Episode_3_Final PROOFED

Thu, Sep 08, 2022 9:49AM • 54:32

SUMMARY KEYWORDS

varroa, bees, pollen, beekeepers, mite, bee, program, beekeeping, colony, apis, honey bee, honey bees, commercial beekeepers, master, species, feed, hive, food, information, podcast

SPEAKERS

Jamie, Mary Bammer, Dr. Cameron Jack, Emily Noordyke, Amy

Jamie 00:05
Welcome to Two Bees in a Podcast brought to you by the Honey Bee Research and 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. We have a great episode in store for you. We are going to be talking about honey bee nutrition with Emily Noordyke, master's student here at the University of Florida. We will also talk about master beekeeper programs. What are they? What do they hope to accomplish? And we are going to be answering some questions from our listeners. In addition to that we are kicking off this podcast with an in depth discussion of Varroa. To do that we are accompanied by Cameron Jack who is a PhD student and lecturer here at the University of Florida Honey Bee Research and Extension Laboratory. He is a Varroa specialist. Welcome to Two Bees in a Podcast. Cameron.

Dr. Cameron Jack 01:22
Thanks again for having me.

Jamie 01:23
Absolutely. It's great to have you so we want to talk Varroa. Amy what do you want to know about Varroa?

Amy 01:30
What is Varroa?

Dr. Cameron Jack 01:31
What is Varroa? Varroa is a parasitic mite that feeds on the honey bee fat tissues that transmits a lot of viruses. So that's why it's such a big frustration for beekeepers.

Jamie 01:46
So are - you say it's frustration for beekeepers, that means most beekeepers are aware that it exists. This is something all beekeepers hear about considerably.

Dr. Cameron Jack 01:53
I think at this point. If you're a beekeeper in the United States, if you've been beekeeping at any point in time, you probably are aware of Varroa.

Jamie 02:03
Yeah, I agree. Everywhere I go on planet Earth, beekeepers, when they have their meetings, there's always a talk or two about Varroa. So we're going to try to use the next 15 or 20 minutes to introduce you listeners to Varroa. Probably many of you are aware of this mite, you're working to control it, but there are some things that we want to share with you a bit about the biology, where it came from, things like that, but we're also going to spend considerable time in future podcasts talking about control and new research overall, etc. So Cameron, you've told us as an ecto parasitic mite, a mite that's on the outside of the bee's body but feeding on fat tissues, where did this thing originate?

Dr. Cameron Jack 02:39
Varroa is from Asia. Its native host is Apis cerana, which is the Asian honey bee. There's a few different species of Varroa actually, the one that we have in the United States is Varroa destructor, which is a great name.

Jamie 02:58
Says what it does.

Dr. Cameron Jack 03:02
Varroa destructor, basically what happened is as beekeepers in Asia started to move bees into Asia for honey production, they were bringing in Apis mellifera. And so when you start overlapping the regions for Apis mellifera and Apis cerana you're gonna get some transfer of different pests and pathogens. And so basically that's what happened is Varroa jumped ship from Apis cerana to Apis mellifera. And then from there since Apis mellifera has kept all over the world, then it just started to spread.

Jamie 03:37
Cameron, I think that is absolutely key to Varroa's issue, right? So it's not always the case, but often the case when things move host. In this case, Varroa is moving from Apis cerana, the Asian honey bee, to Apis mellifera, the western honey bee. When things move hosts in biology we call this a host shift. When things do this, they can be worse for their new host than they were for the original host so cerana presumably, co-evolved with Varroa. So Varroa is not as bad a problem for cerana. How does cerana deal with Varroa? Why do beekeepers of Apis cerana not worry as much about Varroa as do beekeepers of Apis mellifera?

Dr. Cameron Jack 04:21

Yeah, you're right. Because of that coevolution they've evolved a few different mechanisms that we know about. So one of them being an increased hygienic behavior from the Apis cerana bees. They groom themselves more, they groom each other more, and then they are also just more aggressive towards the mite. They will bite at it, they will do what they can, they basically - the workers will not stop until they get that mite off their bodies. Whereas a lot of Apis mellifera workers are just somewhat content. I mean, they just allow the mite to be there where Apis cerana just doesn't put up with that.

Jamie 04:55
So that behavior is called grooming, right? So the work that Apis cerana is grooming it's not as mellifera does the same thing. In fact, you can select for it in mellifera and have enhanced grooming behavior. But more on that in future podcasts.

Dr. Cameron Jack 05:06
There's also a few other mechanisms, one of them being that we don't understand exactly how it's happening. But we basically only find the mite reproducing in drone brood, which is not necessarily the case with Apis mellifera we see it in both workers and drone. And something that's really interesting about Apis cerana biology is if there are under certain conditions, it might cause the, the drone, that's where the mite is in that cell feeding, it might actually cause them to die. And instead of the workers noticing that there is a problem with that bee that's down in that cell, instead of removing that bee, which is kind of a typical hygienic behavior, they actually leave it there and we call that entombing because now the mite only has a dead bee to feed on. And it can do that maybe for a day or so. But then it's not gonna be able to feed anymore, and then it will basically die down in that cell.

Amy 06:12
Hey, Cameron, when you're talking about Varroa and reproduction, can you tell us a little bit about how they reproduce and how they multiply so quickly?

