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SPEAKERS

Jamie, Stump The Chump, Amy, Dr. Kelly Kulhanek, Honey Bee

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. Today, we are joined by Dr. Kelly Kulhanek, who is a postdoc at Washington State University. She and her colleagues from the Bee Informed Partnership have done a lot of work on outlining best management practices for backyard beekeepers. So she'll be here discussing that with us today. And in our Five Minute Management segment, Amy and I will be discussing why you should re-queen colonies. And of course, we'll end today's podcast with our famous question and answer segment, Stump the Chump. Hello, everyone, and welcome to another segment of Two Bees in a Podcast. We have an exciting episode for you today because we are going to be using data to tell you what are some best management practices for backyard beekeepers. This is a really good example of the research honing in and focusing on those types of management strategies that correlate most with survival of colonies. And the reason we're able to talk about this today is because we have a guest who is intimately knowledgeable about this topic. That's Dr. Kelly Kulhanek, who's a postdoctoral associate at the Department of Entomology at Washington State University. She and her colleagues mined a huge data set to get right down to the major points that beekeepers need to know. Kelly, thank you so much for joining us on Two Bees in a Podcast.

Dr. Kelly Kulhanek 02:18
Thank you very much for having me. I'm happy to be here.

Jamie 02:21

One of the things that I'm so excited about having you today is that anytime that we are trying to make management recommendations to beekeepers, we always want them to be data-driven, science-driven, not anecdotal, not hyperbole. We really want to have research backing the management strategies that we recommend. And Kelly, you and your colleagues, you guys did a huge project, looked at a huge data set, where you're able to tease out some recommendations from that. I can't wait to talk to you about that. But before we get there, Kelly, if you'll tell us a little bit about yourself, introduce yourself to our listeners, how you got into bees and bee research in the first place, and then we'll start talking to you about the research that your team and you did specifically.

Dr. Kelly Kulhanek 03:04
So I'm originally from San Diego, California, and I did my undergrad at UC Berkeley, and I was studying biology there. While I was there, I kind of decided that I would like to get some research experience. So I just kind of randomly applied to the Ecology Lab. I had never done anything with bees before. I didn't know any beekeepers, a lot of people have experience growing up with, like, their grandpa was a beekeeper or something like that. But I didn't have anything like that. I just kind of was interested in this idea of pollination as sort of an ecosystem service. So in that research experience, I ended up working for a graduate student who was studying wild bee abundance and diversity in Yosemite National Park actually, and specifically, their response to different fire severities and burn areas. And that was such an amazing experience. Those field seasons working for that graduate student were sampling wild bee communities in Yosemite National Park and backpacking through the back country with a net and sampling bees and flowers and things like that, looking at wild bee response to different fire severities in burn areas. And so that was just a beautiful and amazing first introduction to pollinators. But, in that situation, honey bees were sort of an unwanted visitor and you're somebody who's supposed to sort of be this like pristine, natural environment and these managed pollinators, honey bees, shouldn't really be in that situation. So it's kind of funny like my first introduction to pollination was kind of like not really wanting to look at honey bees and hoping to see wild bees instead. And then when I came to graduate from my undergrad, I was looking to get more research experience. I thought I would probably want to go to grad school eventually, and I liked the pollination bee thing. But I didn't have any honey bee experience. So I applied for a field season with USGS in North Dakota. And I went there to work with Clint Otto and his team looking at sort of landscape nutritional quality, while commercial apiaries were there producing honey in the northern Great Plains over the summer. And so that was my first introduction to honey bees. And I was just hooked and completely amazed at these amazing little social creatures with this complex social hierarchy, just total powerhouse insect. And I was amazed by beekeepers and commercial beekeeping and the massive effort it takes to pollinate crops in the United States. And I just had really no idea about any of that beforehand. So, I decided I wanted to go to grad school for that. I kind of looked at a few places, and I decided that University of Maryland was a good fit. So I went to do my PhD there with Dennis vanEngelsdorp. And that was also the headquarters of the Bee Informed Partnership. And I didn't really know anything about Bee Informed before I got there. So for people who don't know, Bee Informed is a national nonprofit that sort of is a collaboration between universities all over the country and beekeepers. And the goal is to kind of bridge the gap between beekeepers and scientists, a lot like what you guys are doing with your extension program at Florida, and really do applied research that the results can be directly applied by beekeepers and use

to improve their colony health and survival. And yeah, I mean, ending up being able to work with bees during my PhD ended up being an amazing opportunity, and really a great way to form a lot of connections with a lot of beekeepers, and a lot of other scientists and meet people all over the country who are doing amazing work. So I was very fortunate to end up in that situation. And that's sort of the reason I got to do this big study that we're talking about today.

