Episode 77 PROOFED

Mon, Apr 04, 2022 1:06PM • 51:59

SUMMARY KEYWORDS
bees, colony, honey bees, bee, pheromone, beekeepers, predator, stinging, varroa, model, honey bee, super, honey, monitor, queens, question, sting, beekeeping, year, alarm pheromone

SPEAKERS
Amy, Guest 2, Jamie, Guest, Stump The Chump, Dr. Cameron Jack

Jamie 00:10
Welcome to Two Bees in a Podcast brought to you by the Honey Bee Research Extension Laboratory at the University of Florida's Institute of Food and Agricultural Sciences. It is our goal to advance the understanding of honey bees and beekeeping, grow the beekeeping community and improve the health of honey bees everywhere. In this podcast, you'll hear research updates, beekeeping management practices discussed and advice on beekeeping from our resident experts, beekeepers, scientists and other program guests. Join us for today's program. And thank you for listening to Two Bees in a Podcast. Hello, everyone, and welcome to another episode of Two Bees in a Podcast. Today, we're joined by Andrea Lopez-Incera who is a PhD student at Innsbruck University, and Morgane Nourvian, who is a Research Fellow as Zukunftskolleg, who will be here discussing bee communication during collective defense, and in our Five Minute Management, we'll be talking about honey harvesting, and we'll finish our podcast today with our question and answer segment.

Amy 01:49
Hi, everyone, welcome to this segment of Two Bees in a Podcast. Today, Dr. Cameron Jack and I are actually going to be the host. And we have a very awesome topic to discuss today. I'm really excited about it, Cameron, I don't know about you.

Dr. Cameron Jack 02:05
I'm insanely excited about it.

Amy 02:07
Awesome. Alright, well, I'm going to introduce our guest speakers. And usually, Jamie's the person who does the introduction, and here I am, and I'm probably going to butcher names. And I am so, so sincerely sorry to our speakers that they have to even listen to me attempt to try to introduce them. But today, we have Andrea Lopez-Incera, who's a PhD student at the University of Innsbruck in Austria. And we also have Dr. Morgane Nourvian with the Department of Biology and Center for Advanced Study of Collective Behavior. She's also affiliated with an institution for young researchers at the

University that promotes early career researchers. And I wish I could spell this to our audience. I'm going to link it in our notes on our website, but I'm going to try to pronounce it. It's Zukunftskolleg. Did I do that, right? Zukunftskolleg at the University of Konstanz in Germany. So thank you so much, Dr. Morgane, and Andrea, for joining us today.

Guest 03:14
Thank you very much.

Guest 2 03:15
Thank you.

Amy 03:16
So today, so the reason we found you the way that we found you was because you have just recently come out with a publication and it was on honey bee communication during a collective defense, so it's shaped by predation. So today, what we're going to talk about are alarm pheromones and how honey bees really decide whether to sting or not to sting. But first, we usually ask our speakers to introduce themselves. And I'm wondering, Andrea, why don't you go first, can you tell us a little bit about yourself and how you got into honey bee-related work?

Guest 03:49
Of course, thank you Amy. Yes. So I'm Andrea. I'm a PhD student at the University of Innsbruck. In fact, I'm a quantum physicist, so not very related to honey bee. But in my PhD I'm doing I'm using artificial intelligence to model collective behavior. And then I got in contact with Morgane in the University of Konstanz, who was interested in this collective interaction between honey bees. And that's how I started this awesome work.

Amy 03:49
That's great. And Morgane, how about you how, tell us a little bit about yourself and how you got into honey bee related work.

Guest 2 03:51
So hi, I'm Morgane, I am a Junior group leader in Constance. I am a biologist and so I started out being interested in neuroscience and actually did my studies using more classical model like mice and rats and to be honest, I didn't like it so much. And then I discovered that honey bees were great model systems also for cognitive studies. And this is how I got interested in them and I started doing my PhD with them and because there are so awesome, I never let go of them since.

Dr. Cameron Jack 05:01
That's true, they are so awesome. A lot of us have been hooked by just doing some of the research on it and kind of hooks you in. Well, that's great. And it's really nice to meet both of you. I guess maybe my first question I'll start with you, Morgane, about so this paper, again, it's titled honey bee communication during collective defense is shaped by predation. So here, you talk a little bit about how bees react to different alarm pheromone concentrations, and you specifically state that the alarm pheromone is

carried directly on the stinger, and then it builds up, kind of during the course of an attack. So I was wondering if we could just start kind of from the very beginning, can you just tell us a little bit about alarm pheromones and how they work within a honey bee colony?