Dr. Cameron Jack 06:21
Sure, basic Varroa reproduction: the only mites that you're going to see are females. So what happens is, a female enters into a cell, and there maybe are a couple of different mechanisms that are used. One, there's definitely a school of thought that shows that the number of times that a bee is entering to a cell to feed that larva might be a cue for that mite to enter. Or it might also be detecting some of the pheromones that the larva is giving off to let the workers know that it's time to cap that cell. And they will detect that and they hurry and they jump into the cell, they bury themselves under the brood food for a period of time until that cell is capped, and that larva will then eat the remaining brood food, kind of releasing the mite will kind of stand up on its end, enter the pre pupa phase. And at that point, the mite is basically free to move about the cabin, and will then be able to start feeding and within just about 30 hours or so that mite will start to lay eggs, and the first egg will generally always be a male. And then every subsequent egg will then turn into females. And then with just in a short period of time of the bee development going through its pupa period. This, the male son will then mate with all the female daughters. And so there's just a tremendous amount of inbreeding.

Jamie 07:52

Wait a minute, wait, wait, wait. So if a single adult Varroa goes into the cell, and she lays an egg (in science we call that oviposit because nothing's easy to say in science). She oviposits; she produces an egg, that egg's a male, if only one Varroa female goes in she'll produce a male, produce subsequently females. So in this case, only brothers and sisters are available to mate. So this is okay.

Dr. Cameron Jack 08:19
This is, they've somehow got to figure it out. They're not turning blue. They're not some other genetic defects that we're seeing they've got it figured out.

Amy 08:26
How can you tell the difference between a male and a female?

Jamie 08:28
You ask it Amy?

Amy 08:30
Well, I'm asking right now.

Dr. Cameron Jack 08:32
That's rude.

Jamie 08:35
Yeah, okay. All right.

Dr. Cameron Jack 08:36
So you can see that the males are, they're not fully scleratized, they're soft bodied, and they're a bit more round so they just kind of have a whitish pinkish color to them. Whereas the female once they are in a nymph stage, so they're not fully mature, they're still kind of that white color, because they're not fully scleratized or hardened. But when they become adults, they kind of turn that reddish brown color. And they fully scleratize, and that's when they would mate.

Jamie 09:05
So why do we never see males?

Dr. Cameron Jack 09:07
The males will stay down in the cells and they actually die. They never leave the cell so you won't expect to see a male unless you are physically opening up a cell and pulling out the pieces.

Jamie 09:17
So their bodies never scleratize either. Right. Interesting. That's such a weird, you think about the development of that trait. I guess if mating occurs in capped cells, it's not necessary to have males outside of that. But males are really just sperm transfer right. In this case, they don't actually need to come out they don't need to survive very long. They just exist long enough to mate. Interesting.

Amy 09:39
I have two words: girl power.

Jamie 09:43
We have no words. All we can do is agree. Well, that's interesting. I want to circle the wagons back just a little bit. So you said they came from Asia. They're a natural pest of Apis cerana but there are eight species of honey bees in Asia and of course the ninth species Apis mellifera has been introduced. So there are eight species and Apis cerona is one of those that means there are seven other species of honey bee there, right? Do Varroa occur on any of those other species? Are they natural pests of any of these other species? Can they get on dorsata, or florea, or andreniformis, or the other cavity nesters? Cerana is pretty closely related to nuluensis and koschevnikovi so do Varroa show up on these other bees?

Dr. Cameron Jack 10:27
Yeah, that's a great question. They do. They have been found to show up I don't know that they the other species aren't really well managed. And so I don't think we just have as much information Apis cerana is a managed honey bee and so beekeepers have been looking and studying it probably much more than they have some of the other species. Different species have different problems. For instance, Apis dorsata, the giant honey bee, which is not a cavity nester, it's an open nester, they have their own mite, which would be tropilaelaps. And Varroa can show up on there as well, but they just don't. Whenever tropilaelaps is involved, it kind of tends to overshadow Varroa. So I certainly think that these mites can be present in other honey bee species but they're generally not considered as big of a threat, primarily because people aren't really looking and they're not really managing for them.

Jamie 11:19
Sure. So Cameron, you know, I think there really have been kind of two major breakthroughs in Varroa research in my time experience overall, you know, I've only been keeping bees now since the early 90s. But, in my time, the first big breakthrough of Varroa is when they discovered that it was not the species they thought it was. So if you look in the literature prior to 2000, it talks about Varroa jacobsoni, and this was the mite everyone was concerned about and it's the one that they fought. But in 2000 Anderson and Trueman published that it is not in fact, jacobsoni, it's destructor. Now you mentioned that to me that it was a significant breakthrough, understanding species knowing that there's haplotypes or types of destructor that are worse than others. I think the second major breakthrough actually came earlier in 2019. I think that's when Sammy Ramsey and his team at the University of Maryland, as well as the USDA, as well as here at the University of Florida, discovered that they don't indeed feed on hemolymph, which is bee blood, which is what everybody thought for the longest time. And you mentioned early what that food stuff is that they consume and what is it? Fat tissue. So why do you think that's a significant finding? We're gonna - we plan to have Dr. Ramsey on a future podcast. But for now, just to summarize, you know, why is that a major finding?