Amy 07:34
That sounds like an amazing experience. I wish I could go to Yosemite. And it's kind of fun to just hear your story about how it evolved from native pollinators. And for you to land with honey bees is just, it's great to hear about. And so we did bring you on today to discuss one of the published papers that you had done on best management practices for backyard beekeepers. And I know that that's something that, whenever Jamie and I are discussing a topic for our podcasts, best management practices is exactly what everyone wants to hear, right? How do we make it applicable? How do we make it so that people are interested? What can they take away from it that they can implement in their own apiaries? And so I guess, let's just take a step back. You know, we hear BMP everywhere. So what is the term best management practices? Or what does best management practice mean? And why is it important for beekeepers to understand this?

Dr. Kelly Kulhanek 08:28
Yeah, so for us, best management practices really means practices that can significantly improve colony health and reduce mortality. And we are really focusing on kind of, as Jamie touched on earlier, these data-driven best management practices that have been tested and confirmed to have these positive effects. I think in beekeeping particularly, there are a lot of opinions out there, and there's a lot of information very readily available. There's a lot of Facebook experts and YouTube, quote, unquote, experts. And it's a lot of information to sift through, especially as maybe a newer beekeeper, it can be very overwhelming to start, and everybody has conflicting opinions, and you don't know who to believe or what to try. So the goal of this study, and other Bee Informed projects is really to use data and the scientific method to tease apart which of these practices work and which ones don't and to kind of do some of that troubleshooting for beekeepers, so that they don't have to do it on their own colonies. We can kill our bees using bad practices so that you don't have to later. So that was really good operation for the study and what we consider to be best practices.

Jamie 09:49
So I'm intrigued by this study because I love the fact that you guys had access to so much data, and I have a very specific question for you regarding that. But before I get there, I really want to know how you were able to come up with the things that we're about to discuss you in the first place? You mentioned this dataset from BMP. What did you do with it? How did you know how much information was there that allowed you to specifically identify some best management practices that would be useful for beekeepers to follow?

Dr. Kelly Kulhanek 10:22

Yeah, and I have to give a massive amount of the credit here to Dr. Natalie Steinhauer, who's now the research coordinator for BIP. But she did a lot of this data mining. And basically, what she did is use data from the annual loss and management survey. So BIP puts out a national survey every year, and it's coming up on April 1. So if you find this information useful, I encourage you to take that survey because that's how we come up with this stuff. But basically, this is an annual survey of beekeepers across the United States. We get anywhere from four to 6000 responses every year and it's been running since 2009. So just a massive amount of data available, asking beekeepers about their management practices and how many colonies they lost over the year and over the winter. So basically, what that represents is this huge opportunity and availability of information to look at which management practices are associated with lower colony loss in this data. And that's what Natalie did. She analyzed these thousands of survey responses to figure out which practices were consistently associated with lower colony loss. And the other thing that's really important that she did is figure out which of these practices are really important for colony loss and have a big effect on whether your colony survived, because there are lots of different management practices that beekeepers use. The survey on management is like 80 to 100 questions long. Not everything, as it turns out, is super important, is life or death, is gonna make or break your colony health. So she also narrowed it down to, if we were going to give a recommendation to beekeepers, here's the top four most important things you should be focusing on that have this really huge effect on colony loss. Here's what these four things are. So yeah, that's sort of how these practices were developed. They're sort of these theoretical practices based on survey data. Then, when I came in to start my PhD, the next step was to actually test them in the field against what we call our average beekeeping practice, which is what the typical beekeeper does, these four things.

Jamie 12:50
I call it ground truthing. You've got these good data that suggests that something should be the case, and then you ground truth that with actual colony, So Kelly, we're dying here, what practices rose to the top? What are those four things that you mentioned? And we'll talk about these in more detail. But what are those four things?

Dr. Kelly Kulhanek 13:08
Yes, yeah, that's what everybody wants to know. And I will just mention that this paper is open access, which means it's available to the public for free. So if you want to read it yourself, you can google my name and honey bee. There aren't a lot of other Kelly Kulhaneks in the world, so you should be able to find it pretty easily.