Guest 2 05:49
Sure, so pheromones are chemical signals. They're usually perceived through either olfaction or test sometimes, and they're extremely important for animals to communicate. In the case of social insects, like honey bees they are especially important, we find really lots and lots of pheromones inside social insect colonies that really regulate the whole life of the colony. And they're used in many different situations. And the alarm hormones specifically is used, as its name says, when there is a problem and the colony needs to be defended. This is a signal that to bee release to alert other bees around and get them to the site of the disturbance and to participate into defending the colony. And so for the honey bees, this alarm is, you say directly on the stinger, which means that the bees can actually release it in two ways, they have an active way of releasing it, where they can just put their stinger out, and then disperse the alarm pheramone by fanning the wings. But also, as soon as this sting the stinger is out of the body and then this releases is also the alarm pheromone. So in this way, every time a bee stings, she releases more alarm pheromone and so as the predator get more and more stung, the concentration of the alarm pheromone increases in the vicinity. And this is the banana scent that beekeepers know usually that you can actually smell quite easily when you disturb a colony for too long.

Amy 07:36
So that's interesting. So for beekeepers, does that mean that the longer we're in a colony where bees are continually stinging? It promotes more of that behavior from the other workers in the colony? Is that what that means?

Guest 2 07:49
Well, that's what we explored in this study, and what we showed is that it's true to some extent, because what we see is as the alarm, the concentration increases, the bees get more and more likely to sting so they will get more and more likely to attack you or if you are a beekeeper. But we also see that after some point, this goes down again, which means that at very high concentration, the bees don't sting anymore. And this is one of the features that we were trying to explain with this study that I think we will go in deeper, a little bit later.

Amy 08:25
Yeah, that's so interesting. So can you explain more about your research, I guess, just specifics on how you even go about looking at that. And, you know, the fact that there is just kind of a maximum place where, you know, if that pheromone is being released, and they're no longer stinging, how are you able to go about that research.

Guest 2 08:45
So what we did for the behavioral test was to catch bees at the colony, bring them into the lab, and then we would test them into a little arena, in which we put a dummy that is rotating. And this dummy is

designed so that the bees don't like it. It's black it has this jerky movement. So basically, we put everything that the bees don't like togother, to try to trigger them into stinging it and which is what they do. And then inside the arena, we can also manipulate the concentration of the alarm pheromone so we have a system that deliver oders so we can deliver synthetic oders inside the arena. We could also what we did in this study, we could also just pull stingers out of like bees and put them directly on the dummy to simulate as if this had been stung just before. And so once this arena is ready, we introduce a bee inside and this bee is facing these dummy that she usually doesn't like and she decides whether to sting it or not. And so this is just a binary responses either she stings or she doesn't. And afterwards we repeat that with 60-100 bees depends on the time we have. And then we get kind of a frequency at which these bees are stinging depending on those specific conditions that we put inside the arena. And so that's how we get about having this individual behavior of the bees measured. Because of course, at the colony, it's very complicated to control the situation, right, because you have all these bees recruiting each other. And if you have, as you have the group of bees, you cannot really control the alarm concentration or anything anymore.

Dr. Cameron Jack 10:32
That's really interesting. And I thought it was, within your paper, I thought it was really cool to kind of see some of the figures that you had made and about the dummy. I thought that was a fun idea to just set up a dummy and make these bees mad and see what they do too it. It's kind of fun. But I want to bring Andrea into this conversation a little bit, she's got kind of the computer skills to kind of really make an interesting analysis. And I'll admit, Andrea, I, this is something very beyond what my capabilities I have, I really have very few computer skills. And so I thought this part was really interesting and but also a little bit harder for me to understand. So, could you discuss a little bit about the projective simulation model that you use to model each bee as kind of an artificial learning agent that relied on the pheromone concentration to decide whether or not that bee was to sting? So, can you can you just tell us a little bit about that projective stimulation and how that works,

11:35
Yes, I will try my best to make it as easy as possible. So, yes, projective simulation is a model for artificial agency, and then what we do is to model each of these bees as an artificial learning agent that takes part in this defensive behavior. And in fact, what we are doing is we are taking several of these bees So, several of these agents to model the full colony and what we do is we consider that this colony is subjected to the attack of a predator that we model in a simple abstract way. And the full group of agents need to build up a strategy to deter this predator as fast as possible and as efficient as possible. And in order to do that, each bee has in the model their own perceptual apparatus each bee can decide whether to sting or not. So, it has their own decision making process and in particular with these bees perceive is this pheromone concentration in different bees. So they can perceive that different concentration is very low or is increasing or is very high. And depending on this pheromone concentration, that they are able to distinguish, they need to decide whether to sting or not. And then we consider that this decision making is done in sequence. So then one bee decides after the other. So, this is very crucial, because then what the bees at the end of the sequence do depends really on what the other bees have done before. And so, in this way, they have to build up they have to rely on the behavior of the previous bees and the pheromone that is already released in the air in order to