Dr. Cameron Jack 12:34
Well, I think it's important to: one, be able to understand where it's feeding that, at the moment, it's probably not going to change the way that we treat or handle Varroa, but it does definitely affect the way that we might study Varroa. And particularly, trying to produce Varroa in the lab, now that we know

what they eat, we have a better idea of their diet, we can actually try to rear the mites in the lab. And if you think of the significance of something like that, I mean, every kind of agricultural pest that exists if there's a specific insect that feeds on a plant, you can grow that plant and you throw those insects on it. And then you have - I mean they will reproduce and do whatever they need to do on that plant. And then you have, basically, insects that you can use for your research year round. Well, there's nothing like that for Varroa. If we want Varroa, we have to go into the hive and get it. And I know that some of you beekeepers are listening you I mean, the joke, everybody always says to me, every time I go talk, they're like, well, you can have my Varroa. But like I need - when you're doing research, you need lots of Varroa, even a severely infested colony is not enough. I need lots of severely infested colonies. So to have a method of being able to rear the mite in the lab would just be so beneficial to Varroa research. And so understanding what they're actually feeding is a huge step in that direction.

Jamie 13:59
Well, to me, both of those findings, findings that there was, in fact a second species, the one that's the major issue and finding that they don't feed on what we thought they fed on that to me illustrates how science works and how it moves. For example, the number one pest, in my opinion, of honey bees happens to be Varroa. Well, if this is the thing that scientists around the world are studying, and we didn't know that it was a different species. And decades after that, we continued to still believe that it fed on hemolymph rather than fat tissue, and now we know otherwise. Imagine the other things we need to find out about it, but not just it, but other things in the bee world. Things that we might take for granted that might not actually be true, and they might radically change the way we approach bees and beekeeping. I've kind of got one parting question. Maybe Amy has one after this, but I've got one parting question about Varroa. So you've told us that it feeds on fat tissue, these fat bodies are important for bees, bee health, etc. But what else does it do? Why is it bad? You know, it gets in and reproduces on our bees. So what? You know? How do Varroa contribute to the weakening of colony and the overall loss of a colony?

Dr. Cameron Jack 15:08
It really comes down to viruses that they can vector and transmit. Without viruses, if viruses weren't in the picture, then Varroa would probably be nothing more than just a nuisance, right. But the fact that they will then take a virus that maybe they're taking as they feed on one bee, and then they start transmitting that to bee to bee to bee to bee to bee, as they continue to feed and move. That's when it becomes a problem. And it's not necessarily that these mites are bringing in new viruses into your colony. Honey bee colonies already have tons of viruses. Sure, it's just the fact that they are now spreading them like crazy inside the hive. And it would just be like, you know, if you had a large group of people locked in a room, and then there was a bunch of mosquitoes released. I mean, we're going to start pretty soon we're gonna start sharing each other's viruses.

Amy 15:58
So what would your - so, just in closing, what one recommendation would you give to our listeners?

Dr. Cameron Jack 16:09
So, to me, it comes down, you know, the good beekeepers that I've met throughout the years are the ones that are aware of their mite populations. I mean, their mite loads and I think so many people, it's

fair to assume that your colony has mites. Because all colonies in the United States are going to be infested. But the ones that are aware of their mite populations can make better treatment decisions and make better management decisions. They tend to have better colonies and I think that's a really important step that intimidates a lot of new beekeepers, the thought of like going and sampling bees because you think you're gonna get stung up a lot, but if you do it the right way, it's going to be very beneficial for you and your management

Jamie 16:56
Well Cameron, that's great. Thanks for joining us on Two Bees in a Podcast. I appreciate your Varroa knowledge and we are going to mine it significantly more in the future. Amy, I've got some trivia for you.

Amy 17:04
What's that?

Jamie 17:05
All right.

Amy 17:06
I'm ready.

Jamie 17:07
Did you know that Varroa is pretty small to the naked eye? Right. If you see Varroa, it's a pretty small, little thing. But relative to the size of its host, it is one of the largest parasites known on the planet. Do you know that?

Amy 17:21
I didn't know that.

Jamie 17:22
Well, I have a colleague, Dr. Dennis Manning at the University of Maryland every time he gives this talk, he always says that Varroa on a bee is like a vampire baby feeding on an adult human. I don't use vampire babies, that's a little bit creepy. But I do say that, you know, a Varroa to a bee would be something somewhere in the neighborhood of a softball to a volleyball stuck on us, right? So imagine a volleyball-sized tick hanging on your side and you can get the image of what a Varroa is to a bee so of course, that's why it's so bad.

Amy 17:54
That does not sound fun to me. But you know, there was one more thing that I was thinking about, when you were telling me about the Little Mermaid the other day and how all the crab looks like Varroa mite across the screen. So now I can't even think about the Little Mermaid without thinking of Varroa mites running everywhere.

Jamie 18:07

That's right. That's what they all are. They're all Varroa. Well guys, I hope you enjoyed that segment on Two Bees in a Podcast Varroa don't worry, we're going to dive deep into Varroa biology and sampling and control in the future. Thank you. And we look forward to hearing from you listeners about what you think about Varroa and treatment options that you do. We'll talk about this on the air as well.

Amy 18:29
For more information about this podcast, check out our website at www.ufhoneybee.com. Welcome back everyone to Two Bees in a Podcast. We're sitting here with Emily Noordyke. She's one of our master's students here at the University of Florida at the bee lab. And you know, something that she really focuses on is honey bee nutrition. So we were just sitting here talking about the things that bees need. And we all know that bees need honey for energy, and they also need pollen. So today we're gonna talk specifically about pollen, and some of the benefits and you know, really why bees need that. So Hi, Emily. Hi, how are you?

Emily Noordyke 19:14
I'm doing well, happy to be here. Good.

Amy 19:16
So do you want to tell us a little bit about pollen and you know, maybe some of your research or why bees need pollen?

