Episode 249: Harnessing Biotechnology for Pollinator Health with Dr. Vincent Ricigliano

Jamie

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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, Welcome back to this segment of Two Bees in a Podcast. Today, we are joined by Dr. Vincent Recigliano, who is a research scientist with the Pollinator Health Unit at the USDA ARS located in Davis, California. Vincent, thanks for joining us today.

Dr. Vincent Ricigliano

Yeah, thanks for having me. And it's nice to be on the podcast again.

Amy

Definitely. So, we're kind of pivoting a little bit and we are today discussing a review paper on harnessing biotechnology for bee pollinator health. So, we're really going to talk about trends in biotechnology today. I'm excited for this topic. Before we get to that, you know, we do have listeners that chime in late or they listen to episodes at different times.

They don't necessarily start in order. So, can you go ahead and tell our audience a little bit about yourself and how you got into the beekeeping world?

Dr. Vincent Ricigliano

Yeah, absolutely. So, I'm a research scientist with the USDA ARS. I've been doing honey bee research for about 11 years now. Last year, I located my lab to the USDA Pollinator Health Unit in Davis, California, where my lab focuses on mites, viruses, and bee nutrition.

My background is in plant and microbial biotechnology and more broadly, molecular biology. So, when I say that, what I mean is I study how biological systems work at the molecular level, things like genes, proteins, and biochemical pathways, and then think about how we could use that knowledge to solve real world problems.

So, biotechnology is basically the application of that knowledge. It's taking what we understand about biology and turning it into tools, whether that's new treatments, better crops, or in this case, new ways to improve bee health. I got into the beekeeping world because bees are kind of like a perfect storm biologically.

They're incredibly important for agriculture, but they're also dealing with multiple stressors all at once. Mites, viruses, pesticides, nutrition issues, weather, stress. It's not just one problem; it's everything hitting them at the same time. And coming from a biotech background, I saw an opportunity there.

A lot of the tools that were transforming other areas of agriculture and medicine haven't really been fully applied to bees yet. So, what pulled me in was this idea of bringing those tools to beekeeping in a way that's actually practical and useful.

Jamie

Vincent, that is a perfect segue into my question, which is you and some colleagues recently published a review paper titled, “Harnessing Biotechnology for Bee Pollinator Health.” I actually have it up on a second screen. I'm looking at it right now. Looks like a fantastic resource and a very great thought-provoking article about the use of biotechnology to improve honey bee health.

I got to know, provide us an overview of this manuscript. How did you decide to write this? It's like an early career magnum opus.

Dr. Vincent Ricigliano

Yes, well, thanks. OK, so the big picture, the paper is really about this idea that bees are facing a pile up of problems and we're not going to solve that with our current toolbox. So, the review looks at how modern biotechnology can help give us smarter ways to understand bee health, detect problems earlier, and come up with more targeted solutions.

The main message isn't that biotech is some kind of magic fix, it's that it just gives us a better set of tools. Tools that can help us be more precise, more preventative, and hopefully more effective. So that's really the heart of the paper. If we want healthier bees in a rapidly changing world, we need to start bringing better technology to beekeeping.

Amy

Yeah, absolutely. I do think that technology is the future for the bee industry, just for many of the industries that we have out there. In the manuscript you do mention genomics, sensor-based technologies, and AI. And I think that we could talk about this all for a very long time.

Jamie and I talk about technologies and sensors and AI, what this could look like in the beekeeping world. And so, can you explain how these can be used or have been used to improve the health of honey bees?

Dr. Vincent Ricigliano

Yeah, I think this is one of the areas where things could really change how we approach bee health in the coming years. So right now, a lot of beekeeping is reactive. You open a hive, you see a problem, and then you respond. What these technologies could do is help us make moves earlier in that process.

Genomics is really powerful because it lets us see what's going on at the molecular level. So instead of saying this colony looks stressed, we could start asking why. Are there signatures of pesticide exposure? Are certain immune genes turned on? Are viruses replicating before we could even see symptoms?

