



EPISODE 229 TRANSCRIPT

Jamie

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

Hey everyone. As you know, one of our largest events of the year is something called Bee College. And this is something, actually, Jamie, I think you came up with Bee College. Is that right?

Jamie

Yeah, a long time ago, like right when I first got hired. And it was just one of those things that I thought would be a good idea for training beekeepers. And honestly, the idea wasn't unique to me, Amy, but I'll tell you a quick little story. I'm from Georgia, right, originally, and I worked at the bee lab there at UGA. And Keith Delaplane ran a similar thing called the Beekeeping Institute.

So, when I came here, I created the Bee College, kind of mimicking the Beekeeping Institute. Well, Delaplane got the idea for the Beekeeping Institute because he, one time, was a speaker at Tom Sanford's Beekeeping Institute in Florida. So, my predecessor, Malcolm Sanford, ran a beekeeping institute that was essentially duplicated by Delaplane in Georgia, which I've duplicated in Florida.

So, essentially, the Bee College is the son of the Bee Institute, which is the son of the Bee Institute in Florida, making the Bee College the grandson of the beekeeping institute here in Florida.

Amy

I need a family tree. I need a family tree written out for me.

Jamie

Yeah, so it's fun to think about how beekeepers have been trained for decades through the University of Florida because of these various things. And Bee College is just an amazing event.

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You and your team do a great job putting it on. And so, yeah, beekeepers should be excited about attending.

Amy

Absolutely. So, the reason we're doing this little, short segment is to do a quick promotion of our event. We're recording this right now in February 2026, and I would love to invite many of you to come to our event March 20th and 21st, 2026.

We have people from all around the world, Jamie, that are coming. I know we have people that are registered from France, from the Caribbean. We've had people travel road trip from Canada to come down. And what do they do on their road trip? They listen to Two Bees in a Podcast all the way down, and those are really, you know, those are real fan base right there.

So, we appreciate you all listening. We appreciate you all supporting our programs. And if you are interested in coming to Bee College, we hold it twice a year, typically. Information can be found on our website. But you know, just because you don't live in Florida does not mean that you should not attend.

So, consider coming to our event. We have 250 - 300 people. Beekeepers just talkin' bees and it's a lot of fun. We hope to see you there.

Jamie

Yeah, Amy, we've got listeners from over 70 countries around the world. We would love to have a listener from each country join us at Bee College in March. And I'll tell you one other thing, Amy, that's kind of sad. It's my last ever Bee College as a University of Florida employee, unless you guys invite me back in the future, but then I won't work for UF. So, it's my official last one in the UF capacity. So, I'm sad, but that makes me more wanting folks to attend so I can see everybody kind of as my last hurrah before heading north.

Amy

Yeah, before he heads 5 hours north of our facility. This is Jamie's last Bee College, so if you would like to say goodbye to Jamie as an employee of the University of Florida, this is the time to do it. We hope to see you at Bee College in March.

Jamie

Hello, everyone, and welcome to another episode of Two Bees in a Podcast. Today, Amy and I are joined by Dr. Ramesh Sagili, who is a Professor of Apiculture in the Department of Horticulture at Oregon State University, which is in Corvallis, Oregon. Ramesh, thank you so much for joining us on today's podcast episode.

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Dr. Ramesh Sagili

Thank you, Jamie and Amy, for having me. It's a pleasure to be here.

Jamie

Ramesh, I'm actually really excited to have you for a couple of reasons. Number one, I think this is your first time on the podcast. That's great. I can't wait to host you. Secondly, we're talking about a topic that I think is very relevant to listeners, our listeners around the world, and that topic is understanding the nutritional composition of pollens and micronutrient requirements of honey bees.

This is very, very important for honey bee health. Beekeepers spend a lot of time trying to address nutritional related issues. But before we dive into that information, Ramesh, we just simply want you to spend just a brief moment talking about how you got where you are.

How did you get your degrees, where'd you get your degrees, and how did you find yourself working in the beekeeping world?

Dr. Ramesh Sagili

Absolutely. So, I'm originally from India, the home to a large diversity of honey bee species. So, I earned my Bachelor of Science degree in agriculture from a university in South India, agricultural university. And then after my B.S., basically what happens with B.S. agriculture type of degrees in India is you get to be trained in multiple disciplines within agriculture, right?

So, including agronomy, plant pathology, soil science, entomology, and entomology was always my favorite topic or subject. So, then I had an opportunity to take an apiculture course during the final year of my Bachelor of Science in agriculture degree.

And that was very fascinating. That was my first exposure to honey bees, explicitly, the biology and management of bees. And then I worked for three or four years, and then I decided to pursue a PhD, and I was always thinking I should do a PhD in entomology.