Jamie 13:27
And Kelly, I'll add to that, we're gonna make sure and link this paper in our show notes. So people access the podcast to our website, they're going to be able to get a direct link for this manuscript.

Dr. Kelly Kulhanek 13:37
Perfect. Sounds good. So these top four practices that ended up being super important and having a big impact on winter loss, I will just list them now. And we can kind of talk about the best practice in the

average practice in each of these four categories. So the first one was how you start new colonies. The data showed that the average -- and I should also specify that we're talking about backyard beekeeping practices here. Commercial beekeeping, the practices are kind of more specific to the operation and it kind of more depends on what they're trying to do. So the recommendations I'm talking about today are more generally applicable to backyard apiaries. So the first thing was how you start new colonies. And the data show that the average backyard beekeeper starts new colonies from packages. But, Natalie found that it might be better to start packages or start new colonies from splitting your hives. So splitting your own hives, or if you don't have hives available to split or they're not strong enough to split, to purchase a nuc. Splits and nucs seem to survive a little bit better over the years than packages. And you know, I think that kind of makes sense. Splits and nucs are a little bit more established when you get started. Packages kind of have a little bit more of a hill to climb in the beginning there, especially if you're a new beekeeper, and you don't have any wax comb available that first year that you install a package. If you don't have any wax, they're going to be putting a lot of energy into just drawing out those frames. So you might get a little bit higher mortality in that category. So, nucs are a little bit more of an investment, but the data sort of suggested that that higher initial investment might be worth it. The second thing that came out is super important, it's what you do with dead equipment. So this is talking about if you show up to your yard, and you find a dead colony, what you do specifically with those brood boxes, really, and that wax, those wax combs that are in those boxes. So the average backyard beekeeper will show up, find that out and take that equipment back home and store it in their shed or their garage or whatever, and it will be stored there until it needs to get used likely the following year. But the best practice that was associated strongly with reduced colony loss was actually to reuse that equipment immediately. So this means that you would find that dead out and then you would add those boxes to another colony in the same yard who maybe was growing and needed more space. Or if it was at the right time of year and your colonies needed to be split, then you would use that equipment to make a new split. This one is a little bit tricky to do in practice. A lot of the time when beekeepers are finding dead colonies, it's not at a time where they need to be adding boxes to other hives or making splits. So with this one, I just say, if you have an opportunity where you can try this practice out, we recommend you give it a try. But if you don't, don't stress about it, it's okay to store that equipment. But the data just suggests that it might be better to sort of keep those boxes in that wax comb and use as much as possible. The third thing that was important is what you do with brood comb before you reuse it. And these two kind of contradict each other as well. So I'll try to sort of explain how this works. But basically, we all have, probably, around this time of year boxes stored in our garage with frames of wax, and we're getting ready to install new packages on them or add them to new splits or sort of bring them back out into the world to be used. And we just recommend that before you reuse that wax, you treat it in some way to kill anything that might have been leftover in there, small hive beetle larva, bacteria, things like that. We recommend that that colony gets frozen for a minimum of 24 hours. A lot of people don't have access to a freezer that's big enough to make that happen, which we totally understand. In northern climates, you can actually just kind of like leave your stuff outside and it'll freeze solid. We had a collaborator in Minnesota who that was the case, they were just like leaving their boxes outside and they would freeze for like weeks at a time. But it's just a good hygienic practice, if you can, to try to freeze that wax before you introduce it to a new colony. So that kind of contradicts the one I was talking about before where we recommend you reuse that wax immediately. So how this would look in practice

is that if you show up to your yard and you find a dead out and you can reuse that equipment immediately, we suggest that you go ahead and try that and add those boxes to a new colony. If, sort of more likely, you can't reuse that equipment immediately and you do need to take it home to store it, we recommend that you just give them a quick freeze before you put them into storage. Especially for beekeepers in the south, and like in Maryland we have this problem too with small hive beetle, you really just want to make sure you freeze everything before you put it into storage to make sure you kill any small hive beetle larva that might be sort of like lurking in there. It kills wax moth larva too, so it'll just sort of help you maintain healthier comb. Then the last thing that ended up being really important, which is probably the least surprising, and people will be most familiar with this concept, is the frequency of Varroa management. So, how often beekeepers were monitoring and treating for Varroa, and at the time we developed these management practices, the average backyard beekeeper was treating for mites once per year in the fall in August or September. And the best practice here that was associated with a huge reduction in winter loss was monitoring your colonies every month, and treating whenever you exceeded the threshold of three mites per 100 bees. So, now we sort of have these four practices, we have an average practice for each and a theoretical best practice for each. And now we can sort of test these best versus average management regimens on colonies in the field to see if they actually improve colony health and survival and which ones seem to have more of an effect. So that's what I did for the first three years of my PhD from 2017 or 2016 through 2019.