It gives us a way to diagnose stressors and disease much earlier and with more precision. So, sensors, well, they complement that by telling us what's actually happening at the colony level in real time. Things like weight changes, temperature stability, humidity. These are kind of like vital signs for the hive.

So, if something starts drifting away from those baseline measures, it can be an early signal that something's off. So right now, we're talking about tons of data. In fact, that's drowning in data. But AI has the potential to tie this all together because when you have this genomic sensor and environmental data, it gets complicated really fast.

So, AI, in theory, not quite yet, but it could help connect all of these dots, linking patterns in the data to things like disease risk, nutritional stress, and colony declines. So, the way I think about it is genomics helps you understand the biology and diagnose problems.

Sensors tell you how that colony is performing in real time, and AI could potentially help us interpret all of those data and integrate them in a useful way. And together, that could shift us away from reactive beekeeping to something that's a lot more predictive and preventative.

Jamie

Yeah, this is very inspiring to hear, Vincent. One of my issues, and I've talked about even before on the podcast, with sensing technologies is that we can currently gather a lot of sensory type data on colonies. Weight, temperature, humidity, sound even.

But it's hard for me to understand how that's predictive, currently. Like, what is it predicting? OK, so the temperature goes up. What does that predict in a colony? And in context of temperature and humidity, what do those two predict in a colony? And your argument is having

these colony phenotypes, having these biotechnology indicators, having AI will allow us to put all of this together to predict what's actually happening in the future trajectory of the colony. Am I understanding this correctly?

Dr. Vincent Ricigliano

That's right. So, linking those data to meaningful colony outcomes is the challenge and kind of the limiting factor here right now. Like, yes, we can generate tons of genomic data. You could sequence everything in a bee hive; you could measure all kinds of temperature changes and weight changes.

But linking those to meaningful colony outcomes in a way that helps beekeepers manage their operations, that's really what will tie this all together. And some researchers are doing that. So, I have to give a quick shout out to my colleague William Meikle, USDA ARS, Tucson, Arizona.

He's been doing sensor work in bee hives for a long time, and he does a very good job of linking those sensor data to what's actually going on in the colony.

Jamie

Yeah, that's just super cool. Let me pivot a little bit. You also discuss some high throughput screening for new treatments using bio remedies such as RNAi and protein biologics for that. That's obviously for disease and pest control. Can you discuss a little bit where you think biotechnology plays a role in this particular arena of bee health?

Dr. Vincent Ricigliano

Yeah, this is a big one because beekeepers really need better tools, especially for mites and viruses. So high throughput screening is basically about speed and scale, right? Instead of testing one potential treatment at a time, it could be possible in the laboratory to test hundreds and thousands of candidates more efficiently.

So, especially things like natural products from plants, fungi, or microbes. And that opens the door to finding new treatments that we probably wouldn't have discovered otherwise. So, one way we're doing this in my lab is the application of bee cell cultures to test many treatments at once and find out which ones are the best to test in bees and eventually in colonies.

Because if you have thousands of candidate treatments and you're trying to test them in bees or colonies, there's just no way you could possibly do that. But if you could use some of these high throughput screening tools to find some of these needles in a haystack and then select those as candidates for further testing, we could start to whittle down the list of candidates, and it becomes more possible to feasibly test them.

So, on the bio remedy side, things like RNAi and protein-based treatments are exciting because they could be much more targeted. A brief introduction to RNAi – so RNAi stands for RNA interference, and it's a natural process that exists in almost all living things. It's basically a way for cells to regulate or silence specific genes.

So, what's exciting is that we could design RNA molecules that match a gene in a pester pathogen, like the Varroa mite or a virus, and when the RNA gets taken up, it shuts down that gene. So, instead of using a broad chemical, you're using something much more targeted, almost like a genetic off switch for a specific problem.

For example, the new product Norroa by Green Light Biosciences is an RNAi technology that effectively turns off a reproductive pathway in the mite, which limits mite population growth. And this is the shining example of the potential of biotechnology to support more sustainable beekeeping without the use of agrochemicals.

And this is really just the first commercial RNAi product for bee colonies. There's a lot of potential for different miticidal and antiviral applications. So, I think where things are heading is towards more precision, more targeted treatments, fewer off targeted effects and ideally less stress on the bees themselves.