And then with my exposure to bees, it was an easy choice. I would pursue a PhD in entomology. So, I applied to a few universities. I went to Texas A&M University and pursued my entomology PhD with honey bee research under the supervision of Dr. Tanya Pankiw.

Probably, many of your audience don't know her now because she's retired early because of some health reasons. And so, I do still miss her a lot because she was my mentor and I learned everything from her, anything that I owe today for the beekeeping industry. So that was unfortunate.



So, she moved to Canada. She's still doing OK, but I don't think she's actively doing anything with bees. She was a great mentor, very productive. If you guys want to look at some of her work, she has done an amazing amount of work, brood pheromone research and some other aspects as well.

So again, that was my exposure, and that's how I got into a PhD in entomology with a focus on honey bee research. And then, eventually, I did a post doc with her as well for a year and a half, and then I was offered a position at Oregon State University. So, I've been here at Oregon State University for almost 16 years now, and my program mostly focuses on honey bee health, honey bee nutrition and pollination. And I have a great stakeholder group here. Yeah, we work very closely with our beekeepers and farmers in addressing their issues.

Amy

Ramesh, you've also been a mentor to many successful honey bee researchers around the nation. I remember you gave a presentation at the American Beekeeping Federation, the research conference there, and I remember you having a slide of all the students that had come out of your lab, one of them being Dr. Cameron Jack that we have here at UF.

Dr. Ramesh Sagili

Yeah, absolutely. I mean, yeah, it's very satisfying and gratifying as well, right, when one of your mentees is successful. And yeah, I have a few, I know not as many as Jamie has produced, I guess, but yeah, there are like Cameron, Priya, they are still in academia, some have gone to extension.

And so, yeah, I think our goal at the end of the day is we were trained by some great mentors and now that's our duty to train the next generation, which is really critical to serve our stakeholders in the future.

Amy

Absolutely. So, as you mentioned, you know, you have done research on so many different topics. And so, when we reached out to you, you had some topics that we wanted to discuss with you. You gave us some options like you do work with some Amitraz, you work with European foulbrood and blueberries.

But, ultimately, today what we decided to interview you on was understanding the nutritional composition of pollen and micronutrient requirements of honey bees. We have had Priya on, gosh, it must have been maybe a year or so ago.



So, let's go ahead and revisit the honey bee nutrition and let's start from the beginning. So, can you tell us about honey bee nutrition, some of the research that's been conducted related to honey bee nutrition?

Dr. Ramesh Sagili

So, honey bee nutrition, as we all know, is fundamental to the health, productivity and survival of honey bees, right? So, I usually call nutrition the first line of defense, given that our bees are currently encountering so many stressors. So, in the past decade, our lab has been conducting research on honey bee nutrition along with other areas of research that you briefly mentioned just now and mostly focusing on honey bee health.

So, I will list a few nutrition research projects for your audience. So, when we started, at least four years ago, I believed it was about understanding the micronutrient requirements of bees, especially phytosterols. As you all know, bees are really looking for these sterols, especially 24-Methylenecholesterol for their growth and development.

So, if you want more, I can expand on that. But the other project I have is documenting pollen nutritional composition to develop a comprehensive pollen nutritional composition database. This was the USDA funded project we got in 2020 just around COVID time, a very ambitious undertaking, but I can talk about that as well in detail if needed.

The other project I want to mention is we're also evaluating some plant species as supplemental forage for honey bees, especially when commercial beekeepers are pollinating crops that are poor in nutrition. The other one that comes to my mind is the comprehensive micro level evaluation of commercial protein supplements, right? So, I know there are a lot of debates still. We don't have real understanding how protein supplements are really being used by bees, looking at digestibility assimilation, those things are not still very well understood. So, we wanted to look at more micro level understanding.

And our studies have been done on looking at protein supplements efficacy by putting in colonies and looking at brood area and all that stuff. But we're taking a little different approach and looking into more micro level evaluations. And then the last one, which may not be that interesting directly to beekeepers at this point, is we are also looking at something called sterol biosynthesis inhibiting fungicides.

So, there are a bunch of those "end with azole" groups like metaconazole, propaconazole. Those types of fungicides may have potential to compromise the sterol availability in pollen for weeks. So, here's something we have been exploring for last three years.

Finally, we have some good data to look at now. So, those are a few projects that come to my mind on honey bee nutrition that we have been conducting for the last few years.

Jamie

Ramesh, I completely agree with you that nutrition is the first line of defense. And I think, you know, I've said it a lot even on this podcast and other places in person where I just make the point when I think about all the things that we do from a bee health standpoint, to me, nutrition represents one of the greatest opportunities in beekeeping because, you know, we know a lot about Varroa control.