make the following decision process of stinging or not. And one key feature of this predictive simulation is that we incorporate reinforcement learning, which is a model of artificial learning that indeed what it does is after the this encounter with a predator, we evaluate if the full performance of the colony was successful or not. And then we give a reward to a common reward to all the agents depending on the global state of the colony. And then this reward what it does is increases the probability of making a good decision in the next encounter with a predator. So by doing so, we repeat this process iteratively with several predators, and then within this learning process that is called the full colony learns to do the optimal behavior and the optimal strategy in terms of this communication with the pheromone in order to be very efficient against the return of the predator. And what is very nice is that we can model somehow the evolutionary pressures as it is done in evolution in this predator model that we consider and what was really fascinating was to see how we can explain the features that Morgane obtained in the experiments. So this increasing of the probability of stinging with increasing of the pheromone and then this decrease when when the pheromone is super high. And we were able to explain some of these features by selecting different types of predators and different types of conditions in our model.

Amy 15:14
That's so interesting. I'm trying, I have so many questions. And of course, this is not my specialty. So I'm just trying to figure out, you know, what question to ask first. I think the next question I actually have is for Morgane, as you know, and Andrea, you could also chime in on this, but I know that when you were talking about your research, and you were talking about pulling a stinger, and presenting it to a worker bee, you know, is that done immediately? I mean, do you just pull a stinger, and then show the next worker bee? Or how long does it take for that kind of pheromone to go away through time.

Guest 2 15:52
So when we were doing the experiment with the real stingers, what we would do is have a bunch of bees that were just cold anesthetize, so they were just not moving and ready on the side, and then we just pull the number of stingers that we needed from them as fast as we could and then really quickly introduced the bees for her to be tested. Because this pheromone is known to be highly volatile. So usually all alarm pheromones tend to be really volatile, because they need to really spread very quickly to carry the message that there is an emergency and that the other bees should come so this pheromone is known to have a very fast dynamic that it's released quickly. It's also it should be evacuated a bit quickly. And we can really also see that in our experiments when there is the alarm pheromone the bees react sometimes almost immediately, like sometimes we just open the door of the arena and the bee just jump on the dummy, it's really impressive actually how fast they can react.

Amy 17:00
Wow. So it is immediate, that you're doing that is there any way to preserve a pheromone? Are you know, how do you do you make? I know that people make pheromones? And so how do they do that?

Guest 2 17:12
It's so complicated issue so depends a lot on the pheromone. So pheromones can be really simple, like just one compound. And then it's fairly easy. The alarm pheromone of the honey bees is not simple at all. It's over 40 compounds. So it's pretty much impossible to synthesize. Just, yeah, ourselves. So

what we did, what we can do is work with this main active ingredient, which is isoamyl acetate. But of course, this does not fully account for everything that is really in there. So yeah, so sometimes you can do it artificially, sometimes you cannot. And with the honey bee alarm pheromone, you just have this proxy of the main ingredient that works, but it's not perfect. That's why we had both types of stimulation in our experiments.

Amy 18:04
That's awesome. And Andrea, with the projective simulation, you know, what were your findings on that? And how did you do that on the colony level.

Guest 18:15
So the main findings were to explain these features of the curve that was obtained experimentally. In particular, we were able to explain this increase in the aggressiveness of the bees as the pheromone increases by introducing in the model, some false alarms. So when we introduced in these encounters with the predator, some encounters that were really false alarms, so mimicking this process that can happen in the forest or whatever, where there is some leaves falling or something like that, but there's no real threat to the colony. And we observed that what the model did so what the simulated colony did was to decrease the probability of stinging at this very, very low concentrations of pheromone in order to not react very aggressively from the beginning and not to lose the workforce at any disturbance. But then since the predators may come in the end, then we observed that there was this increase in the in the probability of stinging as the pheromone increases. So this pheromone was also part of how to build this collective defense as fast as possible when our real predator is there. And also, the second main finding was this decrease on the pheromone, so on the probability of stinging, as the pheromone is really high. And these according to the model can be due to two things. So it could be just this probability of stinging goes back to the initial default value, or it could be that in fact, what they do is one they notice the largest predator that they encounter in the forest area or in their usual environments is returned, when they don't really need to sting anymore. So in order to avoid this overstinging, they take this, this perception of very high concentration of pheromone in order to stop this defense and to stop stinging, because they also die when they when they sting so, this was also a mechanism to avoid losing bees for the colony.