But honestly, one of the biggest challenges is not just finding something that works, it's getting it to work in a real hive in a field. So, delivery, stability, and cost, cost is a really big one here, ease of use, those are huge. So, if it doesn't fit into how beekeepers actually manage colonies, it's not going to go anywhere.

So, the future needs to include not just better treatments, but better systems for delivering those treatments in a way that's practical and affordable.

Amy

Yeah, Vincent, that was actually going to be a follow-up question that I had while you were answering a couple of the questions that you just answered. And I guess, in your perfect, ideal world in our future, what would it look like for let's say a commercial beekeeper adopting sensor-based technologies using AI, checking their genetics using different products, such as Norroa and the RNAi?

Dr. Vincent Ricigliano

Yeah. So, perhaps predictive models using sensor and genomic data could inform the beekeeper about, oh, you know, there's some low level of virus and it's starting to increase over time. And in fact, over the previous years, we see similar patterns. Perhaps now it's time to apply an antiviral, a double stranded RNA or RNAi type product. Or, oh, mites are becoming resistant to this particular RNAi approach.

Let's switch to the next RNAi that has a different target and rotate these targets. So, yeah, using genomic and sensor data in a predictive way to kind of select which of these targeted treatments would eventually be applied or can be applied at different times or what combination of treatments.

And perhaps, the choice of those treatments are tailored to that particular beekeeping operation because as we know, things are very different seasonally, regionally and even across beekeeping operations.

Amy

Definitely. So, you had mentioned a couple times about genome editing, synthetic biology. Can you explain to our listeners what these are and how they might improve honey bee health and the research that's going on?

Dr. Vincent Ricigliano

Yeah. So, these are topics that tend to sound kind of the most futuristic, but there's some very practical ideas in there. So, genome editing, things like CRISPR are basically a way to make precise changes to DNA. And, in theory, it could help us develop bees with traits like improved disease resistance.

But the challenge and the reality is that bees are not simple to work with biologically and that most of the traits we care about involve lots of genes, not just one. So, while it's powerful, it's still a bit longer term for widespread use, and synthetic biology is a little more flexible and I like to think about it as that's where we might see things move a bit faster.

So instead of modifying the bee itself, it's possible to engineer things around the bee like its microbiome, its food, or even the plants that it interacts with. For example, researchers have engineered beneficial bacteria that produce something protective inside the bee, such as RNAi targeting mites and viruses.

And my group has actually engineered feed ingredients that do more than just provide nutrition. They also provide and support immunity that can help reduce pathogen levels. So, check out our paper titled, “Green Biomanufacturing of Edible Antiviral Therapeutics for Managed Pollinators,” where we engineered edible microalgae to induce RNAi responses that lower deformed wing virus levels in bees that ate that algae.

So, I think the key idea is we might not have to change the bee itself. And that also sounds a bit science fiction and maybe a bit intimidating for some of the listeners right now. That's far off, but sometimes it's more practical to engineer the bees’ environment or its partners, and that's where synthetic biology really becomes interesting.

Jamie

I've really enjoyed this interview so far. You're talking about a lot of things that I've been thinking about for a while. This isn't my expertise, but I keep thinking, oh my gosh, we've got all these next gen technologies and biotechnologies that other fields are using so actively to improve the health of whatever it is that they do.

And now you're talking about it here with bees. You've summarized it in that review article. It's really cool. So, I want to focus on the next question, which is well, how can these next gen technologies, how can this type of thing that you're talking about inform and improve breeding strategies in honey bees?

Dr. Vincent Ricigliano

Yeah, breeding is one of the most powerful tools we currently have, but it's also very challenging because a lot of these important traits in bees are complex. So, traditionally, breeding relies a lot on observable traits, right? Things like colony strength, honey production, hygienic behavior.

That's all incredibly important. But now it's possible that we could start adding more layers to that. So, genomics helps us identify genetic markers associated with useful traits. New phenotyping tools like imaging or colony monitoring can give more objective data on how colonies are performing.