We're not perfect, but we know about it. We know about feeding bees sugar. We know about, you know, managing queens, but we're really bad, I think, at nutrition right now. I think there's so much opportunity in this space and it's really cool to know that you and your team and your colleagues are looking at this.

So, let's zero in specifically, at least initially, about looking at it from the pollen perspective, the nutritional composition of pollen. How do you go about determining how nutritious a pollen is to bees?

Dr. Ramesh Sagili

Absolutely. That's a great question, and I don't think I'll give you a great answer, but I'll try it because, as you said, nutrition is a very complex topic, especially with honey bees being social insects, there are different levels of nutrition. We have to think about the colony level, the individual level, the bee.

And then larval nutrition is very different when compared to other insects that we can think of. It's a being, a highly evolved social insect that comes with this complexity and nutrition to be studied in different levels as well. I'll not go into those details at this time, but we can talk about answering your question on how do we go about examining this composition of pollen.

So, as we all know, pollen is the primary source of protein for honey bees and critical for colony growth and development, right? So, as I said, it's not just the primary source of protein, but it's also an important source of lipids, fatty acids, vitamins, minerals, phytosterols, and then even phytochemicals.

We really don't understand how phytochemicals are related to nutrition directly, but I think that's an important component of pollen as well. So, to assess the composition, we basically have to collect pollen, which again, I can talk a little bit later if you're interested in that project that we are collecting pollen for establishing of nutritional composition database.

So, we need to collect pollen then from specific plants, whatever your target crops or plants. And then it's a very laborious process. You have to get this pollen either via direct collection from the flowers or via bees with the pollen trap, which is very laborious and time consuming.



And so, we can look at fruit protein, amino acid composition, minerals, which are not very well understood. So, so, so many different things. So, again, coming back to your question, how do we assess those things? So, we can assess those with a lot of [inaudible] and other techniques we use.

But again, I think we are not in a position right now, at least there is no robust research done at this point where I can really tell you, your bees will need this type of pollen to satisfy the protein needs. These are having fatty acids that will be really critical for your bee survival and development.

So, as you said, nutrition is such a critical area and unfortunately, we have just barely scratched the surface. There is so much to be known still and I think that's one effort. I'm glad there are few labs. I know you have done some great research on protein supplements, and I've been following some of your work as well. But I think, yeah, I wish there were more labs looking into this aspect and so that in the next 10 years we'll be in a better place to understand all the requirements of bees in terms of nutrition.

Amy

So, you had mentioned the collection of pollen, and I've been receiving a lot of questions lately about sending pollen samples, what this looks like, what the process is like. So, I'd love for you to be able to explain to our listeners what this process does look like when they're collecting pollen samples and then sending it over to the lab.

Dr. Ramesh Sagili

Great question. And I know we initially struggled. So, when we got this funding from USDA to collect pollens from 100 plant species, I think when we were writing the grants, probably we were not thinking about through this that carefully. I believe it's been a huge undertaking, a very laborious process.

We have been using citizen scientists for this approach as well. So, we have collected most of our pollen ourselves, but I think there are beekeepers that could help as well with the audience if you're interested in this. We are still ongoing. One hundred species is a bare minimum that we were proposing just given the funding that we had available at this time.

But there are thousands of plants still available that bees use as forage. And we can still look for pollen composition, the nutritional composition of pollens. So, Amy, coming back to your question, how do we collect, so these pollens for the citizens, we have some videos and we have drafted some other documents that they can follow, how to collect pollen.

So, there are two different ways. You can manually collect pollen. So that's the best way because then you are getting the pure pollen without any contamination. But there is another way to

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collect pollen. We have pollen traps, and then it's a lot – it's a more laborious process in terms, you have to segregate the pollen based on the colors that might be a mixture.

So, it may not be a pure pollen, but still, in some plant species you'll be surprised if I tell you that it's really, really difficult to collect a gram. So, we are looking at a one gram collection so that we can do all the analysis that we are looking for, including protein.

We are looking at lipids, we are looking at phytosterols, we are probably going to look at omega-3 and 6 fatty acids. So, all these different analysis needs a small amount of pollen sample to be taken out, right? So, at least a gram. A gram looks like a very small amount when I'm describing it, but it takes a while. For example, if you're looking at blueberry pollen, I'm just picking a crop for your example.

So those blueberry flowers, they are, as you know, they are bell shaped and there is only a minimal amount of pollen. So, you have to twist them at the base of the corolla and then you can see that the pollen comes out. So, my students here are undergrads, which we really appreciate their work.

So, they have harvested probably some 15-16 thousand flowers to just get one gram of pollen. So, for your audience, yeah, they can still collect pollen manually. And we painfully have designed a vacuum. It's a handheld vacuum. One of the graduate students, he came up with it.