Amy 20:52
Wow, it sounds like that kept you extremely busy.

Dr. Kelly Kulhanek 20:56
Yes. And it was kind of like definitely a crash course introduction to beekeeping. I had 60 hives in Maryland that I was in charge of doing this on. So yeah, it was fun. It was a lot of work.

Amy 21:10
Well, great. So I know that, a lot of the times, when we were talking about the BIP information and the survey, we kind of focus on beekeepers as a whole. And sometimes Jamie and I focus on commercial beekeeping. So I think that this was really helpful in understanding the backyard beekeepers and some of the practicality that goes along with it. You've talked about how to start a new colony and how that affects beekeepers and their bees, what to do with dead out equipment, what to do with wax, and then the frequency of Varroa management. Now, can you tell us about how a backyard beekeeper's management practices can impact the success of their neighbors' colonies?

Dr. Kelly Kulhanek 21:52
Yes, absolutely. So, I think, first I might just talk about what we saw with the Varroa management differences between the best and average apiaries because it'll kind of help explain why you might be affecting your neighbors or your neighbors might be affecting you. So, basically, these average apiaries that were only treated once per year in the Fall had higher mites than the best apiaries that were treated more frequently, and they had higher mite loads throughout the whole season. That's really not surprising that the best apiaries had lower mites. They were treated much more frequently, those

apiaries were exceeding that three mites per 100 bees threshold, at least two and sometimes four times per year. So they were treated quite a bit in the best apiaries. I think another thing that's interesting to note from these results is that those average colonies that were only treated once in the Fall, actually started years two and three with higher mite loads in the Spring. So there was a bit of carryover from the prior year, the colonies that did survive with those higher mite loads, actually started the next year with higher mite loads, then reached that threshold again faster, and sort of had higher mites the whole season. And one of the biggest impacts of that was the viral loads. So because these average colonies had higher mites for longer periods of time, they actually ended up having a lot higher virus loads in the fall, specifically talking about deformed wing virus, Varroa destructor virus, acute paralysis virus and some others. So, it really became clear that the lack of Varroa management early in the season, in the spring, around this time of year was really having a negative effect on the colony health from a virus standpoint. So, that really advocates for being as proactive as you possibly can about your mite management and sort of needing to deal with it earlier than some people might think. Your actual mite load might not get that high until the fall. But once the virus loads gets up there, the damage is sort of done and you can't really treat viruses once you have them. So it's really important to sort of cut that off earlier in the season before those virus loads get high.

Amy 24:22
Sure. Now, would you say that that list that you read out to us, would you say that that was in order from maybe the least important to the most important, with how you start new colonies being kind of at the bottom, and then the frequency of Varroa management kind of being the top priority that beekeepers should be looking at?

Dr. Kelly Kulhanek 24:40
Sure. So I would definitely say that the Varroa management should be the top priority. The other one that I think probably had an effect as well and is relatively easy to implement is the starting new colonies from splits or nucs versus packages. So I read that first, but I wouldn't really consider that lowest priority. I think, sometimes, these package producers are producing a lot of colonies at once and the queens are kind of coming from all over the place. We split our own colonies, and we purchased nucs from a more local beekeeper, which I think can also sort of have a positive effect if the queens you're buying are more conditioned to the local environment where you are, and the queens in those nucs also just seem to do a little bit better. So, I would recommend giving that a try. If you're trying packages over and over again year after year, and they're always giving you trouble, I would recommend trying to make splits or buying a nuc. And then the other two, the freezing the comb and the reusing the deadout equipment, I think those are probably important as well. But like I said, they're a little bit harder to employ and practice, which is totally understandable. And so I always also like to give a disclaimer with all of this information, like, these are just recommendations. The data says that they should work and should improve your colony health and management. But if you're doing something else that's working really well for you and you know that you have low mite loads, for sure, from alcohol wash samples, and your colonies are surviving every year, and you're doing something other than what I'm talking about, then, you should keep doing that. And don't feel like you need to force yourself to use these practices if they don't really fit into your operation. The mite management is,

I think, pretty clearly important for everyone. And there's sort of endless data that suggests that that's absolutely vital. And we can talk about how you might be affecting your neighbors as well, through that one.