Amy 20:35
That's so amazing. I'm just thinking about, you know, I guess human behavior of when we get scared of something, right. And so when you, you're kind of afraid, you're checking things out, but you don't really think you're in danger. And then, you know, if you are in danger, when is that moment of realizing that it is worth doing something. And so that's what the bees are kind of doing on an individual basis. And then on the colony level, which is absolutely incredible. And every time I speak to another researcher, I just get so just more amazed by honey bees and their behavior. It's pretty cool.

Dr. Cameron Jack 21:07
It's fun. I mean, if you know nothing about honey bees, you know, that they...

Amy 21:11

Which I don't, right?

Dr. Cameron Jack 21:12
Well, I wasn't calling you out specifically, I'm gonna say but when we talk to people, I mean, even audiences where they don't really have prior honey bee or beekeeping knowledge. I mean, of course, the one thing that they do know is that yeah, honey bees sting. And so that was one of the constant questions that I guess I get asked about all the time. And people are like, Oh, how many times you've been stung? And of course, if you've been keep beekeeping for a while, you don't know the answer pretty soon, because it becomes a lot but one interesting point is, again, if even if you don't know a lot about honey bees, if you've heard of, of African bees or Africanized bees, you know that they tend to have a more defensive response. Right? So they're, you're more likely to be maybe stung in severity, with those bees. And one thing I wanted to bring up was that, in this research, we, you did a case study with European and African bees and kind of, at least the results from my understanding looked to be kind of what we would expect it that more African bees are getting involved in the stinging behavior, and probably quicker than the European bees. But I thought, you know, maybe Morgan, if you wouldn't mind talking a little bit about this, you know, how do you interpret, you know, these results? And how might this drive the evolution of stinging response patterns?

Guest 2 22:34
So, exactly. So we thought, well, we have a nice model that can basically explore how environmental variables are influencing this thinking response in this individual's stinging response. One way to test the model would be to compare different subspecies of bees, which have different environmental conditions in which maybe evolve different stinging response patterns. And so that's why we got interested into this African honey bees, which, as you know, are very, very aggressive, they are really fierce, they will sting a lot more, and they will follow you for kilometers instead of a few meters. They're really dreadful. What was the hypothesis there was that maybe these bees had more predators in general, that they were just at the higher pressure from from predation. And that these predators maybe were also more resistance, because there are specialized predators, such as the honey badgers, which predate on them very heavily. And so this is what we tested by adjusting the parameters in our model. And indeed, we could predict this increased aggressive behavior in bees that would be exposed to such pressures. So that was quite nice. And this was also supported by a fairly old study that measured experimentally, a little bit similarly to what we did, but not exactly the response of the bees to the alarm pheremone of African bees, and compared it to European bees. This is actually a very interesting point. And I'm very happy to say that, right now, we have collaborators in Africa that are actually measuring the same responses in order to really check and confirm that our predictions are true, and that these bees are really a lot more responsive to the alarm pheromone, I'm really excited to see the results of that. If it really confirms everything alot.

Amy 24:33
You'll definitely have to share the results with us. Once that research and paper does come out, we do have some Africanized honey bees here in south Florida and I I'd be interested even, you know, just looking at some of the samples that we have here and what that kind of looks like. So anyway, thank you so much. Is there anything that you would like to add any concluding remarks, any

recommendations for beekeepers? If you get stung, maybe just be done and walk away. Do you have anything else you would like to add?

Guest 25:05
Yes. So I just want to say that I had a lot of fun modeling, modeling bees, I learned a lot about this particular species. And it was it was really fun. And also, we found that this, this way of modeling collective behavior. So with predictive simulation, and with artificial intelligence was very successful. And it was very interesting because we could change all these parameters like find, like, try different predators try different in situations like these false alarms. And we could have some explanations for experimental results. So it was really it was really exciting.

Guest 2 25:46
Yeah, I completely agree. This is still an ongoing, very nice collaborations. It's very, as a researcher, it's also very nice to interact with people that are outside of our usual field of research. And to get completely different perspectives on what we're doing. One thing we could add is that we were actually continuing so we, right now in this paper that we published, we considered that every single bee is the same. And we know that this is not true that bees have different tasks as they get older and things like that. And so now we are trying to complexify a little bit the model to take this into account, and to really try to see if different bees could have different role during the defensive response. And this would define the strategy at the colony level differently from the this kind of no assumption, starting point that they're all the same.