So, it's partitioned with three different mesh sizes. Just, I'm trying to visualize here for your audience because it's a podcast, they can show you. So, there are three screens in that vacuum tube. Pollen comes in different sizes, anywhere between 20 micron to 200 micron.

So, when you're sucking with this vacuum on the flowers, you're rubbing the flower, technically, with the end of the vacuum device and it sucks up, it has enough power, and the smallest pollen rings will go all the way through the 200 micron and end up at the last mesh.

And then you painfully collect with that brush and then dislodge the pollen and collect in a vial. And then you have to store it in your freezer and then we'll give you instructions on how to ship them to us. So, I think that's a little more complex process, but I think it's worth doing it because that's what we are lacking, the information we do not know, pollen compositions, nutritional compositions of pollen for many of the species that we are looking at.

Amy

So, I want to switch over to the micronutrient requirements. What do we know about the requirements needed for this and how do we know this?

Dr. Ramesh Sagili



Yeah. So, micronutrients are these, as you know, the term itself, micro means small amounts or trace amounts, right, we are looking for. So, when we talk about micronutrients, we basically are looking at vitamins and minerals, and sometimes we classify phytosterols, which are technically lipids, but I still consider them as micronutrients.

I know the definition is not really fitting micronutrients, but we still, in the literature if you see it, think we loosely still fit phytosterols into micronutrients category, and then even sometimes fatty acids, Omega-6 and 3 that I talked about. So, we know a lot about macronutrients, right?

Carbohydrates are proteins and lot of work has been done on that front. But unfortunately, micronutrients are the area where we have not done much. I think we, again, as I said before, barely scratch the surface. We only know a little bit about micronutrients requirements.

For example, we know that we need vitamin B for bees, but again, we don't know exactly what the function of vitamin B in bees is. So, there are only a couple of publications that I've seen. For other minerals like your potassium or sodium or calcium or magnesium or even zinc, those are all really critical, right?

I mean, logically speaking. But I have only seen two studies here and there that have really tried to understand the role of these micronutrients in bees. And like, for example, zinc, we think it's important for protein synthesis, and it's probably an antioxidant and probably also helps with immune function.

But again, there are only a couple of publications that, again, that's why I think our understanding is very minimal in terms of micronutrient requirements. But as you know, micronutrients are really critical, not just for bee health, right, even on human health and other places where we have human health with respect to nutrients has been studied for so long and we understand that there are so many important ones.

This might be very trace amounts, but they have a huge role to play, sometimes, in terms of immune system or other things we talked about, protein synthesis and so on. So, again, very important, micronutrients. But hopefully in the next 10 years, I think with all the other labs working in this area, around the world, maybe we'll have a better understanding to make even our protein supplements better if we understand the needs of bees in terms of micronutrients.

Jamie

All right, Ramesh. So, we've talked a little bit then about how we get nutritional composition of pollen and how that can vary. Then we segue to what are the micronutrient requirements of honey bees, and what I want to do now is kind of put all that together into one question, right?



Can you tell us a little bit about how pollen quality might affect the nutritional requirements in honey bees? So, you've got the pollen half, you've got the honey bee half. How does it all fit together?

Dr. Ramesh Sagili

Yeah. No, that's another excellent question. So, pollen quality, as I said, just for the audience, pollen quality can be pretty broad, right? So, as I mentioned, we are looking for protein. That's a major source, right? Pollen is a major source of protein for our bees. Then, it's also an important source of lipids, fatty acids, vitamins, phytosterols, minerals that I mentioned before.

So, we have to look at it as a big picture, as you asked. So, again, it's unfortunate that I'm giving a similar answer as I talked about micronutrients earlier. So, we still don't know the exact requirements. Again, I know people have looked at this geometric framework of nutrient regulation.

Probably your audience might have heard about that. In some insects, people have looked at the requirements from, what do our bees need in terms of protein to carbohydrate ratio, protein to lipid ratio? These are very, really, really important questions to ask.

And unfortunately, we don't really know at this point. Even with macronutrients. I know we feed our bees with protein supplements when there is a dearth, or we know that our bees are foraging on pollen for a while and then whenever the pollen is available during the brood rearing season. So, again, pollens are not equal, right?

Each pollen is very different in its composition. Sometimes, you may miss some amino acid in one pollen. That's why this is a beautiful system. I think our bees have evolved where, when you sit next to your hive, you're seeing 5-6 different types of pollen coming in depending on the time of the year or where you live.

And I still believe that bees probably have that mechanism. The reason why they're collecting that many different types of pollen is to mix and match where if there is one amino acid missing in this pollen, that can be substituted from a different pollen. So, again, when we look at this geometric framework that I mentioned for nutrient regulation and other insects, it's really challenging.

