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SPEAKERS

Stump The Chump, Guest, Jamie, Amy

Jamie 00:10
Welcome to Two Bees in a Podcast brought to you by the Honey Bee Research Extension Laboratory at the University of Florida's Institute of Food and Agricultural Sciences. It is our goal to advance the understanding of honey bees and beekeeping, grow the beekeeping community and improve the health of honey bees everywhere. In this podcast, you'll hear research updates, beekeeping management practices discussed and advice on beekeeping from our resident experts, beekeepers, scientists and other program guests. Join us for today's program. And thank you for listening to Two Bees in a Podcast.

Amy 00:50
Hello everybody, and welcome to this segment of Two Bees in a Podcast. Today, I'm excited to be joined by Dr. Mehmet Doke, who conducted his work as a PhD student with Dr. Christina Grozinger at the Department of Entomology, Center for Pollinator Research, Huck Institutes of the Life Sciences in Pennsylvania State University in Pennsylvania. He is currently an Assistant Professor at the University College of Utrecht in the Netherlands. We're excited to have him here to talk to us about a publication that he wrote called "Colony Size, Rather Than Geographic Origin of Stocks, Predicts Overwintering Success in Honey Bees in the Northeastern United States." Before we get started, thank you so much, Dr. Doke, for joining us today.

Guest 01:38
Thank you very much for inviting me. It's a pleasure.

Amy 01:41
So we've got listeners from all over the world, and I'm sure they're very excited to hear you tell us about yourself and how you got into beekeeping research.

Guest 01:48

So, I was in a molecular biology genetics type of program as an undergrad in Turkey. I wasn't very keen on the things we were learning in the molecular biology program. So I got introduced into more organismal research through a visiting scholar who came from Puerto Rico, but was also a graduate of the same college. And I started doing research in the field and the love with honey bees. I really liked the organism. I really liked the potential things I can do with it. And I stayed for a master's in the same biology department, followed up on my research there, and then I moved to United States to do my PhD with Christina Grozinger at Penn State where they were already doing lots of bee research. So I got involved that way. That's the short story of my involvement with honey bees.

Jamie 02:35
So this is a very interesting paper that you and your colleagues wrote, "Colony Size, Rather Than Geographic Origin of Stocks, Predicts Overwintering Success in Honey Bees in the Northeastern United States." And the reason this is so interesting to me is I am a member of an international bee research association named COLOSS, and one of the COLOSS research projects, it's a global honey bee health network, but there's a lot of European members in that particular group, and they did a study, or a series of studies, a few years ago on locally adapted stock. Just looking instantly at your title, it's the size of the colony, rather than the geographic origin of the stocks, predicts overwintering success. So already, I know we're going to have some interesting things to talk about. So before we get into the weeds of your project, could you talk a little bit about this idea of where you guys came up with this project? I mean, what do you mean about geographic origin of stock? What do you mean about locally adapted stock? This comes up in your paper. So could you give us a bit of background? Because I think it's such a hot button topic right now.

Guest 03:49
Sure, it is, and it was a hot topic at that time as well. It was funded for before I joined the love and I came into this research as someone who can take care of the bees and do the field work, but also the love work person they were looking for. It's an interesting title. It's carefully worded. We chose the words like geographic origin rather than genetics, and also the little caveat in there, that Northeastern United States, so we were careful.

Jamie 04:18
I saw. It looked like it was incredibly carefully written. I was reading that, and I'm like, someone was thinking a lot about how they put this title together. You did a good job. Sorry to interrupt, but I just thought that's worth discussing.

Guest 04:32
No problem. One of the things I heard later from my postdoc advisor is that I apparently put titles on papers that makes reading the paper unnecessary, because, like, everything you need is in the title.

Amy 04:44
My favorite kind of paper, honestly.

Jamie 04:47

Isn't that the goal of the title? Well done, Mehmet.

Guest 04:51
There's no mystery. He was saying, like, they won't read your papers. What are you doing? Like they don't need to read it anymore. So here's the thing, this research was trying to look at potential differences, especially overwintering success, in different bees stocks, right? And the idea was to get the bees from places that are far away from each other, so hopefully catch these genetic differences that will then yield differences in overwintering success. So why will colony size, all the things we actually measured, some of it never even came to the publication, because, there was nothing to see, but it didn't go that way. So once we did the research, we didn't actually find significant differences in the overwintering success of each stock. There was a minor difference between stocks we got from southern United States versus northern United States. But even that wasn't much, so then we had to rethink our assumptions here, right? So that's how the title came to be.