Amy 26:47
Well, it sounds like there's a lot of research that still needs to be done. And this is a great opportunity. You know, I definitely think that where you both are headed with your research is something that, you know, we're gonna see more and more in beekeeper research, just, you know, artificial learning and artificial intelligence, you know, it, there's just so much to be done. And so we just want to thank you so much for joining us on the podcast today. We'll be sure to link all of your work all of your bios and this article, specifically on our notes page, but if there's anything you'd like to add, you know, we can definitely do that. And hopefully, we'll be able to share your email with some of our listeners.

Guest 2 27:26
Sure. Yeah, I forgot the part of your question about the beekeeping advice.

Amy 27:32
What's your beekeeping advice?

Guest 2 27:34
Yeah, I would just say, most beekeepers know that they should wear white clothing or light clothing and work candidly, and avoid big movements. Because all of this is what triggers bees. And of course, if you start if the colony gets too excited, and a lot of alarm pheremone is around, at some point, you just close it and move on and give them some time to rest before you continue, because it's gonna be a nightmare. And yeah, but I would like to say also that I actually really like aggressive bees, I think they

are much more fun to work with. And they have some character and they're usually more productive and more active and so don't, don't let them go, don't kill them all. Should keep working with them.

Amy 28:28
I was feel like we could put a personality tests with like, the type of bee you should be affiliated with, you know, something like that. I think that'd be something really fun to put together.

Dr. Cameron Jack 28:39
Morgane, sounds like you're an adrenaline junkie, just doing it for the thrill of it.

Guest 2 28:45
I'm not sure so we have this issue here in Konstanc that the bees have been selected very strongly for being gentle. And we actually struggle to find colonies that would just react and defend themselves when we annoy them and I find that really sad.

Amy 29:02
Like it's almost like the grass is greener on the other side. Right because we do have very defensive bees sometimes here and we we recommend that they you know, the beekeepers re-queen so it's funny that you say that

Guest 2 29:14
Exactly, but I think it's a balance to find too aggressive is is just a nightmare to work with. But not aggressive at all is a bit sad and I think also a bit detrimental for the colony that they should be able to defend themselves to some extent.

Amy 29:32
Well, it sounds like we're gonna have to bring you in for another episode to discuss just that topic. What do you think?

Guest 2 29:38
Maybe?

Amy 29:42
All right, everybody that was Andrea Lopez-Incera, she's the PhD student at the University of Innsbruck in Austria. We have Dr. Morgane Nouvion with the Department of Biology and center for the advanced study of collective behavior. Also working with Zukunftskolleg, I tried to say that really fast. Why don't you go ahead and say it, and then I can post it on the notes after this as well.

Guest 2 30:11
I'm also not German native speaker. So I'm also probably butchering it. But I think, Zukunftskolleg

Amy 30:19
There you have it, folks.

Dr. Cameron Jack 30:21
I'll take your word for it.

Amy 30:24
And you're with the University of Konstanz in Germany. Thank you so much, both of you, for joining us today. And everybody, thank you for listening to this segment of Two Bees in a Podcast. Have questions or comments? Don't forget to like and follow us on Facebook, Instagram, and Twitter, @UFhoneybeelab. We are at that Five Minute Management. And we are actually on our second of four segments about honey harvesting. And actually, Jamie, before we get into this Five Minute Management, I do want to put out a little call to our listeners to ask them what they recommend for us to do in 2022. We're going to, hopefully, continue this podcast, but we've been doing Five Minute Managements this year, and we're thinking about doing something different for 2022. And I'm not sure what that is. But we're open to taking suggestions. So that's it. Let's get back to Five Minute Management. Jamie, we're going to do a Five Minute Management on honey harvesting today. Are you prepared?

Jamie 31:58
I am prepared. I actually have a cheat sheet in front of me to make sure I cover all the bases. I'm ready.

Amy 32:03
Do you think people realize that we have cheat sheets with us when we're doing podcasting?

Jamie 32:07
I suspect, if they know me they probably think that I had to write all this out just because I'm so absent-minded. But then maybe they figured it out probably for me.

Amy 32:21
Alright, let's get into it. I'm going to start the timer now.