We can use that framework. I know people are trying to use that geometric framework for nutrient regulation in honey bees, and that's a great thing. I know we should all try doing that, but using that framework for deciphering honey bee nutrient needs is really challenging, because as he said, it's not just the pollen foragers are collecting pollen, right, but they're not the ones consuming it.



There are nurse bees in the hives that are consuming the pollen. So, it makes really difficult. I know there's a feedback loop in the hive and there are some studies, beautiful ones done in '80s and '90s where we see that how pollen foragers are deciding how much pollen to bring in based on the feedback loop they have from the nurse bees.

So those things are still very much unknown. So again, great question that you asked, how can we put these two things together? But again, we still have a lack of – a gap in knowledge, understanding what are the real protein requirements for bees, and lipid requirements and all the other things that pollen provides. So, I think unless we understand all those things, I think we probably can't answer all those questions in a more robust or a conclusive way.

Amy

So that leads me into the last question that I have for you. And I have a feeling you're going to have many, many thoughts on this because there's probably a lot to be done. But my last question to you is what research do you think still needs to be conducted related to the needs of honey bees and their nutrition? I mean, in a perfect world, what would this look like?

Dr. Ramesh Sagili

Yeah. No, that's a great question and a difficult one as well, right? Because there is so much, as I said to answer Jamie's question as well. There is so much to be understood in terms of bee nutrition. So, if you want me to, I can give you probably a hundred different areas that needs to be explored, but I'll keep it brief for the audience here.

So, I think the first one, I think most important is, I know, with planting habitats, you know, we are working on two different angles here in our research program here. One, to look at the naturally available foraging resources for bees in terms of collecting pollen from different pollen resources that are available for bees and see how we can improve the habitat for bees depending on those pollen compositions that we are able to encounter.

And then do something like a database that we are trying to create. But the other part is the one that is immediately useful for our beekeepers – how to provide those protein supplements that are useful for them, right? So right now, I don't think beekeepers here in Oregon and other places that we have been interacting with, they spend a lot of money on protein supplements without knowing the efficacy of those products, right?

So, they don't know whether you're feeding something, is it translating into a better bee, right? And then I said better bee, not just survival. I'm looking at everything from is it translating into something? Is it being digested if they're eating it, is it being translated into something?

Is it assimilating in the bee's body? And can we get something out of it? Those are the questions that need to be addressed for sure. And then, also, our goal should be, because, I know, protein



supplements are really critical for beekeepers. They do use that all the time, the commercial beekeepers especially.

And so, we need to improve the quality of those protein supplements as well. We need to do a lot of research on all these micronutrients that I talked about, and even the macronutrients and see if there is a way to incorporate all those and come up with – I know we will never be close to a pollen in terms of protein supplement.

But I think we can all strive to get closer by providing better nutrition by improving those protein supplements. That's one area. And the other one, I think as I said before, with the protein to carbohydrate ratios or protein to liquid ratios, I think that I'm always curious and it's not an easy experiment to do.

And I've been telling colleagues we worked with nutrition that maybe we should look at these things. So, even Priya, we talked about, she was a postdoc in my lab about five years ago, and she has been still continuing some of the research that we started here. So, you think of bees, bees are collecting pollen at different times of the year, right?

So, we need to understand, is there a evolutionary process as well where some pollens are having high lipid contents during fall? Because bees need, probably, logically speaking, they need high lipid content pollen during fall and late fall because they're raising those winter bees and probably your audience understands those are we call them Diutinus bees or winter bees.

They're long-lived bees. They're the ones that survive the winter. So, we need to understand what is available in nature or in the landscape in terms of that protein to lipid ratio, and if there is something we can learn from there and use it for our benefits, feeding our bees.

And the last one, I'll say the microbiome, the gut bacteria that is really critical, and we still don't understand what's the role of gut bacteria in bee nutrition. We vaguely say, yeah, they help in digestion, they are helping with this and that. But I don't think we have a very clear – and those are not easy ones to study. I'm not just saying no one is trying to understand, but I think that's another area where we need to understand the role of microbiota, the gut bacteria, and honey bee nutrition. I think I'll stop here. Thank you.

Jamie

Ramesh, I was listening to you, you know, talk about all this really great research, and I'm going to ask you kind of this final question where you've got your crystal ball and you're looking at retired Ramesh and you're looking back over your career. Ultimately, what do you hope your research on honey bee nutrition achieves on behalf of beekeepers? Where do you hope you leave the beekeeping industry by the time your work is done?

Dr. Ramesh Sagili

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Yeah, great question. So, yeah, to be very ambitious, I would say, just with honey bees, I know I do a lot of other work as well, Varroa, Nosema, and other aspects as well. But with just honey bee nutrition, I think, I know it's very ambitious to say, but I would say I think it is still possible.

