies. And the funny thing about that is that bees aren't supposed to be flying until they're about two weeks or so old. But the point is within days of emerging, they are already drifting to their own colonies. And so I think in an apiary, there's a massive amount of drift, and spacing colonies many meters, but still being in the same apiary, I don't think is going to eliminate that problem. So, if you keep two or three colonies, you can space them out within a yard pretty reasonably. But if you're in the 10 to 30 range, per apiary, you're just going to have to space, probably, way more space than you can afford to space to keep them apart.

Amy 37:59
Well, so then I have a question. Of course, I'm like queen of dumb questions over here. But can disease transmission happen in the air? Like, let's say they're flying past another bee, and they have, I don't know, Varroa on them.

Jamie 38:16

So I don't think there's any evidence that can happen in the air except with queens and drones because when queens and drones mate, there can be disease transmission while they're flying. But one of the ways that we believe that disease and pest transmission is possible is bees all visit the same flowers, right? So if you've got 10 colonies in your backyard, and there's a citrus grove a mile away, and they're all flying to that, if this particular apiary has a lot of American foulbrood present in the colonies, it could show up on flowers and potentially transmit that way. We're trying to understand this better. And when I say we, I mean the scientific community in general, because when you look at flowers, you'll find honey bee pathogens. When you sample bees in the field, you'll find bees with pathogens, so it just makes logical sense that this is a route for disease transmission. So I wouldn't say it's as much as flying by a colony, but certainly using shared resources in an area is going to make disease transmission possible. And that's why you really have to space them quite far apart before colonies are truly independent. And I would say something like two miles, three, four, or five kilometers, something like that, apart before two colonies are truly independent, they're not foraging on the same resources, or one's not likely to invade the other if it were to get weak during robbing season.

Amy 39:38
That's fair. Okay, so for a second question, someone was asking, so we talk a lot about colony size decrease. I feel like a lot of people, when they email us or when they call us, they say, our colonies, the colony size is just not as large as it used to be. And so this individual had asked about the type of strain. So they keep Russian bees and they said that the colonies dramatically shut down on brood and size when pollen and nectar sources are slow. So what causes this colony size decrease?

Jamie 40:10
That's a really great question because it really speaks to the beauty of biology. So you mentioned strains. The word strain is actually the correct word to use here. In this case, we don't actually have European honey bees in the United States, they've been here for 500-ish years. So at this point they're as much a North American as I am, you know? So we don't have true subspecies or true races of honey bees anymore in North America. Some others around the world do and that's great. And maybe you listening to me out there, you're in an area where honey bees are native, specifically, because Apis mellifera is native, in which case you might have a true subspecies. But if you think about it, all of the strains that we have in North America are derived from subspecies that are present elsewhere. And if you look at the subspecies and their native ranges, you're going to see that they have biological adaptation to where they're at. Basically, you think about some of the African subspecies or African-derived subspecies of honey bees in Africa, they have much hotter climates. There are some that are drought adapted, the ones that are closer to the dry areas, there are some that are humidity and rainfall adapted. If you look in temperate Europe, where some other subspecies of Apis mellifera are native, some of those are very cold-adapted, so they are able to store large amounts of honey, they tend to nest up off of the ground, the bees themselves even tend to be a little bit fatter because they store energy to survive winter. In contrast, the African subspecies of honey bees maybe don't store as much honey and all of this stuff, so all of these different subspecies or races have different characteristics that help them survive where they are native. So when we think about Apis mellifera ligustica, as an example, the Italian honey bee, they tend to carry large colonies through winter, they tend to brood well into fall, if any nectar at all, or pollen at all is available, they'll brood up very quickly when winter just

starts to break. And that's because, climatically, where they're from in Italy, they have these longer warm periods, and they're able to respond appropriately. So in contrast, the Italian honey bees might have difficulty in these colder, harsh winters that are six months or longer. So if you flip that specifically with what the questioner was asking about Russian bees, these bees are temperate adapted in colder climates in Russia, and their adaptation is simply to shut down completely when nectar or pollen sources are low so that they can focus on simply keeping the colony warm and surviving the coming winter. So the basic question asked is what causes these different behaviors with these different strains? And the short answer is, it's ultimately genes that govern these behaviors, but genes that they accumulated or developed based on the climate that they're originally from and the environmental stressors that they would have experienced. So in southern US states, there might be a predisposition to use warmer climate-adapted bees in the northern US states or in Northern Europe. Or, in Northern Asia, there might be a predisposition to use colder climate-adapted bees. So all of it has to do with where they're originally from and what behavioral characteristics they were displaying to survive in the environment where they're native.