And then things like AI and AI models can help us integrate all of that information to guide how selection is carried out in breeding programs. Instead of relying on just one type of data, you're now combining genetics, behavior, and performance. And that can make breeding more precise and potentially faster.

But I always like to emphasize this doesn't replace good beekeepers or breeders; it just gives them better tools. It's like taking someone who already knows what they're doing and giving them more information to work with.

Amy

So, Vincent, before we got on the call today, we were talking a little bit about how you transitioned from working with nutrition to now working more with Varroa and viruses. So, I wanted to kind of take a step back to think about nutrition a bit. So, you know, in this podcast we've talked about stock improvement, we talked about pests and pathogens, but what about nutrition? And how do you see new technologies being used to help with honey bee nutrition?

Dr. Vincent Ricigliano

Yeah, nutrition is huge, always will have a special place in my heart, especially coming from a plant background. But it's sometimes underrated, or at least right now it's been because it's not as flashy as some of these other topics like mites and viruses. But nutrition underpins everything.

So, bees rely on pollen, of course, for protein lipids, micronutrients, and a lot of other bio active compounds. When they don't have access to diverse high-quality forage, that can cascade into all kinds of problems, immune issues, reduced brood, high disease susceptibility.

So artificial diets can help, but they're still not a perfect replacement for natural pollen. In fact, they're not really close to that just yet. So, One Direction is using biotechnology to better understand what makes pollen so valuable and then potentially engineering diets that more closely match that.

Another really interesting area is functional feeds. So, basically, feed that does more than just provide nutrition. It might also support immunity or help bees tolerate pesticides better or even reduce pathogen levels. And then there's the landscape side of things. So, plant science and modern plant science and biotechnology could be used to improve nectar and pollen quality and crops.

So, bees are getting better nutrition out in the field and not just the hive. Ideally, nutrition will become more than just keeping bees alive during a dearth, but it will hopefully become a way to actively build stronger, more resilient colonies.

Jamie

All right, so all of this, you've said it a few times yourself, sounds almost science fiction. And our beekeeper audience around the world is thinking, well, what role do we play in this arena? So, how can beekeepers maybe help inform, help participate in, be involved in the type of topics here that you're discussing?

Dr. Vincent Ricigliano

Yeah, so, what role do beekeepers play? A huge role. And honestly, none of this works without beekeepers. So, beekeepers are the reality check for everything we do as scientists, especially in the world of applied beekeeping, especially ARS honey bee research. They know what's practical and what's too complicated or what's too expensive and what actually fits into the day-to-day operations and management.

So, it's possible to have a great idea in the lab, but if it doesn't translate to the field, it's not going to matter. Beekeepers are also a crucial source of knowledge. Years of hands-on experience, observing colonies, dealing with different environments, that's incredibly valuable, and it should absolutely inform how these technologies are developed.

So going forward, I think beekeepers will play a role in shaping how these tools are used and adopted. Especially with newer technology, there's always going to be questions about safety, cost and value. Beekeepers are the only ones who will ultimately decide what makes sense.

So, to me, the goal of my lab is to not just develop technology in isolation, but it's to build tools and partnership with beekeepers. Tools that can actually make their life easier and their colonies healthier.

Amy

Vincent, I'm just thinking about this episode. We're recording this in April of 2026. Yes, I got the year right. I'm just thinking about someone listening to this podcast 50, 60, 70 years from now and what they're going to be thinking, and where we're going to be in the beekeeping world.

So, it's kind of fun to think about that, you know, being able to go back and be like, hey, they were kind of talking about this early on and here we are. And who knows what that could look like, right? I'm pretty excited. I hope that people can listen to this podcast forever and look back and say, huh, it was there, it was at the very beginning, and here we are.

Jamie

Amy, I think that's a fair statement, Vincent, Amy's leading you to here. What's it going to look like in 10 years, in 20 years, in 30 years, you knowing what you know about the trajectory of biotechnology research?

Dr. Vincent Ricigliano

I am an optimist and I think that technology is a path forward through a lot of the challenges that we face in agriculture and beekeeping. And I'm hopeful that we'll be able to overcome and outrun some of these problems and even be able to adopt to this rapidly changing world that we're facing today.