Emily Noordyke 19:22
Yeah, absolutely. Well, the first thing to start with is that bees need pollen to develop their brood. They need pollen to feed their brood. It's essentially the source of protein, vitamins, lipids and minerals that bees need to fully develop into adults. So foragers will go out into the environment. They'll collect pollen from all sorts of different plants, bring it back, and then that gets fed to the brood.

Jamie 19:56
Yeah, Emily, that's always been kind of an interesting thing to me like, you know, there's 20,000 species of bees on the planet and the vast majority of them collect pollen, moisten it with nectar, bring it back to a nest and they'll lay an egg on that and the resulting larvae physically eats pollen. They eat that pollen nectar ball. But honey bees are a little different. You know, we always talk about bees convert pollen into more bees, right? Through the brood, but brood is fed a lot of brood food, or in the queen's case, royal jelly. So that composes the volume of the diet. So they're not exclusively eating pollen. Pollen's added to the diet, but pollen is still necessary for the production of that brood food. Could you kind of explain this? I mean, this really makes honey bees unique, you know, they're not laying eggs on pollen balls. So where does pollen play a role in the production of brood in that example?

Emily Noordyke 20:49
Right, exactly. So basically, the nurse bees are the way that all the protein and nutrients from pollen gets to the brood. So the nurse bees will actually eat the bee bread. So that's the stored pollen. In the hive, they consumed the most bee bread in the hive out of any other worker cohort. And then they essentially convert all of those nutrients into the brood food through their hypopharyngeal glands. And

then they feed that directly to the brood. So for the first three days of larval development, worker larval development, they'll get that brood food and then after that, they'll get brood food and then they'll also get a little portion of just straight pollen and then they also mix in nectar as well. So as they age, their nutrition differs. But they're getting pollen like the nutrients from pollen. Yes. Mostly, mostly from the brood.

Jamie 21:53
Yeah, that's interesting is you know, honeybees are really just unique in that capacity. So essentially, their pollen is responsible in two ways for their diet, right? It helps the the nurse bees like what you said develop their glands that they use to produce brood food and pollen is also mixed into the food later. I think that's fascinating that that developed bees at all, it's just a crazy thing. So, you know, are all pollens created equal? I mean, there's lots of plants out there that have flowers. Bees and honey bees are visiting lots of different flowers. Are all pollens created equal? You said they get proteins, vitamin, vitamins, minerals, etc. So can they get everything they need from just one pollen type?

Emily Noordyke 22:30
Oh, yeah, good question. So just like humans, like we need a good diverse diet. If we're just eating burgers and fries everyday, we're not going to be healthy. We don't diversify.

Jamie 22:41
I don't think that's - already I don't believe you, Emily.

Emily Noordyke 22:45
But if we mix in veggies and you know, have a good balanced diet, following the food pyramid, then we're going to be healthier individuals. The same goes for bees, so they need different sources of pollen from different plants. So different plants will actually produce completely different types of pollen. They'll have different sets of amino acids, which will cover different requirements that the bees need. They'll have different amounts of lipids, different minerals, different vitamins, the whole deal. So if bees are collecting pollen from a lot of different species of plants, then they're more likely to get a balanced diet.

Jamie 23:23
Sure. So when beekeepers look at a comb, and they see the pollen stores is it better to see one color across the face of that comb or just multicolor pollens coming in?

Emily Noordyke 23:32
Yeah, definitely multicolored. Of course, one source of pollen could be really nutritious. For example, certain clovers are considered very nutritious they have a complete suite of amino acids.

Jamie 23:45
Interesting so the physical pollen from some clovers itself is like a well rounded diet all in one pollen.

Emily Noordyke 23:50

Yes, exactly. So in that case, you know, the bees could be getting a good diet from a single source. However, if you want to guarantee that they're getting a lot and you don't exactly know what they're foraging from, it's nice to see a range of of colors in your stores.

Amy 24:05
So it kind of makes me think of when people go to a nutritional supplement store, do you think the bees are out there just shopping for all these different pollen colors and all these different benefits that they have to offer.

Emily Noordyke 24:18
So there has been previous work done as to whether the bees are actually choosing, like behaviorally choosing for better nutrition. Apparently the nurse bees can't really tell but there's not exactly consensus whether the foragers can tell.

Jamie 24:39
To me, pollen foraging and pollen handling is just a fascinating topic. So the worker bees are out there, they're getting pollen on their bodies, they're using their legs to rake this pollen, moisten it with nectar and stick it on their back legs to fly it back home. They then pop those pollen pellets off. It's a lot of "P"'s, there, pop pollen pellets. And I did it just fine. They pop those pollen pellets off into a cell. Some other bees come behind them and pack those pollen pellets in and start the process of creating something that you referred to earlier as bee bread. What in the world is bee bread?

Emily Noordyke 25:11
Yes, so bee bread is the stored version of pollen, so they're able to keep it in the combs longer term. Basically, once that pollen is packed in to the cells, the bees will add some nectar and also enzymes and bacteria. And that will actually ferment the bee bread (and yeast as well,) that will allow it to be stored longer term for the bees to use later in the year.

Jamie 25:40
So I don't know if you've read this in the literature, but I've had colleagues say at meetings that part of the bee bread - and maybe I'm wrong about this - but this idea that, as the bee bread is stored, part of that processing makes the pollen digestible to the adult bees. I guess pollen is a little grain covered in a shell, and the goodies are on the inside of that shell. But bees otherwise can't digest that shell. So how does that shell - like - I've read that when bees defecate, their feces are just full of pollen shells that are otherwise empty. So how are those pollen grains ruptured? Does that happen in the bee bread process or happened in the digestion of that pollen process?