Amy 05:53
Mehmet, I have so many thoughts on this just looking at geographic origin. Of course, you were looking specifically in the northeastern United States. And I think the beekeepers in the United States would say, well, there may already be different stocks of the southeast or other parts of the nation that are in the Northeast. It's really interesting, even just to think about that and what that looks like, as far as whether they are already adapted or not in those locations. That kind of leads me to the next question about just the methods. I can't even imagine what that kind of looked like, and what you were trying to figure out as far as the methods of your research. And so can you answer questions like, how many years or how many seasons did you have with the project? Again, let's talk a little bit about those northern versus southern adapted bees. What stocks did you choose? Why did you choose these stocks? I'd love to hear a little bit more about those methods.

Guest 06:48
Surely. So we wanted to kind of replicate what also happens in Pennsylvania already. We were trying to be more field relevant in a sense. The way we did that was we got packaged bees from a provider in the south, Lee, Georgia. But we didn't keep the queens from those packages. Instead, we just used them as starters, and then we replaced the queens with queens we purchased separately from providers that are reputable, let's say, that are in the north and south. The idea here was that a lot of beekeepers in the northeast, in Pennsylvania, for example, already do that. They buy the package bees for workers. They build up the colony, to some extent, in the early spring, because if you buy them from south, they come early in the season, and then they can replace the queens either with their own queens or their neighbor's queens, right? Or they can just purchase them. So you were interested in the decisions they can make when purchasing the queens. Should they get queens from a northern provider or a southern provider was kind of the basic question here.

Jamie 07:48
I just remain intrigued with this idea because I speak to a lot of beekeepers groups every year, and I have for a few decades now, and there's this growing groundswell, this idea about locally adapted stocks. And I know you weren't necessarily getting to that microscopic of a scale, but it is interesting to

me that thematically, you're basically saying, is there really an impact of using southern bees in northern states kind of thing, right? And to me, having read the paper as a lab and discussed the paper at a lab, it kind of flies a little bit in the face of the concept of locally adapted stocks, which I know is contrary to what I was seeing kind of come out of those local genotype by environment studies that were happening in Europe. And again, we chuckled about the way you wrote the title, but I really feel like the title was very specific, so that you weren't necessarily trying to make a blanket statement about locally adapted bees globally. But it does show, in some ways, that southern bees didn't do any better or worse than northern bees where you were. And so that kind of flies in the face with what a lot of people are anecdotally saying, so I'd love for you to elaborate a bit on your findings. We've got an idea of the background of this study, we've got a little bit of an idea of the methods, but can you give us, thematically, some of the big findings that you and your team made throughout this study? Because I really think it's quite fascinating.

Guest 09:19
No, surely, surely. And also, I'd like to just clarify that I'm definitely not saying locally adopted stocks don't exist. I truly believe in their existence, and I think there's excellent papers from Europe, from other parts of the world, that legitimately shows that when you move those stocks in different places to different geographies, they don't do as well. My personal experience from Turkey is also the same way. I was doing beekeeping and bee research in Turkey, and we have five or six, depending on who you ask, distinctive subspecies or stocks or breeds of bees, and they clearly have different phenotypes. You can easily notice that when you keep them in the same environment, they don't all do equally well. So I'm not dismissing that, and that's absolutely part of the reason the title was like in the northeastern United States, right? We're focusing on this very specific setup rather than making the blanket statement. So you're right about that. And what we found was, so we looked at lots of things. We traced the amount of honey they store, the amount of pollen they store, how many frames of larvae or brood they make, how many bees are in there? What's the colony weight? Right? We were weighing the colonies, and we kept keeping that data for two years, basically, two winters. The sad part of this research is that in the first year it was conducted, I joined in the winter. So the colonies were already set up before I joined the lab, and this research had already started. And the initial idea with the researchers like Maryann and Christina was that they didn't treat these colonies for Varroa. They didn't do that is because all of the stocks we purchased are sold as Varroa resistant stocks. The providers are swearing on it that their stocks are Varroa resistant, which is a phrasing that I really don't like, because perhaps stocks can be Varroa tolerant. Resistant, not so much. And what happened in the first year when they didn't treat for Varroa at all is that almost all of the colonies died, and then we had near zero statistical power to say anything. So we had to restart the next winter. And then we did it again. We're using 15 colonies per stock, on average, 14 to 16. And overall, I think we had a good representation of each stock. But this time, the survival rate was, of course, a lot higher because we actually treated for Varroa. In the end, what we found was that overwintering survival itself did not significantly differ in the four stocks that we were able to use. And I need to clarify that three of them were requeened with provider queens, and one of them was the Russian stock, the famous Russian stock we have in United States, which we didn't get through requeening. Instead, we bought as nucleus colonies, because Russian queens are very hard to [inaudible]. But in the end, we didn't see differences in their survival rate, in their overall success, also in the other things we reported, like how much pollen they were able

to get, how much honey they were able to get, but instead, we found a very apparent and statistically significant difference of location. Well, statistically, maybe not. We had three locations, we put into a lot of statistics on it, but major differences in the amount of storage they can accumulate, colony size, and in relation to that survival.