Jamie 26:52
Kelly, I want to specifically think about this mite thing a little bit because when I look at survey data, it's important for me to be able to tease apart the results from the noise, and I think specifically about the best recommendation for Varroa is to monitor monthly and then treat. And so I completely agree with you. I was at a meeting some years ago where we had commercial beekeepers. At the meeting, it was mainly for commercial beekeepers, and we were asking them their management practices, and some of them were making the claim that when they monitor, they have to treat four to eight times a year, which was mind-boggling for me at the time, but I want to think specifically about backyard beekeepers. If those who are going into their colonies and monthly monitoring Varroa have lower losses, can you conclusively say it's from Varroa or from the fact that maybe they just monitor colonies with regular frequency and so they're able to address the other issues that they see that they're having, in addition to getting a pulse on what the Varroa loads are in those colonies?

Dr. Kelly Kulhanek 27:52
Yeah, absolutely. I think more active beekeeping and being more on top of it is definitely associated with lower losses. We think that might be one of the reasons this action on deadout category came out is so important, because beekeepers who are finding a deadout in enough time to reuse that equipment might be more active participants in beekeeping and in their colonies. So I do think that regular monitoring, and just colony health inspections and taking good notes, it's hard to take good notes, especially in the field on a hot day, when you're getting stung. It's kind of a struggle sometimes, but it's super important in order to understand how your colony health is fluctuating over long periods of time. The more you do that, the more you understand what a regular year looks like for you, and you can identify if something weird is going on, if something has changed, and you can better anticipate what your colonies might need next month, next week, things like that, because you get more used to what might be happening. But all that being said, the mites are still a huge issue and a very important thing to address and something that everybody needs to stay on top of. I have a lot of beekeepers who will monitor and realize they have a high mite load and they apply a treatment and then think they're good to go. But it's really, really vital to monitor after you apply that treatment, after the treatment should be finished to make sure that it actually worked. And we saw an example of that in this study where, by October, the mite loads in the best and average apiaries actually kind of evened out. So the best apiaries that were treated all the time had lower mite loads for most of the season, but then by October, their mite loads had gone up to kind of match and be on par with the mite loads in the average apiaries. One of the reasons we think that might have happened is because the best and average apiaries in the study were only about 100 yards apart in a lot of places. And we did that so that they would have access to the same floral resources, and they wouldn't have environmental differences and things like that. But one of the negative parts of that is that they could find each other. And so, especially in Maryland in the fall, there's a dearth starting in about July. So there's absolutely no nectar resources for them after that and they rob like crazy. There are bees visiting other colonies all over the place. And

what we think may have happened is that because these best and average apiaries were kind of close together is that these average apiaries were sort of harboring these big mite loads, and then everybody started robbing each other in the fall. And the best colonies actually picked up mites from those average apiaries, and ended up seeing an increase in mite load. Their virus load stayed low, and they got another treatment again, after that, pre-winter, they were cleaned up with an oxalic acid dribble, which helped improve their survival. But that goes to show that even if you are super on top of your stuff, and you have a neighbor who's maybe not, you're gonna have a high mite load even if you just treated. It's possible that you might have a high mite load. So we always recommend never assuming your treatment worked, always monitoring before and afterwards to make sure that that treatment had the effects that you expected it to.

Amy 31:38
Well, it sounds like you've already answered my last question, but I'm going to ask you anyway. So what would you say the most important takeaway from this study is for backyard beekeepers?

Dr. Kelly Kulhanek 31:49
Yeah. So I think there are a couple important takeaways, one of the main ones being this idea of really active Varroa management starting earlier in the season than people are maybe used to thinking about. I think, sort of the traditional ideas that mites are sort of a Fall problem. But really, the earlier you can keep those mite loads low, the easier time you will have later in the season. Also, making sure to monitor after you're applying these treatments to make sure they had the effect that you expected. And then, another kind of interesting thing we found from this study is that there seems to be this cumulative effect of these management practices over time. So like I said before, the average colonies were starting each spring with a higher mite load that seems to have carried over from the previous fall. And we also saw this with winter losses each year. Over the three years, the average apiaries did a little bit worse, and actually lost a few more colonies. And in the best apiaries, they actually did a little bit better each year on last fewer colonies. So it seems like there's sort of this cumulative effect of both good and bad practices, that kind of adds up over time. So, that's, I guess, kind of a lesson in patience. If you're trying a new management approach or tactic that it might take a few months, or even a couple years to have its full impact on your colonies and your operation.