Emily Noordyke 26:16
Yeah, as far as I know, it happens more in the bee gut. I don't know how much research has actually been done as to if that happens in the bee bread stores. There's a lot of debate as to whether the bee bread is actually more nutritious than the pollen pellets coming in. So some research suggests that the bee bread is actually more nutritious, like that fermentation process allows certain nutrients to be uptaken by the bees. However, they're not completely sure if that's true. So there's really kind of a 50/50 split.

Jamie 26:52
It's interesting, I hadn't heard that. I have colleagues who go to meetings and some of the common statements are "bees don't eat pollen, they eat bee bread." So that's very interesting to hear. So I've got this interesting observation. So there's a lot of bee meetings in June and July every year. And so I'm often away from home during those months, so my grass doesn't get cut. And in my backyard, I've got bahia. So for the listeners, if you don't know what bahia is, it's a grass that sends up a foot-tall shoot that's got a fork at the top; that's where the pollen is. And in June and July, I will see my bees foraging for pollen on bahia, and I will see evidence of bahia pollen stored as bee bread. So as a pollen expert, Emily, no pressure, what does that tell you? About my bees and the pollen availability in my backyard?

Emily Noordyke 27:40
Well, I imagine bahia is not a typical diet for bees, I'm not familiar with it so much myself. But if it's a grass, it's probably wind- pollinated and typically, wind-pollinated plants don't need an animal to actually cross pollinate them. So they're not offering a lot of nutritional value to the bees. These pollens aren't usually full of a lot of protein and lipids, like the stuff that bees need. So if there's not a lot for them in the environment, they will actually start collecting those, pollens from grasses, that might not be necessarily as good for them.

Jamie 28:18
Yeah, you know, I always think two things when I see that happening. Thing number one, I think is that there's clearly not enough high quality pollen available in the environment that bees are having to forage on the tall grass. And thing number two is that I think my wife needs to learn how to use a lawn mower. But in all seriousness, I do think that is suggestive of low quality pollen in the environment. So let me ask with that in mind, is pollen quality and quantity, something beekeepers can address? Is it something for which they can manage?

Emily Noordyke 28:54
Yeah, definitely. I think pollen quantity is difficult. If there's not a lot in the environment already, then the bees just won't have anything to forage on. But they can use protein supplements to try to manage for that, to use these alternative sorts of proteins to give them a boost. So yeah, and then quality on the other hand is difficult. A lot of these feeds on the market, they might address certain problems, but there's no perfect diet out there that addresses all of the nutritional needs, that bees require, so supplemental feeding can definitely start to address the quantity problem, but I think the quality problem is kind of where we need to kind of look more into beekeeping management for pollen deficiencies.

Jamie 29:49
So Emily Noordyke, you're a specialist on this because you're studying this for your masters but we are not going to give away results. Now we're going to bring you guys back for future episodes of Two Bees in a Podcast. Emily, you've been a great guest. We look forward to interviewing you a lot more about how bees use pollen, how beekeepers should be managing for pollen quality and quantity and some of the research that you have and we'll bring in other experts as well to talk about this topic but thank you so much for joining us on Two Bees in a Podcast.

Emily Noordyke 30:17
Thanks for having me.

Jamie 30:18
Absolutely. We are discussing master beekeeper programs and we are accompanied in this segment by Mary Bammer who was extension Coordinator here at University of Florida honey bee research and extension laboratory. Now she is the instructional design expert and creator and facilitator of our new UF master beekeeper program. Welcome Mary Bammer.

Mary Bammer 30:55
Thanks so much for having me. Appreciate it.

Jamie 30:56
Oh, and did I forget to mention she's joining us all the way from snowy cold Milwaukee, Wisconsin.

Mary Bammer 31:04
It is a warm 20 degrees and snowy currently where I am at.

Jamie 31:08
Mary, you are our first call-in guest this is kind of exciting for us here at Two Bees in a Podcast. Yeah, exciting.

Mary Bammer 31:15
Well, I'm honored. I'm honored to be here.

Jamie 31:16
You should be honored. I mean, it's a great accomplishment to be on our podcast. So Amy, we need to talk with Mary about master beekeeper program. So Mary, I'm going to give you an easy volley. The first question I have for you is what is a master beekeeper program?

Mary Bammer 31:35
That's a great start. I like it. Yeah, master beekeeper program. There's many different iterations of them. But essentially, they're all the same process. So it's a certificate program that beekeepers can take to essentially learn about bees and beekeeping. Most of them have multiple levels. So they start with sort of beginner beekeeping topics, and then they work their way into more complicated, more advanced beekeeping topics. But beekeepers are deciding to participate in these programs basically, because they want to learn how to be better beekeepers, and they want to learn more about their bees.

Amy 32:10
So Mary, who runs master beekeeper programs, I mean are they throughout the United States?

Mary Bammer 32:17
Yeah, so again, they're not any - no one program is the same. So they're all a bit different in how they're managed, but in general, they tend to be managed by local or regional beekeeping groups.

Sometimes government groups within a state will run them. A lot of times they're run through universities, often the land grant universities in a state. But again, they're all kind of managed a bit differently.