Amy 12:40
So I have a really silly question. I know that you were looking at the geographic origin of those stocks. Were those related to colony size before going into winter at all?

Guest 12:50
What we found is that it was not. So colonies from different stocks were housed in the same apiary. So we had three locations where each stock was represented by five colonies or so. When we look at those cross design type of effects, we don't see the effect of the stock on the colony size before or after the winter, but what we really see is the effect of the location itself.

Amy 13:16
I'm also interested to know what research projects had to go in before this project was conducted, and then, of course, after the project is completed, what are the natural steps next that will come from this work, like what other research projects need to happen next?

Guest 13:32
So I think what came before this was that they already had some research showing that if you use packaged queens, you don't get great results. So if you buy packaged bees and use the queens that come in the package, that doesn't go very well. But if you replace those queens with queens from your neighbor, your friend who's a beekeeper, it goes much better. And the idea that that brought up was that the queens that they're getting from their neighbors or friendly beekeepers around is locally adopted, but the bees that are coming in the packages are not. So they kind of wanted to test that, but took it a step further to see if there's a stock effect between different parts of the country, because if the queens in Pennsylvania are adapted to Pennsylvania in winters, then the bees from Florida or California shouldn't be. So that was the main logic behind testing this hypothesis for this project. And I think what follows would be basically trying to look at what level of genetic differences we really have between different stocks. And I know there's already research on that. I believe Dr. Tarpy has some papers published on that. I'm not sure any others, but this is something that's already being researched. From my understanding of what I read in the literature, the honey bees in the United States are not necessarily not diverse. They are a bit diverse, not maybe as good as European counterparts, but the population seems unstructured. What we mean by that is that the stocks are not that separated from each other, genetically speaking. So I think we're kind of hitting on that, and potentially, if anybody wants to pick up on that, this is not the line of research I followed later. I think a deep dive into the genetics of bees across different climatic zones in the United States would be a nice thing to see.

Jamie 15:17
Obviously, your research has a lot of practical implications, right? That's why I'm giggling. I keep thinking this is one of those interviews that we conduct that our beekeepers are probably sitting on the

edge of their seat and going well, okay, Mahmet, what would you recommend? So that's kind of where I'm going to go from here. Based on the care that you guys put into writing your title, you'll probably be very careful in your answer of this question as well. But what are the take-home messages from your research, principally from a beekeeper perspective? What do you tell beekeepers as a result of the work that you and your colleagues published?

Guest 15:55
Well, then this might be surprisingly refreshing, because I think I'll give a very direct answer for that, which may or may not be agreed by all beekeepers. Sometimes, I go to those beekeepers meetings and they say, ask 10 beekeepers, and you will get 11 answers. So maybe I'm putting the 12th in the line. But the basic idea to me, from what I learned in this research, and also keeping bees in the United States to do research, is that the first thing to do is treat for Varroa. A lot of beekeepers don't like that, especially the small-sized hobbyist or medium-sized beekeepers don't want to treat, recently, more and more. There's this idea that treating will create resistance, which is a legitimate concern, of course, but at the same time, in this moment, if we don't treat for Varroa, colonies have little chance to survive without perhaps other interventions then, which might be more costly, more time consuming, more effort heavy. So they have to think about it. If I was keeping colonies now in Pennsylvania, for example, I would treat for Varroa. The next thing would be, then, of course, keep an eye on the colonies as any good beekeeper should do. And if your bees are lightweight, if your colonies are lightweight, if they're not storing enough food for the winter, you already know it's not going to be nice. Beekeepers were sometimes making fun of my research when I talked to them, because they were saying, so basically, I can just lift up one edge of the colony with my hand and be like, yeah, that's going to make it, which is kind of true, kind of what we're saying. So if your colony is very lightweight, that's not a good sign. So if a colony is lightweight, then I would suggest feeding, and that's also a thing that not every beekeepers likes to do. They want to take pride in not feeding their bees. Sometimes they consider that cheating or tainting the honey somehow. Yeah, I understand the concern, but at the same time, it's better than letting the colonies perish, in my opinion, because at the same time, we're keeping those bees, we're responsible to the bees as well, right? We're responsible to the well-being of them. So I would highly recommend making sure there's enough weight in the colony, not in form of honey, of course. You can't just get a colony that has like 1000 bees left in it, and dump honey on them and expect them to survive the winter. And if it's too late into the season when the feeding won't do it, because maybe it's just not enough time anymore for them to build populations, then you might have to sacrifice one of your queens and just add the workers to another colony that is also suffering to make it better. One colony surviving is better than both of them dying.

Amy 18:23
I think those are great recommendations. I definitely understand speaking to beekeepers and having that 12th answer. I don't know if your answer was really a 12th answer, Mehmet. I think that many people would agree with some of your recommendations in management.