Jamie 32:25
Okie dokie. So assuming that you have supered appropriately, in other words, you've put supers on as the nectar flow was picking up and hitting its stride. And you started condensing supers or condensing frames and honey supers as the nectar flow began to wane. You should have honey that's ready. So incidentally, why would you want to condense supers? Well, it takes the energy of incoming nectar to process the incoming nectar and cap that honey and we all know that bees cap honey because it's ripe. And we only want to harvest ripe honey. So if we are leaving lots of open cells and lots of space for them. As the honey flow begins to slow down, they might just store that nectar in all of this space, and then use none of it the incoming nectar or run out of incoming nectar to ripen it and cap it. So when you harvest honey, it is best to take frames that are greater than 80% capped because you want to extract honey that is somewhere in the 15.5 to 18.5% moisture range. That's the magic. That's where honey needs to be. If it is above 18.5% water, it's going to be prone to fermentation, which is irreversible. If it's below 15.5% moisture, it's going to be prone to granulation. Yes, you can reverse that, but it's a

headache. So you really want to be in that sweet spot pun intended between 15.5 and 18.5% moisture. And bees tell you more often than not when that is by capping the cells. So you don't have to go frame by frame. Most commercial beekeepers will just look at the whole super and say, "Is it 80 or 90% capped? Good, that's fine." Even if the outer frames aren't capped so well as long as the inner frames are capped well and it's all going to be mixed together, usually, it all comes out in the wash. So what are some tricks you can know that you're in that right range? Make sure all the frames are capped. Number two, you could turn a frame, you take a frame out of a box, turn it kind of on its side and gently shake it. If nectar is raining out on your boots or pants it is too wet and will not be in the right range or you can purchase and use a refractometer that will tell you what percent sugar is in that nectar so you want to make sure and be somewhere in the only the 15.5-18.5% water and the rest being the bricks of the sugar. Alright, so assuming your supers are ready now you've got to de-bee them. And there are four ways that I de-bee supers one of those is the old school way that I've used a long time myself yeah have an empty super sitting beside you. You go to the super on the hive that's got the honey you take out the first frame, you shake the bees off of that frame and you use a bee brush to remove the bees from both sides of that frame. Then you take that bee's frame and put it in the empty super that you set beside the hive, you're going to want to have a lid on top of that super so the bees you're shaking into the air don't fly back. But you will use that super as the place to move all of your frames from which you brush the bees. A second way that I have never used myself, but nevertheless they still sell these things and equipment supply companies. Is using the porter bee escape now most people who use inner covers will notice that there's a hole in the middle of inner cover and wonder what that hole is for well that hole actually accommodates a piece of equipment called a porter bee escape and when you purchase a bee escape and put in that hole it is a one way valve for bees; bees can go down through it, but they cannot come back up through it. So if you take the inner cover and put it underneath the super that you want to harvest and put a porter bee escape in that hole and the inner cover bees in that super we'll go through it you know as a part of their normal daily activities, and they will be unable to go back up into that super so over the course of a day or two the porter bee escape will help remove the bees from the super and you can come and remove the beeless super the next day. The downside of that is those types of supers can be very vulnerable to small hive beetles when there's no bees in the to protect. Like I said, I've never used that strategy myself. I own lots of bee escapes, but I've never used them. A more common way to harvest honey is to remove the lid of the hive and the inner cover if you have one and put a fume board; a fume board is a piece of cloth mounted in a wooden frame, you will usually spray a repellent. There's a few repellents that are offered in the big companies catalogs, you spray that repel it on the cloth, put that on top of the super from what you want to remove bees and they will run from the smell of the fume board down into the lower boxes, essentially debeeing the box that you want to harvest then you would move that fume board down one box at a time as it empties of bees. And the final way, my favorite way to remove bees from a super is the the leaf blower method where you simply go and remove the super off of a hive. It's got honey in it, you turn that super up on its end so that you can see the top on one side and the bottom and the frames on the other. And you simply use a leaf blower to blow the bees out from between the frames. This does not harm the bees you're still able to fly and get back into the hive you'll blow out from the top of the super and then go to the bottom of the super and blow out the bees and go to the top you do this kind of back and forth a few times at debees it a lot of commercial beekeepers use leaf blowers or bee blowers for this purpose. Now, you got all these supers full of honey, you before you extract you're going to want to take them to a place that you store them. It's always best to extract the day you remove them, but in the event you don't you want to put him in a warm, dry room. A lot of Beekeepers will use heaters and dehumidifiers in that room to keep the heat up and the moisture down so that those supers will be ready for you when it's time to extract honey. So there you go, Amy, probably right over but hopefully close.

Amy 38:55
It was a little longer than normal, but that's okay. It was great information. Those are great harvesting methods. I'm really glad I almost thought you were going to forget the leaf blower and that's one of my favorite ways and so I was really glad you added it at the end.

Jamie 39:08
Amy, it's funny. I used to think it made bees mad but I work with this beekeeper up in north Georgia years and years ago and he was the one who taught me this leaf-blower method. He would go through all of his colonies and remove all the supers and have all the super standing on their end. Then he would go back and blow them all like one at a time. And I would stand on the other side of the super and let the bees hit me, and I never got stung doing this. I'm not recommending you guys out there to try this. I'm just saying they didn't respond to it as defensively as I thought they were going to.