Jamie 33:26
So Kelly, you've really been giving us some great advice today. I really appreciate your time. I love the fact that it's all data-driven. I know that backyard beekeepers around the world can benefit because a lot of these points are universally true. So thank you so much for your work on behalf, I know, of your team, your collaborators. Thank you. And again, I appreciate you joining us on Two Bees in a Podcast.

Dr. Kelly Kulhanek 33:47
Yeah, my pleasure. Yeah, very happy to be here. Thank you for having me. I love talking to beekeepers and talking about this stuff. So yeah, I mean, I'm also available to give talks if clubs need speakers. One good thing about this whole COVID situation is everyone's getting more comfortable with virtual talks. So I'm happy to talk about this with anyone who wants to.

Jamie 34:10
Kelly, with that in mind, I will make sure and link your contact information in our show notes as well as the paper that I alluded to earlier. We'll make sure it's linked in the show notes so that people can reach out to you if they have specific questions.

Dr. Kelly Kulhanek 34:20
Perfect.

Jamie 34:21
Everybody, that was Dr. Kelly Kulhanek, postdoctoral associate at the Department of Entomology, Washington State University, talking with us about best management practices for backyard beekeepers. Thank you for joining us on this segment of Two Bees in a Podcast.

Honey Bee 34:40
For more information about this podcast, check out our website at UFhoneybee.com.

Amy 34:52
Today's Five Minute Management is about re-queening. So Jamie we are going to talk about why anyone would want to re-queen. And I will go ahead and start the timer.

Jamie 35:06
You know, Amy, that's actually a comment that I get quite a bit that I actually give a presentation called identifying queen-related issues and then remedying them, in other words, how to spot problems and then fixing them. And I always have to give the example that when we're new beekeepers, all we ever want to do is see a queen, right? And when she's in there, we're so happy that she's there that we're not going to do anything to address any problems related to her, and so what we tend to do as beekeepers is we tend to allow, especially young beekeepers, we tend to allow queen problems to persist without fixing them. I always tell people, it's a good idea to re-queen once a year. That's just part of normal management. And I'm saying that to keep a young queen in there who has a high egg output as well as a good pheromone output. These are productive queens whose presence is known. As long as the bees know that she's there, as long as she's producing lots of brood and her bees are docile, and all of those things, that's great. And so re-queening once a year can kind of help you achieve that. So that's just based on habit. Now, there are plenty of times that you're going to need to re-queen because the queen is failing in some way. And so that's the part that I find it more difficult to coach to new beekeepers. Everybody understands this idea of replacing queens once a year, just as part of basic management. But a lot of people struggle with the idea that, "Wait, you want me to de-queen a perfectly okay colony? They've got a queen, if I take her out, it's going to be a problem." But let me tell you, Amy, some scenarios that would lead a person to want to re-queen in the first place, scenarios that go beyond simply habitually re-queening once a year. Alright, so there are times throughout the year that your colonies may have a dead queen, right, or missing queen so you can allow them to re-queen themselves. But if you do that, it can take up to six weeks before that new queen has offspring

that's emerging from the comb. It's just real simple math. I'm gonna round everything off to the week. It can take a couple of weeks for the new queen to emerge, a couple of weeks for her to mate, and three weeks before her first egg goes through all its developmental stages and emerges as an adult bee 21 days later, so that's six to seven weeks of missing time. So you might want to re-queen colonies when you find that the queen is altogether gone. You'll also want to re-queen colonies if your queen is poor quality or failing in some way. Maybe her offspring are quite defensive, maybe they're not productive, maybe she's not laying as many eggs as you think she should be, maybe she's running out of semen or mated poorly and has a disproportionately high number of drone offspring that she's producing. All of these could be reasons that you would want to requeen. If you have laying workers in your colonies, you are going to have to try to find a way to re-queen those hives. If your colony swarmed immediately before production season, you're going to have to find a way to re-queen your colony. If you live in an area where African honey bees are present or African-derived honey bees are present and your colonies become defensive, you'll want to re-queen those colonies. So, what I always tell people is if things are going really well in your apiary, then you're going to want to re-queen about once a year, right? But there are times like missing queens, poor-quality queens, laying workers, swarming, living in areas where African bees are present and you get defensive bees, all of these also would drive me to want to re-queen my colonies.

Amy 38:39
You did it with a minute and a half left. Congratulations.