Jamie 32:40
You know, it's funny, I hate to be misquoted since podcasts actually frees your words, but if I'm not mistaken, I believe it may be Cornell University where the first master beekeeper program was run and since then, they've kind of spread. So Mary, you're right. You know, a lot of them are run out of universities and increasingly more I think are run out of state beekeeper clubs usually. I know that the Eastern apicultural society has a master beekeeper program. So that's kind of a US regional master beekeeper program. And I've even heard rumblings that some of the national associations have considered master beekeeper program. So they are popular and one thing that's interesting is, even though other countries don't call them master beekeeper programs, there are similar iterations of programs. I know when I'm in the UK, they have advanced training programs, they might call them certificates or something, but for lack of a better comparison, they're very similar otherwise to master beekeeper programs. And so you mentioned some things that are of extreme interest to me, you know, talk about beekeepers learning about beekeeping. So I've been keeping bees 30 years, I didn't have a master beekeeper program when I was growing up, and I can keep bees just fine, thank you. So, are master beekeeper programs necessary? What benefit do beekeepers get out of participating in them?

Mary Bammer 33:55
Sure. Yeah. And I think it's important to point out too, that, you know, the beekeeping landscape today is considerably different than it was even 10 years ago.

Jamie 34:03
Are you calling me old?

Mary Bammer 34:04
10 years ago I said is all, so no. So I think one important thing to note here is that there are so many new beekeepers now that are just getting into the field that maybe didn't have some family tie to beekeeping, they might just be getting into it. Brand new. And so I think there is even moreso today than 10 or 20 years ago, I think there is a strong need for sort of more formal education for these new beekeepers who are just sort of jumping into the field. And I think, one thing that master beekeeper programs do well is they offer a place to start for a lot of beekeepers. So a lot of people are interested in beekeeping. They want to get into it, but it's sort of a daunting process, especially if you don't already have sort of local or family ties to beekeeping. So I think one big benefit of master beekeeper programs is it really provides that foundation from which beekeepers can start.

Jamie 35:10
Yeah, I think that's a really interesting point. You know, everything that you mentioned there, though, was a focus on new beekeepers. And so what about seasoned beekeepers or people who've even been in bees for 10 years? Can a commercial beekeeper, who's been keeping bees for 50 years, benefit from this education?

Mary Bammer 35:25
Yeah, I think it's not the obvious track for experienced beekeepers to take, but I think there is a lot of excellent information in a lot of these programs that can benefit beekeepers from brand new to experienced. And one of the things that this type of program does is it sort of takes some of the guesswork out of beekeeping so we can learn a lot about our bees. And we do learn a lot about our bees by working with them, and through trial and error. But one of the beautiful things about this type of program is it collects the information that we know about these from across the country and compiles it into one place. So it I think it can sort of help even experience beekeepers take some of that guesswork out of the basics of beekeeping. And oftentimes, these types of programs, because they are often run through research universities, you can often have more cutting edge beekeeping information in this type of program. So I think that's one place where experienced beekeepers, even, can really benefit from this type of structured program.

Amy 36:30
So it sounds like, Mary, all of the things that maybe the beekeepers have out there, this course could maybe help them reaffirm some of the things that they were thinking or kind of wondering about. What do you think?

Mary Bammer 36:42
Yeah, I think that's a great way to put it. And I also think that it can help sort of banish those misconceptions that are out there, even among experienced beekeepers, I mean, there's a lot of things that just get circulated through word of mouth and beekeeping as good practice, but maybe aren't as substantiated when you actually look at the research. So I think that these types of programs are a good way to reevaluate what you do know and kind of push out those misconceptions.

Amy 37:11
Yeah, absolutely. The master beekeepers are all over the United States, but our program here at UF, it's available to people outside of Florida as well. Do you want to tell us a little bit about the program?

Mary Bammer 37:26
Yeah, I would love to tell you about the program, because it's what I spend all day doing. So I'm very happy to tell you about it.

Jamie 37:31
Your time to shine, Mary, your time to shine.

Mary Bammer 37:34
So I mean, I think so we've recently at UF have transitioned our program from an in-person program that was very Florida-centric, to an online program that does allow beekeepers from around the country, and honestly from around the world to participate in this training. So most master beekeeper programs are very regionally focused. Jamie mentioned that some of the federal or some of the national level beekeeping groups are starting these programs and those are obviously a bit broader. But I think what is unique about this online program that we've been developing is that there is Florida-specific content, but it's delivered for the national audience. So all of the information in there is relevant

to beekeepers across the country. And as I said, around the world even, all you really need is access to bees and access to the internet to get into this program.

Jamie 38:28
And Mary, I'm just gonna layer on top of that, just kind of bridging together a few thoughts that we've had recently. So, you know, one of the barriers to commercial beekeepers or experienced beekeepers getting into the program is that we all require them to start at the beginning level, and they all know how to light a smoker and things like that. So you know, the earlier levels can be barriers to more advanced beekeepers. But the beauty of making this online means that we have this depth and breadth of resources that we can excise and export to commercial beekeepers who might only want to see certain modules. So maybe they don't have to join the master beekeeper program. But the content developed for the master beekeeper program can be extraneously offered in other ways for commercial beekeepers who might otherwise not want to hear the information because they don't want to wade through the stuff that's more beginner-centric in the first level. Does that make sense? This idea that we're creating a mess load of content to populate the entire course. And since commercial beekeepers don't want to start from the beginning, we can just pull information that's relevant to them, and they would still benefit from the program, even if they're not participating in the program.

Mary Bammer 39:36
Yeah, I think that's a really good point. And just to give an example of that, you know, right now, we're sort of working on multiple levels of the master beekeeper program at the same time, and we have content on Varroa and integrated pest management and other pests and disease management strategies. And you're right. Right now they're spread across a couple of different master beekeeper levels, but we can, because this program is online and we've modularized the content, we can kind of pull those modules from the different levels, and as you said, package them into this program that is specific to the needs of the beekeepers.