I'm still very positive and ambitious that we should come up with a diet for honey bees that could be used to at least get close results as we can get from pollen. So, I know we will never be very close to that given all the limitations that I mentioned.

But I think that's my eventual ambition would be to have a diet that is pretty close to pollen. Because with all the changes in the landscape that has happened over the years, I think that would be a really hard endeavor to go and get something for your bees.

Wouldn't it be great if we could come up with something that is really close to pollen that we have in our hands to substitute that for bees. And because I still believe, as I said before, nutrition is the first line of defense. So, I think nutrition should be taken very seriously and come somewhere close to those so that the bees have access to good diet so that we can reduce our colony losses in the future.

Jamie

Ramesh, I love it. That's exactly what I would love to see on behalf of beekeepers as well. So, thank you for joining us. I appreciate your research, and I can't wait to see where it all heads in the future.

Dr. Ramesh Sagili

Absolutely. It was a pleasure, Jamie and Amy. Thank you very much.

Stump the Chump

It's everybody's favorite game show, Stump the Chump.

Amy

All right. Welcome back to the question-and-answer segment. Jamie, the first question that we have, I really like this question. I'm excited for it. What is a bee gym, and do you have any input on it? I mean, are we like sending our bees to go work out, gain muscle? What's going on?

Jamie

Honestly, Amy, I need to go work out and gain muscle. I'm hitting the midlife spread, so maybe there needs to be a Jamie gym. OK, back to what we're actually discussing, the bee gym. I try very hard, not necessarily to give opinions about beekeeping equipment that's not more generic, you know, hive tools, I'm happy to talk about, smokers, I'm happy to talk about.

But some of these are new things that companies are trying to market for very specific purposes. So, a couple things, I guess to keep me out of trouble here is the bee gym is a device that you can put into hives, and the manufacturer, the inventor claims that it increases honey bee grooming behavior and, therefore, decreases Varroa in the nest. And so, if you look at this thing online, and I watched a few videos of it in preparation to answer this question because I had not heard of it, I needed to do some background research on it.

Amy

What? You hadn't heard of it?

Jamie

I had not heard of it. And so when I saw it, I was like, OK, so there's these different flaps and these different things on this contraption that when you put it in the nest and bees walk by it, you know, the claim for the manufacturers is it increases their grooming behavior and, therefore, reduces Varroa in the nest.

So, all of the claims that I was seeing were being made by beekeepers who are using it or the manufacturers themselves. I have not actually seen any research on this. And you know, I don't know what episode this is going to show up in, but the 220s or the 230s or something. If you've been listening to our podcast for that long, you'll know that I need data in order to believe the statements that are being made.

I'm not saying it does work or it doesn't work. I just haven't seen any replicated studies on it to support the claims. That does not mean it doesn't work. I'm just saying I've not seen data from a third-party research lab on it. So, it's an interesting thing. There are a lot of interesting things in the bee industry right now where, with a lot of claims, maybe it does have something.

So, Amy, a really good way to handle this question then would be to say, hey, listeners all around the world, if you've tried this thing, what do you think about it? Just reach out to us through our social media account, let us know. But I did look at the manufacturer's website, and they mentioned that it could reduce Varroa populations in the nest, but it would need to be used in the integrated pest management strategy and that Varroa populations can still go up.

And so, there you go. I'd love to see somebody study it and that's that. So, maybe I disappointed you, Amy, since you were so excited.

Amy

You did. I was really excited to, like, spot a worker bee. You know, that's probably the only thing I can spot because I can't carry or lift anything.

Jamie



Well, there are some really cool videos online where the manufacturer's like zooming into a bee, kind of rubbing its abdomen on it. It was interesting, very interesting. So that's kind of where I'll leave it.

Amy

All right. OK. So, the second question that we have, so some of our listeners, you know, they listen to them from the very beginning, episode one. I wonder Jamie, I would love for people to tell us, like what difference has it made from like episode 1 to episode 200 and whatever we are on right now, right?

Jamie

That would be great.

Amy

I know, I know, like –

Jamie

I wonder how many of you've, like, listened to us every episode. Gosh, drop a note in our social media, say, I've listened to every episode, because I'd be curious about that.

Amy

Yeah. Or I've listened to Episode X 17 times in a row.

Jamie

Yeah, that's a good question. I mean, like, what's the episode that –

Amy

People want to listen to.

Jamie

What episode have you listened to the most and tell us that number too. That would be – OK, we're going to have to read those, Amy. If we get some feedback, we're going to have to read those.

Amy

Definitely. OK, so some listeners have listened from the very beginning and some just, you know, kind of pick and choose which episodes they want to listen to based on the name. We did an episode with Dr. Jeff Harris, and we were talking about Varroa sensitive hygienic research.