Jamie 38:43
Thank you.

Amy 38:44
And I do know that here in the state of Florida, it is a best management recommendation to re-queen if they're beekeepers that go out to catch wild or feral colonies. That's true, right?

Jamie 38:58
Amy, what a great contribution to this list of reasons you'd want to re-queen, something I missed all together. Absolutely. So maybe this isn't universally true, for example, around much of North America or Europe, but in areas where African bees are present, they establish a really high density in the natural environment. So, for example, in South Florida, there's a reasonable probability that if you're removing colonies in South Florida from people's houses or trees, etc, that they're going there's a high probability that there'll be African honey bees or bees of African honey bee descent. In those cases, it's just a general best management practice, if you are a bee remover in areas where African bees are present, it's a good best management practice to re-queen those colonies once you get them back to your apiary

Amy 39:42
Awesome, and I know that in our next Five Minute Management, we are going to be talking about how to re-queen so stay tuned for that.

Stump The Chump 39:55
It's everybody's favorite game show, Stump the Chump.

Amy 40:07
It is a question and answer time, and we are going to try to stump the chump today. Okay, so the first question we have, we did an episode, either was a segment or a Q&A and we were talking about nematodes and whether that is used to treat small hive beetle larva. So someone had a follow-up question of what brands of nematodes have you used to treat small hive beetle larva?

Jamie 40:39
Okay, so the history of my research with small hive beetle and nematode control dates back to my postdoc days at the University of Georgia. I was working with some colleagues out of Perry, Georgia. They were a private company, and they were interested in trying -- they produce nematodes and were interested in trying to control small high beetles using them. So for those of you who don't know, nematodes are worm-like creatures. They're not worms, but they're worm-like creatures that are incredibly small. There are nematodes that eat plants, there are nematodes that eat insects, there are nematodes that eat all kinds of things, and they tend to be very specific. So there are some species of nematodes that are really good at eating certain types of insects, for example, beetles. How they kill the beetles, in this case, or insects in general, is the nematodes will tunnel into the body of the insect, they will regurgitate bacteria into the body of that insect, that bacteria will produce a toxin that kills the insect and the nematodes kind of slurp up the digestive juice it all together. So it's almost like that movie, right? Alien, right? They come out of you. Well, a few nematodes go in, they reproduce and more nematodes come out. So it's an example of biological control. Since small hive beetles pupate in the soil around hives, the idea is if you can find some soil dwelling nematode species that will attack small hive beetles, you might have a good opportunity to reduce beetle populations in the soil. Okay, so my colleagues and I did a lot of research on this topic. And we did, in fact, in the US, find two species that are very useful. The reason I put the US caveat in there is because I know a lot of folks are listening from overseas. We tried with our project to make sure to find nematode species that are already native to the area. We were doing the work that way you wouldn't have to petition to be able to introduce an introduced species. We'd only have to augment populations of existing species. To make a long story short, the two species that we found worked best, and Amy, I have to apologize for this because, of all the scientific names I know, they're the scientifically-tificist of all the scientific names. It's just really bad.

Amy 43:03
What is it?

Jamie 43:04
The first one is Steinernema riobrave. The second is Heterorhabditis indica. These are two fairly common nematode species for biological control purposes in the US. We'll make sure, Amy, and link the refereed manuscript where these two species were tested and are described in the show notes for the Q&A section, that way folks know how to find it. But again, it's Steinernema riobrave, and

Heterorhabditis indica. Those two species had a lot of good activity against small hive beetles in our very controlled studies. I'm stopping short of saying they're going to make a difference in managed populations, in apiaries. But in our very controlled studies, they absolutely did kill beetles. The problem is right when we were about to take the next step, and look at this on a grand scheme, something called colony collapse disorder was born. And that shifted nearly every bee researcher's attention away from what they were doing to the new issues surrounding bee losses. So never did a follow-up study at the commercial level. But in all the very controlled studies we did, those two species were pretty efficacious against small hive beetles.

Amy 43:05
Sure. So how would you even go out getting nematodes?

Jamie 43:17
Yeah, believe it or not, Amy, there's a handful of companies that sell these things. And it's almost always in biological control. Believe it or not, there's some fungal pathogens that you can put out for insects and other things and almost all the time, if people sell one, they sell the other. This particular company we're not allowed to endorse or put down a company, for that matter, in any of this work we do, but this particular company in Perry, Georgia, they sold some beetle grubs for the purpose of bird food. It's very common to sell beetle grubs that you can put out for wild birds. This group also happened to use those beetle grubs to rear nematodes for biological control purposes. So, if you just Google the names of those two species of nematodes, and we'll have to make sure and spell them for our listeners, and I'm not even sure I could spell them correctly. If you just Google it and biological control, and then for sale, then you'll probably find a handful of places that sell them. They're actually fairly common in the biological control world.