Amy 43:40
Sure. And we're recording this in January of 2021, which is crazy to think about. But we, with our social media, did a Species Saturday, which was a lot of fun to do. And I think maybe, this upcoming semester, we'll try to get some interns to work on some subspecies of honey bees that everyone can kind of learn about.

Jamie 44:03
Amy, I think that's a good idea, right? There's nine species of honey bees. And we were all talking exclusively about this one Apis mellifera, its natural distributions, Europe, Africa, the Middle Eastern, Western Asia, but you mentioned subspecies. With Apis mellifera, there are probably somewhere between 25 and 30 different subspecies of this bee distributed from Northern Europe to Southern Africa, to the Middle East, and into Western Asia. And the reason I say that is think about all the climates and environmental diversity in those areas. So if you're a honey bee in Equatorial Africa, which is the same species of honey bee that's in Northern Europe, you're going to have two different variants of the species because there are different environmental climatic issues that they have to face. And then when you couple all of that with selective breeding, where we can say, "Hey, we like the traits in this particular subspecies, but we wish it also did this, that, or the other," and we can cross them with other subspecies, you can see that the number of traits honey bees are capable of having gets really, really large. And so when the questioner asks specifically about Russian honey bees, it's just one of those traits that they have for local adaptation purposes. And you can breed that trait into or out of bees that you're keeping based on the rest of the gene pool available in your area.

Amy 45:30
Very cool. So the last question we have is, can a laying queen immediately be placed into a queenless colony?

Jamie 45:39

So I think the spirit of the question is if you've got a queenless colony, can you release a laying queen directly into that colony? So the short answer is no. Even though the colony is queenless, it is going to recognize that that new queen that you just placed in there as foreign and they're going to try to kill her. A better way to do it is keep that queen caged. I like to put queen cages in colonies and manually release them. A lot of the queen cages that come these days have candy in them. And as bees are eating through that candy, they're becoming accustomed to the queen contained within that cage, so that by the time they've made it through that candy and release the queen, they've accepted her. I like to manually release my queen. So I'll go back two to four days later after putting that cage in there, and if I see that they have a good response to the queen in that cage, then I will release her manually and watch and make sure they accept her. So a lot of people ask me, "Well, Jamie, what's that response that you're looking for?" Well, think about a queen cage that's made of wire. There will be bees on the outside covering it looking at the queen contained within. If they are biting the cage, and they're really tight on the cage, they're really bunched up, and they're hard to move by just rubbing them lightly with your finger, then they likely have not accepted her. If they are freely moving on the cage and not biting the wire and you can use your finger or hive tool to brush them aside easily, then they've likely accepted her and you can release her, then, into the colony and watch and make sure. But I never release queens directly into colonies that haven't spent some time with her while she's caged first because it's a recipe for disaster.

Amy 47:29
That's fair. So let's say you're requeening, just real quickly, you're requeening, how many days do you wait between pulling an old queen and putting a new queen in?

Jamie 47:39
I know that the research suggests if you give them a day or two, it's better introduction chances, but I usually pull the old queen, put the new one right in, and come back to two to four days later to release her, which is one of the reasons I like to manually release my queens, that way I can judge if they've accepted her or not. But a lot of commercial beekeepers, some of them don't even requeen with caged queens, they'll just put new queen cells in there. And that first queen, when she emerges, they don't even look for the old queen to get rid of her. They'll just put queen cells in there, and if the queen emerges, they duke it out and one of them survives. And so there are a lot of strategies for requeening. But the way I like to do it is to dequeen a colony if they're still queenright, and place a caged queen in there, and then come back somewhere between two and four days later and determine for myself if they've accepted her. And if they have, I release her manually from the cage at that point.

Amy 48:35
Awesome. Well, thank you so much. We have had a ton of questions, especially, I feel like, during the time that we had our break. People were really getting involved and emailing us with lots of questions. Stay tuned for the upcoming question and answer segments that we have in our episodes. And if we don't get to them, be patient or go ahead and just send me an email, give me a little nudge and ask that question again so we can get you on the air. But thanks, Jamie.

Jamie 49:02

My pleasure.

Amy 49:11
Hey, everyone, thanks for listening today. We'd like to give an extra special thank you to our podcast coordinator Lauren Goldstein and to our audio engineer James Weaver. Without their hard work, Two Bees in a Podcast would not be possible.

Jamie 49:26
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!