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And so, this individual is asking if we're going to have another interview with him. We probably should, actually. We should probably bring him on again to do an update on this research. But are we going to have another interview with him? Let's kind of talk about Varroa sensitive hygiene or just, I guess, research on insemination, because the other question was how long do instrumentally inseminated queens normally last?

Jamie

Yeah, a lot to unpack here. We did interview Dr. Jeff Harris. He's got a very interesting career. He was a USDA scientist who worked on honey bee breeding, VSH traits and other things. And now he works at Mississippi State University and continues to do work on this particular topic.

You know me. I am a huge fan of people using resistant stock, building their apiaries on resistant stock of any type. I don't care what they use. If it's VSH queen, Pol-line queens, if it's, you know, the Russian honey bees, New World Carniolans, Varroa sensitive, I mean, the Minnesota hygienic stock, the ankle biters for Purdue. I just love, love, love resistant stock. So, we do need to have Jeff on again. Honestly, Amy, he's not the only one who does research on resistance stock. You and I were just at the Florida State Beekeepers Association meeting here.

We're recording this episode in November of 2025. We were there over the past weekend and Garrett Slater was there from Texas A&M University talking about really cool research he does with queen breeding. We know that Brock Harper does some really interesting research, Krispn Given. They do cool stuff on bee stocks and bee breeding just around the world.

Amy, queen breeding is having a resurgence of interest and we absolutely 100% need to have these folks online. Because number one, I'm such a believer in it, number two, I really think it forms a great foundational base for our battle against Varroa and improvement in honey bee health in general, number three, these are just cool people who we need to have on our podcast.

So, the second question is, how long do instrumentally inseminated queens last? Well, that is very dependent on the person doing the instrumental insemination. There are people out there, Sue Cobey, Krispn Given, those folks can do it so well that those queens can have the longevity of an open-mated queen.

But for many of us, probably me included, such a technical thing that if you get it just a little bit wrong, it can damage the queen, it can shorten her longevity. If you don't inseminate her well, she can be poorly inseminated, therefore not produce a lot of worker offspring, which will lead to her early supersedure.

So, it really depends on the individual, and I know that I've heard people talk about, well instrumentally inseminated queens are only good for breeding purposes. You're only doing it so



that you can control the mom and you can control the dad. And because of that, you can graft from her and then you'll open-mate her offspring for purposes of selling to beekeepers.

But I know some people who instrumentally inseminate, Sue Cobey as an example, who claims that, you know, she's been able to do it to the point that the queens that she instrumentally inseminates themselves are good production queens. Queens that you can put in colonies that will head that colony, not for breeding purposes, but from a production standpoint.

I would say most of us out there can really only inseminate queens for breeding purposes, but I know there are really good people out there who can do it and those queens can be for production. So, the answer to that question is how long do they last? It depends on the one pulling the trigger because some people out there can do it well and those queens will stay alive a long time.

Others not so, but it's a technique that's very important, utilized by many of these scientists who we discussed as I've answered this question, folks who we need to have on our podcast with absolute certainty.

Amy

Definitely. We actually have Krispn Given that's scheduled here in the next, I think, couple of episodes. So, he will be on, and we'll talk to him about the ankle biters, and I did a class with him. And I will tell you, Jamie, it is very easy to mess up instrumental insemination.

Jamie

What? Was it tricky?

Amy

I know. It's shocking, right? It's so difficult to do. I jokingly say that it's like the second most difficult thing to do in the honey bee world, next to harvesting honey in the summer in Florida, you know?

Jamie

I'm pretty convinced it's more technical than brain surgery, right? Aren't we more skilled than brain surgeons?

Amy

Oh gosh, it is so hard and it really tests your patience. And Krispn will not tell this to you all on air, but he saw a very, very frustrated Amy. He was like, all right, you need to go take a break. And I was getting so frustrated and my patience was being tested.

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Jamie

Good for you. Bad for the queen, right?

Amy

I know, right? Man, I felt terrible for her. OK, so for the last question that we have, it's a statement. And so, I thought maybe we could dig into this statement and what it all means. This person says, I believe, they're quoting this, that the olfactory sense is highly significant to honey bees. And so, I guess, let's go ahead and just talk about what is an olfactory sense and what is it used for?

Jamie

So, Amy, olfaction is smell, right? So, olfactory sense then would be the bees' ability to smell, and of course, they smell with specialized parts of their antenna, these little pits that are chemo receptors. So that's how they smell. We all smell because of chemo reception.

We're bringing in odors that are basically chemicals floating through the air and bees are the same. And the questioner is 100% right. The olfactory sense in bees is highly significant to honey bees. Very, very, very, very important in their sense perception.

Their smell is incredibly good and fine to the fact they are capable of smelling better than dogs can smell. And we know that dogs have a very good sense of smell and they're using a lot of smelling type context. Well, honey bees are even better in that regard.