Amy 45:25
All right. Okay. So for a second question, I'm just going to go ahead and read the question. So we kind of have just the history of background behind the question. So this person checks their mites each month, religiously, and they treat accordingly, which is great. Good job, congratulations. Okay. So this past winter, they were only able to get about 50% through with treatments. So the question was, they're trying to get mite counts early in the spring and they feel like they need to get a more accurate mite count. Would it be a better practice to do 100 pupa samples instead of doing an alcohol wash, you know, basically just trying to look at the pupa versus the adults?

Jamie 46:08
Yeah, those are interesting questions. I've actually never been asked those before. And what I will tell you the short answer to your question is all the recommendations I've ever seen are based on the number of mites per 100 adult bees. So that percentage, that's called an infestation percentage or infestation rate. So if you have three or more mites per 100 adult bees, then you've reached an infestation rate that you need to make an intervention. You need to treat your colony to kill those mites. If you have two or fewer mites per 100 adult bees, then you can continue non-chemical control options to try to keep those Varroa populations low. Now, the questioner is asking, can we, instead of using

adult bees, use brood? And my only concern, in that regard, is we just really have no recommendations based on brood amount. I would argue that we know three mites per 100 adult bees is a damaging level. It's not safe to say that three mites per 100 pupal cells would be an equal recommendation. So I would argue that even though I understand the motivation behind that question, we still need to use adult bees. Now, speaking to the specific comment that they were saying regarding their loss rate, a couple things that I'll just bring up, they're arguing that, "I was monitoring closely, I treated in response to trouble, but I still lost half of my bees over winter." So there's a couple of explanations here. Number one, is it's possible that your colonies died for something else that wasn't related to mites. Maybe it was starvation, maybe it was some other stress, whatever the case may be. So don't instantly assume that maybe you need to change your monitoring tactics because it very well could simply be that it was something else altogether. Alright. My second comment is it's also possible that the treatments didn't work. So what I always tell people is if you're a monitoring before, and making a decision to treat based on that monitoring, then you should also monitor after a treatment to confirm the treatment worked. And that's just kind of part of our best management recommendation. So it is possible that you did treat timely based in response to a load of mites that you knew you needed to address, but that the treatments failed. So the only way to really know that is to monitor afterwards as well.

Amy 48:27
It almost seems like it would take a lot longer to go through pupa samples, you know, to go through uncap and pull each sample outright.

Jamie 48:34
Amy, that's why we have you as part of the Two Bees in a Podcast.

Amy 48:38
You're welcome.

Jamie 48:38
You're absolutely right. That's something I completely overlooked. I'll give you some mad props for that because that's absolutely right.

Amy 48:45
Thank you. Thank you.

Jamie 48:46
Even though I'm not sure what mad props are.

Amy 48:49
That's all right. Thanks. I appreciate it either way. Okay, so the last question that we have, someone was wondering, is there a scientific name for the substance that queen uses to glue eggs to the bottom of cells? Does she even glue the eggs to the bottom of cells? Or does she just lay an egg and it just sits there?

Jamie 49:05
I really love this question. It's one of those questions that's super easy for me to answer and I'll tell you, here's my answer.

Amy 49:11
You don't know?

Jamie 49:12
I don't know. But let me just say I have read a ton about honey bee biology and I know this particular questioner even quotes the book that they get it from, which is "The Biology the Honey Bee" by Mark Winston where Mark says the queen glues the eggs to the bottom of the cell. I have never seen a scientific term ever used for that glue-like substance. Every time I've ever heard it mentioned in our lecture, or ever seen it written in text, it's just called glue. Queens glue the eggs to the cells. I bet there is a name, but I don't know it and I'm not sure any bee people know it. So if you are a listener, and you are out there and you know what that stuff is called, tell us through our social media accounts. Amy and I will make sure and update everyone with the actual name. What a great question.

Amy 50:11
That is a really a great question. Keep your questions coming. We've been receiving lots of questions on email, social media, I've been getting voicemails, people calling and asking questions, so keep them coming. And that's our Q&A. Thanks. 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 50:48
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!