Amy 39:41
They're probably having a blast. The bees are like weee. It's just a nice little ride.

Jamie 39:44
Literally and figuratively I'm sure.

Stump The Chump 39:54
It's everybody's favorite game show, Stump the Chump.

Amy 40:12
Welcome back to the question and answer time. Right now, let's see, Jamie, we've got three questions as always. I never know how to introduce this segment. I'm like, it's the same every time. But let's just get to the question, shall we? Okay, so, first question is if Varroa is always a problem, do you have to test/monitor? Or could you simply just rotate management practices?

Jamie 40:36
Yeah, so I get that question a lot when I'm talking about Varroa control. And it's a fantastic question. A lot of folks say, "Well, then why would I need to monitor if they're always a problem? I should just routinely treat." And as I say that, a lot of commercial beekeepers take that approach. They just simply know that Varroa is going to be again, I'm going to just fictitiously say, a few months so don't say these are the worst months for you. But, I always know Varroa is going to be a problem in, I don't know, March, July, and September; so I'm just going to go ahead and treat kind of habitually or robotically, I call it those three months. Why monitor? I know it's going to be a problem. So I'm going to go ahead and get ahead of the curve. So I would argue that you monitor for three principal reasons. Number one, you monitor because you might end up needing to treat colonies more often than you think. And I think

that's the next question. So I'll end up saving that answer. But, but I will say that beekeepers who monitor, and when I look at monitoring data, I discover that many times we under treat our colonies who might treat twice a year and think we done what's necessary, because we've done it robotically and habitually, but they may have needed two or three other treatments. So you want to monitor to see if more than what you're doing is necessary. Right? Number Number two, you want to monitor to see if it's necessary to treat it all. In as much as you can under treat, you can over treat, maybe you say I'm going to treat four times a year, but you may only need to treat three and if you would only know that by monitoring it. So monitoring is necessary not just protect you from under treating, but also protect you from overtraining, which ultimately saves you money. Third, and finally, why I would advocate monitoring is you monitor to determine that the treatment works. And this is something that very, proportionately few people do. Most people can buy into, though the idea of it to monitor to see if trading is necessary, but very few people question if their treatments work. And so I argue that it is as important to monitor immediately after your treatment is over to see if you achieve what you think you did. We are actually running a big project at the moment where we're looking at how long label products provide controls. If you treat today, how long can you expect the Varroa populations to be below what you started with? And it's pretty stunning, how often that we don't get to answer that question because our treatment failed. So people are often living under the false assurance that hey, I treated it wasn't Varroa that killed my hive, when in reality, their treatment failed. And they didn't know because they didn't monitor. So I would argue it is important to monitor for those reasons.

Amy 43:30
So then I guess that would be my other question. I receive this question pretty often. How often should you be monitoring? Should it be every time you go into a colony? Once a month? What are your thoughts on that?

Jamie 43:41
So I'm going to go out on a limb here at risk misquoting the Bee Informed Partnership, but I think the Bee Informed Partnership says every other month, based on some of their data, what I've always told people is that you should monitor once a month during production season. So where we live here in Florida bees are active from February kind of through October. So you know, I would probably monitor February through October, monthly, maybe February, March area and the September, October, November area maybe every other month. But for sure, April through August, monthly just because Varroa populations can absolutely explode. I wouldn't check as much during winter because they tend to be less of a problem, you know, the build up is lower there. But during production season, whatever your production season is, and I'm not talking about honey production, I meant, I mean the growth and sustenance of colonies, you know in your area, I'd be monitoring throughout that to make sure that they're receiving adequate control when they need to receive it.

Amy 44:43
Alright, well, that kind of leads us into our second question for this segment. And you know, we're talking about monitoring and then you decide that okay, yes, you do need to treat. So what are the minimum or maximum number of times that you should be treating a colony for mites per year. And then also I guess to make it more complicated, you're using this for honey production specifically.