Guest 18:37
I sure hope so.

Amy 18:38
So the last thing I wanted to ask is, what's next for you? Is there anything else that you wanted to add? And I know that you've been in the Netherlands for a couple of years. Are you still working with honey bees currently? Are you still conducting honey bee research?

Guest 18:51
So I kind of moved in a different direction in my research. The next thing I did was, because I was always interested in seasonal adaptations, we're doing work in the intersection of physiology and environment, or genes and environment. So that's where I moved on. I actually did this other project in Puerto Rico after that, in my postdoc years, where we were able to show that the extreme longevity, for example, that we observe in winter bees or other physiological changes can be triggered even in a tropical climate with Africanized bees. So there's some cool research that came out of that. And then I also moved on to more neurobiology, learning, memory type of work. You can count me out when it comes to being useful to beekeepers at this point. I don't think my research is going in that direction. Moving to Netherlands and accepting this position, I also had to give away a lot of the opportunities I had to do research, but I'm still involved with the previous research group. I work with Dr. Tugrul Giray's group in University of Puerto Rico in Rio Piedras, so I still work with them. We're still publishing together. I hopefully want to continue this, but I think my research now is more on the basics of honey bee biology rather than applicable information. However, if applicable information comes out of it for beekeepers, I would be very happy to share with them. I think it's important to make scientific information available to beekeepers so they can make better decisions.

Amy 20:19
Absolutely. Well, thank you so much, and good luck on your future endeavors.

Guest 20:23
Thank you very much.

Amy 20:35
So Jamie, I think there's a lot to kind of discuss, just following up from our interview with Dr. Mehmet, and I think he did a great job. I think it's so funny. We're jokingly laughing about his title, and that would have been a really short episode, right, to just say what the title was, and there you go. There you have it. Colony size over geographic origin of stock is more of a predictor of overwintering in the Northeast United States. Done.

Jamie 21:02
Well, there's a lot to think about with that statement, and I have both a research appointment and an extension appointment. And the reason I'm saying that is because my mind is constantly having to play in those two fields. And so I think about doing a project like Mehmet and his colleagues did that has practical application. So beekeepers want to hear, okay, you did this research. What do I need to do based on what you found? Right? So, that's what the extension part of us wants to do, is communicate those results in a way beekeepers can change their operation to benefit them and their bees. On the other hand, as a scientist, we are skeptical about everything, and we also have a really good

appreciation for what our research does say and what it doesn't say. And we know as scientists that our results are limited to how we did the study, when we did the study, and where we did the study. We are always dubious and nervous about making broad recommendations off of very specific, localized research project. So the scientist in Mehmet and his colleagues wrote that title: Colony size, rather than geographic origin of stocks, predict overwintering success in honey bees. If it just stopped there, it would sound like, well, it only matters how big your colony is or how heavy it is, rather than where your bees came from. But then they said, in the northeastern United States, and that's basically giving a shout out to the science saying, hey, look, we recognize that we're making this statement of this claim, but it is limited to the conditions under which we tested it. So it's like, Amy, this conflict between what beekeepers want from science, which are these immediate answers that are universally applicable, to what scientists want from science, and they know that it's kind of specific to how they did it, where they did it, when they did it, and they're nervous about making these broad statements. And so it's this balance. So sometimes beekeepers think science moves too slow. Sometimes science feels like we've got to be careful and make sure that what we say is true, because otherwise people are going to do it and they may benefit or fail as a result. And so there's this kind of really delicate balance between what beekeepers need and what scientists are able to say with just a single research project.

Amy 23:19
Yeah, absolutely. So I wanted to talk a little bit. Let's start with just his recommendation to beekeepers, the management recommendation. So what were your thoughts on his recommendations? I agreed with them. I mean, in general, you know, I did.

Jamie 23:30
There's three things that he said, and the whole time I was thinking in my mind, oh my gosh, this is so good. He said, if I was keeping bees in Pennsylvania, based on my research, there's a couple things I do. I'd control Varroa. I'd make sure my bees had food. Those are two of the three things you and I say all the time, right? Kill Varroa, manage nutrition. Remember, that's coming directly from the former Bee Informed Partnership surveys. We talk about it all the time. What are the big three? Varroa control, nutrition, and what? Queens. Their whole study was a queen study. How do different stocks influence overwintering success? And so queens, food, and Varroa control. So all of those are important. And then the next statement he made, I don't know if you heard it or caught it, but he made a statement, with Varroa control, there's a lot of people who don't like to essentially control Varroa, something to the effect that if we keep bees, we have an obligation to control Varroa. That's something you and I talk about all the time. If we keep bees and bring them under our husbandry, our care, then we have an obligation to take care of them and address things like Varroa issues or nutrition issues. I just don't buy into the logic of not killing Varroa and not meeting the nutritional needs of bees. And he said it without necessarily knowing he was agreeing with us. It was nice to hear that.