So, I hope that the future of beekeeping is a bright one, where colonies are thriving. There will always be problems. And I hope that we'll overcome the problems of today and be more equipped to address the problems of tomorrow.

Amy

Absolutely. Well, Vincent, I'm really excited to see your lab grow. I know that you've just transitioned over to the USDA ARS in Davis and you've been doing honey bee research for quite a while. But now that you're working with Varroa and viruses, I'm excited to see what research comes out of it in the future. Thank you so much for joining us today.

Dr. Vincent Ricigliano

An Equal Opportunity Institution.

Thanks so much for having me. It's always a pleasure to be on with you guys and I'd love to come on again and talk about some of the work that we're doing, and we'll be publishing in the near future.

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, we've got three questions today about queens and feeding bees and more queens, OK?

Jamie

I think I'm ready. Let's do this thing.

Amy

I hope you know about queens and feeding bees.

Jamie

And more queens.

Amy

Yep, and more queens. Exactly. OK, so the first question that we have, this individual was asking, when there are several swarm cells that are present, will the first one emerge, and will they start destroying other cells before they mate? We always hear that queens will battle to the death. Does this happen before or after mating?

Jamie

It's a good question with a lot of little nuance scattered throughout. Let's give a hypothetical. Let's say that a colony has successfully swarmed, so the old queen left with about half of the bees, and for the sake of easy math, let's say that there's five ripe queen cells remaining in the nest.

A couple of things can happen. Thing number one is, occasionally, the first virgin queen to emerge will actually go out with another swarm. So, colonies can swarm a second or even third time or even fourth time under some circumstances with the first swarm with the old queen being called the primary swarm, and then the second swarm, the secondary swarm, and the third swarm the tertiary swarm.

So those secondary, tertiary and so forth swarms can be led by virgin queens. Now, it does not always happen. Sometimes the primary swarm is the only swarm that happens, but occasionally if the colony is sufficiently strong and wants to continue to swarm, they can do so with virgin queens that are emerging.

So, the first answer to this question is the first queen to emerge does not always do anything to her sisters. Sometimes they also swarm. Let's now say option two, the second option is that she is the queen that will remain in the nest and does not go out with a swarm.

As a virgin, she begins killing her sisters. She's going through the nest, finding the cells, biting holes in those cells, and stinging her competition to death. Now, what's interesting about this, and this all by the way, because the question is, does this happen prior to mating or afterwards?

This is all prior to mating. What's interesting to me about the biology of this is it doesn't really appear to be the queen making that decision. It looks like the queen just wants to do this. She just wants to become the reigning matriarch and take out her sisters.

But it's a group decision of the worker bees in the nest that decides whether they want to swarm again, in which case the queen doesn't kill her competition, or they want to stop swarming, in which case they allow the queen to kill her competition.

So, worker bees can actually cluster around queen cells to keep that new virgin from getting to them and killing her sisters. So, the shortest possible answer to this question is, well, the virgin queen may swarm, or she may stay behind and kill her sisters.

A lot of those decisions are made by the workers themselves. If she does kill her sisters, she does all of this before she mates.

Amy

Interesting, so you were talking about how worker bees can sometimes just stay around a queen cell to prevent the virgin queen that has already emerged from stinging a new queen. Also, queens will go in, and they'll kill other queens and their cells, but do workers ever help with that process?

Jamie

So, the workers are the ones responsible for kind of cleaning up the mess, so to speak. So once the developing queen has been stung and is dying, workers will go in and widen that hole. They'll clean out the cell, and they'll basically tear down the queen cell. It's a pretty remarkable process. And Amy, I didn't go into the full biology of it. Queen's pipe.

We know this. Virgin queen's pipe a lot. They make this noise, but there could also be this quacking and tooting that they do inside of the cell while they are developing and prior to

emergence. And if you recall, a few years ago, we actually interviewed someone who talked about the quacking and tooting and piping noises that queens make.