Jamie 45:07
Yeah, so you obviously have to follow the label on the product if there is a number of times per year restriction, it would be represented on the label right. So, if - but but that said, I would monitor throughout the year and I would treat whenever the numbers reached, you know, three mites per 100 bees that this generally recommended and recognized threshold for for mites per 100 bees. So it's three mites per 100 bees would necessitate a treatment. So when I encountered that number, I would use a treatment and I would rotate my treatment so that they're not getting the same thing throughout the year, I'd try to maximize the efficacy of, or use a treatment whose efficacy is maximized that time of year and incidentally, the Honey Bee Health Coalition has produced a really good document. Varroa controlled outlines, products that work, you know, better or certain times a year. So I would recommend taking a look at that. I remember being in a meeting years ago, commercial beekeepers who monitor their colonies were finding depending on the commercial beekeeper that they were needing to treat four to eight times a year. And what's interesting about that stat is that most people up until, you know, 10 years ago, were only treating twice a year, they were only told to treat twice a year, but it became very evident that more control was necessary, because Varroa populations are rebounding so fast. So you would need to treat as often as your sampling tells you that you've hit that treatment threshold. Of course, there's the big caveat during honey production season, because a lot of products don't allow you to use them or aren't labeled for use during honey flows. So then it's your judgment call not a judgment call whether or not you should follow the label, because you always should, but a judgment call on whether or not you should treat. Because the honey flow might start within the label restriction. And so you might have to say, Hey, I've got high Varroa numbers, but the colony looks good. And I know the honey flows coming in, I don't want to compromise that. So I'm not going to treat and I'm just going to wait to treat them after the honey flow, label permitting, or no, this colony really needs it. And if they don't get treatment, they're not going to survive the honey flow. So I'm just going to treat it and write off honey production in this colony if the label doesn't permit so. So you need to treat as often as possible. And then sorry, as often as sampling dictates. And then you have to use your judgment during honey flows on whether or not you think a treatment's absolutely necessary, which would work - which would risk producing honey in that colony. Or it's not necessary and they can wait so that you can get through the honey flow and be able to follow the label restrictions regarding that.

Amy 47:43
Yeah, so this is just a totally random comment. I'm just trying to figure out like out of all of the podcast episodes that we released. I wonder if there's a single one where we don't talk about Varroa and Varroa monitoring. Like I'm convinced every single episode we've talked about has to do with that.

Jamie 47:59
Right. Amy? What saddens me the most with your statement is there's still so many beekeepers out there who don't believe Varroa's a problem or think that we are emphasizing but Varroa to the exclusion of other stressors. Usually people who feel that way are thinking pesticide so this whole Varroa thing's made up to distract us from pesticides and it's crazy people who think that way lose their bees to Varroa. So it's very important to know Varroa are a big deal, and we need to work to stop them.

Amy 48:31
Alright, well, the last question we have does not have to do with Varroa. But actually no, it does. It kind of does. So this person's asking, are they setting themselves up for failure? If they allow their bees to raise their own queens? Or is it preferred to order mite resistant queens from a reliable source? What are your thoughts on that?

Jamie 48:53
You're not necessarily setting yourself up for failure. And I know Amy, we actually talked about this in our Five Minute Management segments recently. So So if all of you have a similar question, make sure you go and check out that one where we talk about allowing colonies to requeen themselves. But you know, bees know what they're doing. They've been requeening themselves before there were people to worry about requeening the bees, right? So you're not necessarily setting yourself up for failure. It's just that you're not necessarily setting yourself up for success. Right. And by that I mean if you are trying to maintain a Varroa resistant stock and you allow your colony to requeen itself your queen is going your virgin queen is going to mate with drones that are available in the environment that may or may not carry the traits that you want. Furthermore, you know, the requeening of it may fail. Not every colony requeens itself successfully biology is messy, right? So occasionally a queen won't make it she'll be eaten by birds she'll get lost whatever. Or you might get an inferior queen. So there is risk associated with allowing colonies to requeen themselves but also there's a risk associated with purchasing queens. You got to put money into that, number one. Number two, they could release her and kill her, in which case you'd have been better off and save yourself the trouble just ripping up the money, right? But the benefit of doing that is you're bringing in stock that you hope and have reason to believe was selected for productivity, gentleness, Varroa control or Varroa resistance, things like that. So there are pluses and minuses of allowing colonies to requeen themselves as well as you doing it directly, or purchasing queens directly. So, what I would argue is that there's pros and cons and you just need to do what's comfortable for you, but you just need to be more importantly, able to recognize failing queens and address it regardless of how you got her, via letting colonies requeen themselves, or you purchasing and putting a queen in there? If you can recognize failing queens, then you can work to remedy it again, regardless of the source.

Amy 50:59
All right, well, I think that's totally fair. There we have it. We have Varroa queens, and that's what we should do. We should just have our question and answer segment be one question on Varroa. One question on queens. And one question on nutrition. What do you think?

Jamie 51:13
Well, I think those are the three big stressors so it would go a long way to helping but we love every question we get. So I really appreciate you listeners out there. Please keep sending us questions. They're always great.

Amy 51:34

Hi, everyone, thanks for listening today. We'd like to give an extra special thank you to our podcast coordinator, Chelsea Baca, and to our audio engineer, James Weaver. Without their hard work, Two Bees in a Podcast would not be possible.