Amy 24:56
Well, the funniest part was like, okay, going to a Beekeepers Association, you ask them, you've got 10 beekeepers, and you end up with 11 answers, and here's the 12th one. I'm like, no, it's not the 12th one. We say it all the time.

Jamie 25:06
Exactly. Well, that's the thing, it's the take-home message. Listen, if you are listening to this podcast, and have been a faithful listener, you know from our mouths, kill Varroa, take care of nutrition, take care of the queens. Those are the three biggest issues that the average beekeeper is going to face in his or her colonies.

Amy 25:24
Definitely. And the last thing I wanted to bring up was, I'm going to loop it around to the very beginning again. It's just that discussion of local queen stock.

Jamie 25:31
Yes, and as I've said multiple times, kind of through my questioning with Mehmet, was this idea that, hey, listen, local stocks are totally in vogue. I hear it everywhere I go. Beekeepers talk about it, especially hobbyist beekeepers, sideline beekeepers. It's less of a thing I hear from commercial beekeepers, but certainly from hobbyists and sideliners. When I listen to my colleagues, particularly in Europe, talk about these things, local stock, local stock, local stock, local stock, locally adapted stock, stock that's adapted to local environmental conditions, and at least in this one study, that didn't matter. But you've noticed, Mehmetdidn't say, well, local stocks aren't important. In fact, he said, I believe in them. I advocate for them. And there's a wealth of research to suggest that it's a real thing. But, my, I guess, take-home message from all of this discussion is it's maybe not, at least in the US or a place like that, quite as simple as going that route, because bees are moved all around all the time in the US. So it raises questions on, well, how does a local stock adapt if bees are coming in and out of the system all the time? In Europe, their countries are smaller, and it's almost like our states, and maybe there's not free movement of colonies between countries. Maybe there's geographic boundaries and environmental boundaries, like mountain ranges, etc, that you can generate these true local stocks. So I say all of that to say that this is clearly a growing area of interest, and one in which people are going to continue to work and we'll know a lot more about in the future. So it's neat to see their paper in the US, but to hear him even talk about, well, I still believe in locally adapted stocks, and they're important. So it's a great time to be in the bee world and watch how all this unfolds in the future.

Amy 27:12
Absolutely. So what we'll do, listeners is we'll take that paper, we'll link it to our additional notes and resources. If you have any questions, feel free to reach out.

Stump The Chump 27:28
It's everybody's favorite game show, Stump the Chump.

Amy 27:39
All right, everybody, welcome back to the question and answer segment. Jamie, the first question we have today is, what is hive collapse? How many times have you heard that?

Jamie 27:48
Oh, man. Quite a few, I will say.

Amy 27:51
Colony collapse.

Jamie 27:53
I do like this question. It's going to be a little tricky to answer, because it means something different to everybody. So I'm just going to start from the perspective that they're kind of asking under the umbrella of Colony Collapse Disorder. So I mean, in the strictest sense, hive collapse is when the hive collapses and dies. In the sense that, all the bees die, there was some catastrophic failure in the hive. When I first heard this term being used, it was associated with, quote, Colony Collapse Disorder, which is kind of that phenomenon that started in late 2006, became a thing that everybody talked about 2007, and it dominated headlines from 2007, I don't know, to 2015 or more. And in that context, it had a very specific definition, because you had to be able to separate Colony Collapse Disorder from everything else. Like we know what collapse looks like due to Varroa, we know what collapse looks like due to starvation, things like that. But in the case of CCD, hive collapse meant that you would go into your colonies and you would have hardly any adult bees relative to the amount of brood in the nest. So the adult bees just disappeared, as it were. You might have a small cluster of adult bees remaining. The queen seemed to always be the last one to go down with a ship. So she always seemed to be present in that small population. If you saw any bees at all. If you saw no bees, it's usually a fair amount of brood, a fair amount of honey, no bees. And all of these were kind of clinical signs associated with Colony Collapse Disorder that some people called hive collapse, or colony collapse, things like that. So the questioner may be asking like, what is hive collapse in that context? And that's what I just answered. But the questioner may also say, well, generally speaking, what does hive collapse look like? And that's what I answered earlier. Well, it means different things to different people, and it looks different depending on what the stressor is. For Varroa, a hive is collapsing when you start seeing very spotty brood patterns, few bees being produced. You might see a lot of bees with deformed wings because Varroa carries deformed wing virus that can get into other bees. And all of this stuff is associated with a Varroa hive collapse. When it's due to nutrition, you might see very little brood being produced, a lot of bees, but the bees seem very lethargic. You may see no stores of honey in the hive. You know, that would be a collapse due to nutritional, specifically loss of honey or carbohydrate issues. What about a queen issue? Well, when there's a bad queen, you might see a spotty brood pattern, a little bit of brood when the queen is dead and they fail to requeen themselves, you might see lessening bee population, really spotty brood pattern, maybe a high proportion of that brood is drone brood rather than worker brood, or maybe it's all drone brood, which would indicate laying workers. So that would be hive collapse related to queen issues. Hive collapse related to pesticides, you might see a lot of honey, a fair amount of brood, but a pile of dead bees at the bottom of the hive, outside the entrance of the hive, and you would distinguish this from Colony Collapse Disorder related hive collapse in that the CCD hive collapse, you don't see dead bodies. You just don't see bees. They're just not there. But in a pesticide kill, you see inches and inches of dead bees. And so really, it all relates to what stressor is causing that hive collapse, and that might manifest differently. If it was viral related, you might see a lot of bees on the ground outside the hive, crawling around, unable to fly, crawling up blades of grass. This is a clinical sign of viral infection, or even Nosema infection, or tracheal mite infection. So what is hive