And they went into the biology of how the virgin queen is calling out for her developing sisters and how they're responding with their own noises in the cells and kind of the process of that virgin queen killing her sisters. And then to your specific question, the workers coming in and cleaning up the mess after it's all been done.

Amy

Okay, but they're probably not going to be opening the queen cell for her so that she can go in and just kill.

Jamie

You know, that's a fascinating question. I would say, Amy, probably not, but there's still some biology to be worked out there about the involvement at the point of attack. You should study this, Amy. This could be a great PhD project for you.

Amy

Yeah, I don't have much time to do a PhD project right now in honey bees. All right, the last question related to this question, Jamie, can you make the sound that a queen makes when she's tooting?

Jamie

Why did I even bring that up? Yeah, it takes a little bit of practice, and the sound is not good today. But you know, when she's piping, if I can get it right, it's a bit like this. And of course, if she does that from inside of a queen cell, it's got a more "quackier" or 2-D sound.

And I'm not going to reproduce those. I will not reproduce those. You'll just have to use imagination, listeners.

Amy

I'm so immature. OK, all right, on to the next question. That was a pretty good queen piping, actually.

Jamie

It wasn't bad, on the fly, yeah. I wasn't prepared or warmed up, but yeah, there you go.

Amy

Yeah. OK. So, the second question that we have on the Q&A today, this was actually a response to one of your feeding presentations, you know, feeding honey bees with sugar water. And so, the question is, why not feed bees 100 feet away so that they couldn't get robbed? And maybe that could help keep small hive beetles away.

Jamie

Let me add some context to this. Essentially, you know, Amy, we produced a video series out of the University of Florida called Beekeeping Academy, and we did a video on feeding bees and went through the process of all the ways that you can feed bees sugar syrup. And essentially, you're right, Amy, this person's asking about open feeding.

And for our listeners, open feeding is kind of what it sounds like. So, usually, when people are trained about feeding bees, it's all targeted feeding where you administer the sugar syrup directly to the hive. And you do that through external feeders like entrance feeders or the feeders that go through the lid of the hive, or internal feeders like hive top feeders or division board feeders, things like that.

But the idea is that you're delivering the sugar syrup straight to the colony, through the hive that needs it. So, you can think about the pros and cons of that, right? It's timely to go to each hive. And on the other hand, the colony that needs it is the one that gets it. Now, in contrast to that, you can open feed.

And the way to think about this is almost like slopping the hogs, right? You got this food trough, you throw out the food, and lots of hogs come to it. Well, in open feeding, you're doing just that. You are creating a scenario where there's a large feeder of some sort that has sugar water in it and you're inviting all the honey bee colonies from the area to go to it.

And the advantage of this is you're not having to take the time to go to each colony individually. For that matter, you're not even having to purchase a feeder for each colony individually. And all of that stuff takes time and money. You know, the advantage is you're able to feed a lot of colonies at one time.

The downside of this is that open feeding can incite robbing. You're not only feeding your bees, you're also feeding other bees coming in from the area. And people have long believed that it's a really good opportunity to cause this robbing behavior and spread diseases and potentially pests as well.

So, the questioner is essentially saying, well, if we remove the open feeding from the apiary, you know, put it 100 feet away, maybe we could reduce that robbing behavior. Maybe we could reduce those feeding frenzies that happen in the apiary.

It's true. I think if you moved it 100 feet away, you very well could reduce that robbing tendency in the apiary. On the other hand, it might make it trickier for the bees to find it. You might be inviting more bees. I guess if you hear me talk about feeding, I'm not really a big fan of open feeding.

I certainly understand why beekeepers do this. You know, commercial beekeepers especially, you just go to one feeder, you put out all the food and your job is done. But I'm not a huge fan of it for all the reasons that we've mentioned. Furthermore, if you think about it, the colonies that need it are not always the ones that are capable of going out and competing with the other colonies for it. So, yes, you could probably reduce that robbing tendency if you move the feeder away from the apiary, but I'm still not sure the benefits of open feeding outweigh the cons for most beekeepers.