So, for example, we know that they communicate within the nest using pheromones. Those are chemicals produced by one bee that changes the behavior in another bee. And how they perceive those pheromones is through this chemical olfaction. We know that when bees are flying and going to flowers, part of how they find flowers from which they want to forage is based on the scent of the flower.

And honey bees, especially foragers, display what we call foraging constancy. That means if a bee has chosen to forage on a species of plant, they're going to forage on that species of plant. So, if they're foraging on gallberry flowers, that's what they're going to go out and forage on.

They're not going to shift midstream and forage on Palmetto. They're going to stay on gallberry. So, they can find gallberry, obviously, through sight and some other things, but principally through smell. So, they demonstrate smell preference. There are things that they prefer, and we know this because there are tests like the proboscis extension response where bees can be trained to want certain smells and recognize certain smells, that they use those smells to make a decision.



And that's the whole purpose of the proboscis extension response. You train bees to associate a certain smell with food. And so, when they smell it, they'll stick out their proboscis, they'll extend their proboscis so you can puff smells over their antenna, and they'll stick out their proboscis.

And then you could train them to like certain smells and not like other smells. So, they have great discrimination power, and this even has some human application. There are some labs out there, some scientists out there who have trained bees to find land mines because they have trained bees to associate the smell of land mines with food resources.

Basically, they would provide bees with a sugar reward every time they would puff the smell of a landmine over their antenna. So, bees learn to associate that smell of land mines with a food resource, and then when you release them in the environment, they fly to those areas to find food and then you could map out where those land mines are.

I knew a lab doing that, that same lab was using bee olfaction to find bombs. Again, it's the same premise. You train the bees to associate the smell of bombs with a food. And when the bees are, like, in an airport, they would rig them up in certain boxes that when they would sense this odor, they would stick out their tongue and that would trigger a light to come on in the box.

So, they have a remarkable sense of smell, can smell things that we can't smell. They can discriminate levels of intensity of that smell. They can like certain smells. They cannot like certain smells. Smells can bring them to food. Smells can keep them away. And within a colony, smells can change their entire behavior. So, olfaction is incredibly important to honey bees.

Amy

So cool. I think they even tried having the bees' scent try to find invasive species, right? Like, that's also a thing.

Jamie

Yeah, I love that. So yeah, they absolutely have. And I know that people have used that to find American foulbrood and do these other things. So yeah, it's crazy the potential practical application. I mean, the downside is that honey bees live such short lives. It's hard to hard to use them in these contexts. But yeah, it's really – they're remarkable, which is why we have a podcast and which is why there are zillions of people from all around the world and maybe even around the universe listening to this podcast.

Amy

Zillions of people. Yes, thank goodness for this insect who created a job for us. Plus, you know what? Olfactory is really fun to say.

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Jamie

It is. Amy, how many honey bees do you think have listened to our podcast? So, if beekeepers are out in the apiary listening to our podcast, do you think that there's bees listening to our podcast?

Amy

Gazillions.

Jamie

Do you think there are bees who would recognize us by our voices?

Amy

Yeah, probably. I mean they do use their olfactory sense, so.

Jamie

Oh, so they recognize us by our smells? Are you saying I stink?

Amy

Well, I mean, we were talking about, you know, bees without ears, right?

Jamie

Yeah, for sure.

Amy

I guess they don't listen to the podcast, which means we probably have to change the image of bees wearing, like, a headset.

Jamie

I guess.

Amy

For a podcast.

Jamie

That's a bummer.

Amy

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Anyway, that was a really fun question. All the questions are always so fun. You know, Jamie, sometimes I'll go to a conference and people will come up to me and say, you know, we listen to your podcast, we listen to your podcast. I'm like, that's awesome. Like, you know, thank you so much for supporting us. And I've had people say, well, I've considered like, you know, entering a question and sending you all questions, but then I just never did.

And I'm like, it's never too late. You know, we're always collecting questions. So, if you're listening to this and you have a question, even if it's a follow-up question on any of the questions that we've already answered, we'd love to see what your questions are because if you have the questions, someone else probably does as well.

So, we appreciate our listeners. Thank you for supporting us. If you have questions, do not hesitate. Jamie and I basically live at our computers, and we are here to answer those questions to you all. Send us an e-mail or you can reach out to us on one of our social media pages.

Hey everyone, thanks for listening today. We would like to give an extra special thank you to our podcast coordinator, Jeffrey Carmichael. Without his hard work, Two Bees in a Podcast would not be possible.

Jamie

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 An Equal Opportunity Institution. answered on air to honeybee@ifas.ufl.edu. You can also submit questions to us on X, Instagram, or Facebook [@UFhoneybeelab](https://www.facebook.com/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.