collapse? It all depends on what the stressor is, and knowing that, it's a little bit easier to define. So hopefully, I've given some varying definitions based on the intent of the questioner.

Amy 31:44
Definitely. I'm just thinking, part of our job is to work with media, and we're kind of at the forefront of answering questions. That's almost every single time someone calls me to do a media anything, they always ask about Colony Collapse, or honey bees declining. They've heard that honey bees are declining, so what is that? And I think I'll just take this segment of the Q&A and I'll just send them the recording that you've just said.

Jamie 32:08
Hopefully it'll be helpful.

Amy 32:10
Yeah, absolutely. Okay. So for the second question that we have, this person is wondering how they can grow their bee yard quickly.

Jamie 32:18
Amy, is theft on the table or not? I'm just kidding.

Amy 32:21
Oh my gosh.

Jamie 32:25
Obviously, I am just kidding. Don't use that one for the press, Amy. But how can I grow my bee yard quickly? Well, the easiest way to grow your bee yard quickly is to have a lot of money and just buy the bees directly, right? I mean, you can either independently be wealthy or take out a loan. In a lot of places, there are agricultural loans that make it possible for you to grow an ag related business, in this case, beekeeping, relatively quickly. If, on the other hand, this person's asking maybe for a more organic perspective, I'll try to answer it that way. So let's say you purchase 10 colonies, and you don't want to purchase anymore. You don't necessarily want to pay someone else for bees. What would you do? Well, you would need to optimize growth conditions for those 10 colonies, which would correspondingly mean that you are able to make splits from those colonies. So you've got to have Varroa under control. You've got to have good queen and genetic stock, young queens that are producing lots of brood. You've got to have significant pollen flows, and you've got to have incoming nectar. Listen to everything I just said, good queens, making sure there's incoming resources, pollen and nectar, and disease and pest control. If you have all of those things under control, then it boils down to this statement: Bees make bees. So there's really two ways to grow your operation. You're either paying for it, you're buying packages, you're buying nucs, you're buying full-sized colonies, or you pay for initial investment of bees, and then you manage those bees optimally, so that they're as strong and healthy as possible, so that you can make splits. Now let's think about the latter option because I think, probably, this is more where the questioner is coming from. If you have 10 colonies that have good queens, and the disease and pests are under control, and you're heading into spring,

Mother Nature is going to take care of this for you. Mother Nature is going to provide copious amounts of nectar and pollen and your bees are going to grow. And rather than allowing your bees to swarm or make honey, you just make splits. But outside of spring, you may have to feed your bees to keep those resources coming in so that they want to grow their colonies, and so that you can continue to make splits. A single well-maintained colony, if Mother Nature's feeding it in spring and you're feeding it the rest of the season, a single well-maintained production colony can probably produce three to five splits for you in the growing season. So that would be from spring until the end of summer, as long as queens are still available. So if you have 10 colonies, it's reasonable to think, with optimal management, you can have 30 to 50 colonies at the end of the year. If you have 50 colonies, it's reasonable to believe that you could have 150 to 250 at the end of the year, but that still takes economic input, because you got to have the boxes to make those splits into. You got to have the feed. You got to get those queens into those new colonies, and that costs money. So, it all depends on your strategy. But optimal managing of what you have or being willing to purchase from the outside in, both of those are great ways to grow your bee yard quickly.

Amy 35:45
Yeah, absolutely. I mean, we've seen it with our own eyes, right? I mean, many of the participants that we have will start off small, and then just grow and grow and grow so fast, and they're like, oh my gosh, what do we do? It's almost like sometimes it becomes the opposite of, what do we do because we've grown so quickly. So it's kind of fun to see both sides of it.