Jamie 40:11
Yeah, I think another powerful thing about putting it online rather than doing it face to face is when you're doing stuff live, you know that that's often the preferred way, right? People want to see their teachers and want to interact with them. But on the other hand, when it's online, it allows you to put a lot of thought and planning into the information that you are offering, right. And so once it gets online, it's very good. And so I want you to kind of walk us through just the levels in our program and our expectations of the students as they move through. And just keep in mind, we know that this is a Florida centric answer, but it's relevant because a lot of programs follow the same method, they want to see their beekeepers advance. But walk through our program, what are beekeepers experiencing? What educational opportunities are available to them? And in the various levels? What do we expect of them as they progress?

Mary Bammer 41:04
Yeah, and this is something that we have been transforming throughout the history of our program, as many other programs have, as well. So, you know, what we expected of beekeepers, maybe five or 10 years ago is different. And this program, being in an online environment has sort of allowed us to focus in on some of those, really look at the scholarship of learning and how is it that beekeepers can

actually, not just absorb information, but translate that information into their beekeeping practices. So the way that our program works, and it's not dissimilar from other programs, is our program has four levels to it. So a lot of programs have three, we did add a fourth level previously in our program's history, but our program has four levels. So all beekeepers will start off at that apprentice level. So that's level one. And the purpose of that level is really just to lay a solid foundation in honey bees and beekeeping. So being a scientific organization, we feel like understanding the biology of the bees is really key to being able to manage them effectively. So a big portion of the apprentice level course is honey bee biology. It's also an introduction to equipment, how to install your first hives, where to go for other resources, when you have questions about your bees. So the apprentice level is that foundation. The second level in our program is advanced. So this is when we're kind of taking the next step into not just managing our bees to survive, but how to manage them so that they benefit us. So this is when we start looking more seriously at pest management. At how bees are used in pollination services, and how to produce and extract and process honey. So that's sort of a main focus of the advanced level. And the following two levels are master, and master craftsman is the fourth level. And then these two levels is when we're really diving into sort of the nitty gritty, technical details of beekeeping. So those more advanced topics, looking at integrated pest management in the hive, how beekeepers can sort of adopt these strategies, focusing on some of the more specifics of honey bee biology and how that influences management. So essentially, the program is these four levels, we're starting with the basics, and then we're building over time, so that you're not getting all of this information at once. But you're sort of getting it in these digestible chunks that the learner can - I think one of the coolest things about the online program is that it's asynchronous, meaning you can do the program as fast or as slowly as you want. You can look at lessons, you can, watch all of the lessons for the apprentice level at once, or you can do it over the course of two years. So you as a learner have control over your learning process.

Jamie 43:57
Yeah, I think, you know, there's value in master beekeeper programs. I know that we've done it here at Florida, University of Florida for quite a while as you know, that we're transitioning our lab, but over the years, some of the skeptics are like, well, you know, people are learning information, but they can't practically apply it. You know, I've gotten experience, they've just got book knowledge and what I would say to people who have that idea, just give the program a try. I mean, if you learn nothing, then perhaps the program's not for you. But I'm utterly convinced that everyone would learn something in each level progressing through the program. It's just impossible not to. And ultimately, education is education, right? We provide the content and the education, we hope people use it and apply it. But you know, the university doesn't make foresters or lawyers, if the people who hear and learn the information, don't apply it correctly. So ultimately, people are responsible for their behavior. So if you go through our program and can't put a frame together, that's on you, but nevertheless, we have worked hard to develop it in an appropriate way. I think it's a benefit to beekeepers. Amy?

Amy 44:59
Yeah. When I was an agent a couple years back, I remember I did have beekeeping experience and I decided to take the master beekeeper program, and it was more difficult than I expected it to be. I mean, I don't know, Jamie, I know that you narrated some of those presentations. But we'll have to see if he can test out of some of the questions that we offer. What do you think?

Jamie 45:20
Yeah, I don't know. I'm a little nervous. Well, Mary, sorry. Go ahead.

Mary Bammer 45:26
I was just gonna piggyback on something you said earlier about sort of that, you know, practical hands on knowledge. I think that is one criticism we receive about having an online beekeeping program is, you know, how can you learn everything about beekeeping online? And how does that translate to real life practice? But one interesting thing I think we've implemented is, there is in-hive practical assessments that are built in to this online course. So even though you know, we might not be with you, as you go through a colony technology today allows us to, you know, you record yourself going through colony and talking through what you're doing, and then we can see it after you've uploaded it to the course. So there are definitely ways to implement that sort of hands on practical assessment into even an online program

Jamie 46:16
And Mary, that's a good point, I'm going to layer on top of that. To the people who think that this is just an academic program, we require individuals in the program to be active beekeepers, at each level. So that's the practical part. They are listening to us, and they're seeing their colonies a different way the next time they open it. So there's a tremendous amount of hands-on learning that accompanies our program just by virtue of us requiring that participants be beekeepers and actually own colonies. So that's how I usually addressed that critique, is it is in fact, a practical learning experience in addition to the academic or more PowerPoint or video or reading learning experience. We think it's comprehensive, and we use a lot of different methods of teaching to get the point across. Mary, you've been a great interviewee, I appreciate you talking about Master beekeeper programs with us.

Mary Bammer 47:16
Yeah, thanks for having me. And thanks for including me back in the lab. It feels good to be a part of the group again.

Jamie 47:21
Well, thanks for joining us on Two Bees in a Podcast. And we know that we are going to have you on our podcast in the future. Thank you so much.