Amy

Yeah, I think that's fair. All right. The third question that we have today, so I guess I'll give a little bit of background. This is under the assumption that a colony has multiple queens, which, you know, we've seen that before, two queens, three queens living in a colony together, and they're completely fine, right?

And so, when you're going through and you're starting to split these bees, is it OK to remove the queens and separate them during that splitting? What would that process look like when you do have multiple videos? And then, I guess, which queen would you choose if you had to?

Jamie

Yeah, I like this question because it really picks up on how to structure one's management around strange biological phenomenon. So, to expand this concept a little bit, Amy, you're spot on. We have talked about, even on this podcast, but certainly a lot when we were in the lab together, about finding colonies with multiple queens.

We've talked about the biology of why that may happen. We even put together a Beekeeping Academy YouTube video on this topic. But one of the key points that I make when I talk about multiple queens in a colony is this idea that there's probably multiple queens in that colony for a reason.

And that reason could be, for example, that the colony no longer believes that they have a queen. Maybe that old queen’s pheromonal output has diminished to the point that the bees don't recognize her any longer.

Or maybe they were in the process of superseding her and she ended up not dying, but they were successful adding a second queen to the nest. My point is, even though there's often no visual

reasons that colonies would have tried to make a second queen and therefore end up with two queens in the nest, there could be underlying reasons for that occurring.

And the reason I'm saying all of this is my comment in that video, usually when I see multiple queens, is to do nothing. Because what I've discovered is usually after about a month or two, the colony is back down to one queen. So, the colony has made a decision on which queen to keep.

And I make a point in that video to state I don't usually dequeen or remove one of those queens myself because I don't want to guess wrong. So, let's bring all of that back to this management question. Hey, if you've got two queens in a colony, why not just split the colony and put one queen in one colony and one queen in another? And it all goes back to that biological nuance.

I'm not sure why they had two queens. It could be that they couldn't detect the first queen. So, splitting two queens into two colonies might give that one colony that got that one queen the same problem that led to them producing a second queen in the first place, which is not knowing that there's a queen.

That could have not been an issue. Maybe the workers didn't do it for that reason and moving these two queens and the two colonies is not a problem. I'm not telling the beekeeper not to try that. You can certainly do this. So, if you have two queens in a colony, you can certainly split the colony.

Put one queen in one and one queen in the other. I'm just making the argument that you're going to need to watch both colonies closely in the event that whatever led to the original colony having two queens still occurs when you've split those two queens up into two different colonies.

So, it's certainly worth a try. Just watch the colonies closely to make sure the bees are moving forward appropriately.

Amy

Right. I'm also thinking – my brain is in my head now and you know, I'm thinking about –

Jamie

Good. I'm glad your brain's in your head.

Amy

I'm thinking about, OK, let's say that there are two queens in a colony and all of a sudden you start seeing swarm cells, and at that point, you do want to split maybe, and maybe the bees are overflowing.

You've got a lot of bees. I mean, I'd personally probably just take the two queens and try to split that into two other colonies to have three overall and see what happens. So, then, of course, as

you mentioned, if one's not doing well, then of course I'd start merging them back together. But you're right, I mean, it would take a lot to just make sure that she's still in there, that she's still laying. And if she's not, then you've got to do something about it at that point.

Jamie

Exactly. I don't think there's any harm in doing exactly what the questioner's asking. Just split the colony, put one queen in one, one queen in another. My only appeal is just watch them both for the next month just to make sure that the queens are doing well and the colonies are responding appropriately.

And Amy, in the scenario you gave, if there are two queens and queen cells and the colony's overflowing with bees, man, if you want to make 3 colonies, go for it. Colony with queen one, colony with queen 2, and colony with queen cells. Absolutely.

Amy

I just became a chicken keeper, and it's interesting because they talk about chicken math and how chicken math is a real thing. And I do believe that bee math is also.

Jamie

For sure, yeah. One colony equals three. Three equals 120.

Amy

Exactly. I agree. All right. Well, thank you, listeners. We're glad you're still sticking with us and listening to our podcast and supporting us. Keep those questions coming. You know how to send us questions. Email is the best way to do that, and we will continue doing Q&A.

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 honey bee@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.