Jamie 36:03
You're spot on right. And I will tell you, people who buy bees going into the nectar flow, their bees will grow real fast, but if you still want that same growth outside of the nectar flow, you've got to have input. You've got to manage those bees optimally, and you're going to probably have to feed because incoming resources makes colonies want to grow, and growing colonies are the ones you've got to split, right? So it takes a lot. If you if you talk to these folks who produce nucs for a living, they're feeding bees and all of that stuff. Optimal queen management, disease and pest management, so colonies are always in growth mode.

Amy 36:36
Sounds good. Also, Jamie, I'm convinced now this is going to be our very last episode of Two Bees in a Podcast because of your first recommendation.

Jamie 36:43
Uh-oh, what was that?

Amy 36:45
Stealing bees? You forgot you said it.

Jamie 36:47
It wasn't a recommendation. It was a joke. It was a joke. So no, you should not steal bees. No one, none of you should steal bees. Please don't steal bees.

Amy 36:57
Oh, my goodness. Okay, so for the last question that we have for today, this individual has read that small hive beetles will travel with swarms. Is this true, and if so, are there a lot of small hive beetles going with swarms? Is it just a few adults? What's going on? Do small hive beetles travel with swarms?

Jamie 37:16
I chuckle, because also embedded in that question that I can see is I have a hard time finding scientific evidence of this online. I really love this question. Do you know why I'm chuckling, Amy?

Amy 37:27
No. Tell me. Tell us.

Jamie 37:30
Because it was my research as a PhD student that suggested that small hive beetles travel with swarms.

Amy 37:37
When was this? What year was this? That's funny.

Jamie 37:37
So my research is the scientific evidence that would be online. So the question -- let me be a scientist as I answer the question. I've read that small hive beetle travel with swarms. Is this true? The truest answer to that is, we don't know. We don't know for sure. So then, how is it that my data as a PhD student years ago suggests that it did? Well, I was doing a project years and years ago, actually, gosh, over two decades. 20 years ago, easily, when I was a PhD student. Probably everybody knows my story. I'm from Georgia and did my PhD overseas in South Africa. And South Africa has the opposite climate that we do in that their winters are our summers, our summers are their winters. And so when I would do experiment in South Africa, then I would come back to the States and do the same experiment in the States, just in our same season, but at the opposite time of the year. So I, as a PhD student in the States, I didn't have a university affiliation, and so my grandfather was a dairy farmer in central Georgia. So I did this project on my grandfather's dairy farm with research bees for my PhD. And what I was doing is I was going into colonies every night, and I was adding 100 small hive beetles to see what the ultimate response that the colony would have. This was causing colonies to abscond because we were putting high densities in. So what does this have to do with swarming? Well, one day, when I was out making my observations of these hives, one of the colonies tried to abscond. Now, absconding is not swarming. I will 100% confess that absconding is when the queen and all the bees, all of the bees, leave the nest. They are trying to escape something, maybe a dearth, maybe a stressor. In this case, it was clearly the small hive beetles, and I hunkered down beside that nuc. And you could tell I'm from Georgia, right, because I used the phrase "hunkered down beside that nuc." And while the bees were leaving, while they were flooding out of the hive, small hive beetles came flooding out with them. The bees were all flying around in the air. They landed near the nuc, like what you would see with a swarm, except this was an absconding event. Swarms, the colony's splitting. Abscond,

everybody's leaving. It's kind of a similar behavior, but for different purposes. When they settled down in their cluster, I collected the cluster and went through it and found adult small hive beetles. So I have small hive beetles leaving the hive with, essentially, absconding bees.I had small hive beetles in the cluster with the absconding bees. So that led me to speculate in the manuscript that I ultimately published that it is possible, though not proven, but possible that small hive beetles can migrate with honey bee swarms. The last piece of evidence that we would need, and I did this there, but I still don't think it's a great causality, I did end up hiving that cluster, and instead of dumping that cluster straight into the hive, I did that kind of old beekeeper parlor trick where you dump the bees in front of the hive, and once they find the cavity, they'll walk their way into it. And while they were walking their way into it, small hive beetles were walking their way into the hive with the bees. And so even though I've got a lot of anecdotal evidence to suggest that this is possible, it still needs to be documented in a formal study with a lot more purpose. So mine was more anecdotal support that this is a possibility, rather than kind of hardcore support that this actually happens. So to answer the question, I suspect that they are capable of moving with swarms, but this still needs to be shown definitively. So as a result, I can't answer how many go with the hive and which beetles do it as a contingent. We just simply don't know. We have anecdotal support for the possibility of movement with swarms, in this case, an absconding event, which, of course, is not a swarm. But we don't have definitive evidence to suggest that this is something that happens as a part of small hive beetle dispersal mechanisms.

Amy 41:48
That's fair. So I have one question. How did you look at small hive beetle in the cluster?

Jamie 41:52
So what I did is it boils down to what I just mentioned, where I would shake that cluster in front of the hive, and as they were walking into it, I saw small hive beetles with the bees moving in, and deduced that they were present in the cluster. I did try to comb through the cluster a little bit to spot small hive beetles, but the greatest support came for it from when I shook that cluster right in front of an empty hive and watched them march in with the bees.