Mary Bammer 47:28
Sounds good. Thanks, guys.

Jamie 47:28
Stay warm. It's q&a time.

Amy 47:39
All right. It's about that time our question and answers, we have a couple of questions that we got off of social media. And we'll just go ahead and talk about some landscape stuff. Jamie, I know we were just talking about how much you don't like to mow your grass. But one of our questions was that people are

seeing bees in their landscape. And suddenly, you know, maybe the next year, they don't see any bees anymore. So what could be going on?

Jamie 48:03
You know, Amy, I get that question all the time, probably three to four times a year. And honestly, there's about a zillion answers to it. The easiest answer that I give right out the gate is, you know, just because you saw them one year doesn't mean that you presume that they should be there the next year. People have been hearing the story of bee losses, right. So when they see honey bees on their plants, and then fail to see them on their plants, they assume that this is just one of the symptoms of bee loss. "My bees have died, too. It's a problem." But in reality, it could be that you had a nesting colony nearby last year that died and is no longer there this year. This doesn't mean the entire population is wiped out, it could just mean the nest is gone. It could also mean that they're foraging on other things and heading a different direction because your yard's not sufficient. It also could mean that you were seeing not honey bees or non honey bees and seeing other bees whose populations have shifted to another area. So there's lots of potential reasons, it's not necessarily a cause for concern. Just cross your fingers and expect them to be back next year. And you can always plant pollinator friendly landscape, and then expect them to be back next year. So good question, but it's not necessarily a cause for alarm.

Amy 49:10
Yeah, I guess I'd be pretty offended if bees and want to visit my yard. I'm planting those pollinator plants for those bees.

Jamie 49:16
But are you planting the right plants for those bees.

Amy 49:18
That's true. And that'll be on a podcast in a future session.

Jamie 49:21
No doubt.

Amy 49:23
All right, so the second question we have is about the waggle dance. So we're talking about bees leaving the hive and when they're doing the waggle dance, what are they actually trying to do?

Jamie 49:31
Now, you're asking a Baptist about dancing, right? I already don't know the answer. Okay. In all seriousness, one of the ways that bees communicate, is through dancing. Of course, they communicate in other ways through pheromones, etc. But when they are trying to communicate food resources available in the environment, one of the dances that they will use is a dance called the waggle dance. The waggle dance is roughly in the shape of figure eight. So the bees will dance on the face of the comb in the shape of a figure eight to communicate to their watchers, where the food resource is and with that dance, they can communicate direction of the food source relative to the sun, distance, and

quality of the food out there waiting. So it is so coded that humans deciphered the code. In fact, Karl von Frisch, the [Austrian] bee scientist deciphered the code, such that we can actually watch them dance and know where the resource is that they're trying to communicate to their workers. It's an amazing behavior.

Amy 50:41
Sounds like you could probably use some.....

Jamie 50:45
Yes, Amy? Are you -

Amy 50:48
You might want to take some tips from the bees.

Jamie 50:51
Let me tell you, Amy, I've got a secret for you. bees are not the only things that communicate by dancing.

Amy 50:56
What else communicates?

Jamie 50:57
College students. Yeah, you set yourself up for that one.

Amy 51:02
I did. All right. Okay, so the last one again, we're on the same topic is what happens outside that hive. So when we see swarms, when swarms happen, usually they find a place, the queen goes off. Everyone follows the queen, they find a location, what happens if the queen dies?

Jamie 51:21
Well, good question. So the problem with the question, it's a good question, but the problem with it is that, you know, the queen can die at multiple points in the swarm, and it depends on at what point she dies, the response of the swarm. Obviously, when a colony swarms, the 70% or so of the bees will rush out with the queen and they'll coalesce into what we call a swarm. A physical ball or grouping of bees usually hanging from a tree limb or fence. If she dies in that process, somewhere in that stage, the bees will actually return to their parent hive, and so the queen might die, the bees will go back, essentially. That's the usual case. Now, once that swarm has found a location or a cavity in which to move, maybe a hollow tree, or a hole in the ground, or a wall, or chimney, once they move to that new cavity, if the queen were to die at that stage, usually the colony is hopelessly lost, unless they'd already constructed a little bit of comb and the queen laid eggs in that colony. But pending, she didn't do that, they're hopelessly queenless. Workers will begin to lay eggs and such a colony is doomed. Hopefully if she did move into a cavity and lay a little bit before she died, there'll be female larvae from which they could make new queens. It's a great question. But like I said, it all depends on where in the process, the queen died.

Amy 52:47
Yeah, and I always remember you say, as far as when do bees swarm? That answer is typically when you least want them to.

Jamie 52:55
Yeah, you know, bees swarm when you least want them to. That's because bees tend to swarm leading up to and during the first half of the major nectar flow. And so you need all of your bees present. Bees want to be gone. So they most likely swarm when you most want them not to swarm. Nevertheless, Amy, it is incredibly important to remember that swarming is natural and it is colony level reproduction. It is what bees want to do more than anything else, right? Because anything that can reproduce, really, really wants to.

Amy 53:28
And we'll get talking more about that in future episodes. But wait, keep the questions coming. We're having a lot of fun with them. And we'll see you on the next podcast. We'd like to give an extra special thank you to the following: to our editors, Shelby Hal and Bailey Carol, and to our audio engineer James Weaver. Without their hard work, Two Bees in a Podcast would not be possible. So thank you.

Jamie 53:56
For more information and additional resources for today's episode, don't forget to visit the UF IFAS Honey Bee Research and 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.