Amy 42:21
I was thinking those were two different things. Okay, that makes sense.

Jamie 42:22
I know. When I heard myself describing it, I certainly led to believe that that's what the case. But the evidence came from them leaving with the bees and marching back in once I shook the cluster in front of the hive.

Amy 42:27
So this actually leads us to the second question. This is kind of a two-part question about small hive beetles. So once a swarm is contained, at that point, it seems like they're probably a little stressed. They're in a new location. There may or may not be some small hive beetle that have come with them. Does this, quote, unquote, stress pheromone, would that attract more small hive beetle to come? What are your thoughts on that? Is their presence of yeast from the small hive beetle to basically show that,

hey, look over here. There's a swarm. It's new. It's not fully figured everything out, and so come on over, other small hive beetles. What are your thoughts on this?

Jamie 43:14
Yeah, these are very insightful questions, because it means the questioner knows a fair amount about small hive beetle biology, and I really applaud that. So to catch everybody else up to be able to understand the question, there was some research out of a USDA lab actually here in Gainesville, Florida, from the late Peter Till who's really good scientist. He and his, at the time, postdoc, Dr. Baldwyn Torto, who's now a researcher at ICIPE in Kenya, they found, with colleagues, that there is a yeast that's associated with small hive beetles. That yeast is Kodamaea ohmeri. And then, when that yeast is exposed to pollen, it produces a component of honey bee alarm pheromone. And they were able to demonstrate that small hive beetles are very attracted to honey bee alarm pheromone. So they had kind of put together this rolling series of steps that led to this hypothesis that small hive beetles are attracted to stressed colonies or alarmed colonies. So that when a colony is stressed to the point that it's producing stress pheromones, or maybe even alarm pheromones, it might attract small hive beetles in. Small hive beetles might have some sort of symbiotic relationship with this Kodamaea ohmeri and Kodamaea ohmeri might be important in finding colonies, ultimately, to overrun. So there's a lot of assumptions there in those statements that still need to be documented, but nevertheless, that's kind of the train of thought. And so the questioner is saying, well, swarming probably produces a stress pheromone, and I would say, absconding certainly does. Surely, they're stressed, that's why they're leaving. So is a colony that just swarmed or moved into a nest cavity, are they more likely to have a lot of small hive beetles because they're stressed, they're cranking out this pheromone that would make them attractive to small hive beetles? Or is it exclusively the presence of this yeast, Kodamaea ohmerithat that says this colony is right for infestation? The truth is we don't know. We're not quite sure what role Kodamaea ohmeri plays in colonies. The trick is, I could go on for days at this idea, but if you think about it, in Florida, small hive beetles are in every colony I go into, and the vast majority of colonies don't die. But every once in a while, you'll get one that's completely overrun with beetles. And the question is what's the trigger? What causes beetles to ultimately overrun a colony? And it doesn't always matter if the colony is queenright or healthy. I've seen them take out queenright, healthy colonies, and I've seen them do nothing to weak colonies. And so clearly, there's some sort of trigger that leads to this explosive overrunning and reproduction of beetles in the nest. So, this hypothesis about the size that it's related to this yeast, I would just say the jury's still out there. We don't really know for sure all the biology associated with small hive beetle attraction to colonies, what role stress plays in the nest, what role this yeast plays in the nest. But the questioner was asking great questions, kind of subsequent to that swarm question. Do they really swarm with bees? Well, we're not sure. We've got anecdotal support through absconding bees. Once they get there, is it a stressed colony that might attract beetles? Well, we think stress is important, but we're not sure. And we're also not sure what role Kodamaea ohmeri plays. But all of these are great insights, and these are great things that absolutely need to be studied further for confirmation purposes.

Amy 46:23
Yeah, absolutely. I'll just give a quick shout, because the person who asked this question is one of Cameron's students, and it's Dr. Tim. I'm not going to say his last name, but I do know he's an active

listener. He's in South Carolina, so thank you so much, Tim, for sending us your question. All right. Thank you so much, Jamie. Thank you to our listeners. Don't forget to send us any questions that you have. We love to hear your questions. Send them over to our email or any of our social media pages. Thanks for listening to today's episode. This episode was edited and produced by our podcast coordinator Mitra Hamzavi. Thanks, Mitra.

Jamie 47:09
Visit the UF/IFAS Honey Bee Research and Extension Laboratory's website, UFhoneybee.com, for additional information and resources for today's episode. Email any questions that you want answered on air to honeybee@ifas.ufl.edu. You can also submit questions to us on X, Instagram, or Facebook @UFhoneybeelab. Don't forget to follow us while you're visiting our social media sites. Thank you for listening to Two Bees in a Podcast.