

# Episode 82 Mixdown PROOFED

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## SUMMARY KEYWORDS

beekeepers, colonies, bees, honey bees, podcast, fungicides, pristine, combs, natural resources, wax, people, varroa, florida, question, shannon, beekeeping, frames, research, pollen patties, honey bee

## SPEAKERS

Guest, Jamie, Amy, Guest 3, Guest 2, Stump The Chump

### Jamie 00:10

Welcome to Two Bees in a Podcast brought to you by the Honey Bee Research Extension Laboratory at the University of Florida's Institute of Food and Agricultural Sciences. It is our goal to advance the understanding of honey bees and beekeeping, grow the beekeeping community and improve the health of honey bees everywhere. In this podcast, you'll hear research updates, beekeeping management practices discussed and advice on beekeeping from our resident experts, beekeepers, scientists and other program guests. Join us for today's program. And thank you for listening to Two Bees in a Podcast. Hello, and welcome to another episode of Two bees in a Podcast. In today's podcast, we actually have two interview sections. We've got one with Nicole DesJardins who's a Graduate Research Assistant at Arizona State University. She'll be with us talking about Pristine Impairing Olfactory Associative Learning in honey bees. And in our second segment, we'll be joined by Lara Milligan, who's a Natural Resource Agent with UF/IFAS Extension in Pinellas County and Shannon Carnevale, who's a Natural Resource Agent with UF/IFAS Extension in Polk County, talking about their Naturally Florida Podcast. Following that, we'll have a Five Minute Management on how to collect wax, and, of course, we'll finish today's podcast with a question and answer segment. Hello, everyone, and welcome to another episode of Two Bees in a Podcast. I am happy today to be joined by Nicole DesJardins, who's a PhD candidate at the School of Life Sciences at Arizona State University. Nicole and her colleagues have done some research on fungicide impacts on associative learning performance in honey bees. Nicole, thank you so much for joining us on Two Bees in a Podcast.

### Guest 02:28

Thanks for having me. Really happy to be here.

### Jamie 02:30

Absolutely. So Amy does a lot of our research. Hey, Amy, by the way.

### Amy 02:34

Oh, hi.

**Jamie 02:36**

Amy does a lot of the background research for the podcast, and she stumbled across the paper that you guys have published: Common fungicide Pristine impairs olfactory associative learning performance in honey bees. We'll make sure and link that paper in our show notes so that our listeners --

**Amy 02:52**

That's so many big words for me, Jamie.

**Jamie 02:54**

I know, well, don't worry, because Nicole is going to tell us what they all mean. So Nicole, we're going to talk about all that in a moment. If first, you do us a favor, our listeners really enjoy getting to meet the folks who are first time guests. So could you tell us a little bit about yourself and how you ended up where you are doing the type of work that you're doing now?

**Guest 03:12**

Yeah, of course. So I'm originally from Michigan. When I was a kid, I just really liked playing outside, spending a lot of time in nature. And I was always picking up insects and bringing them into the house and freaking out my parents. And it was kind of all of those experiences that got me really interested in biology and animal behavior, specifically. So I did my undergraduate degree at the University of Michigan, and my interest in animal behavior sort of led me to getting involved in research in a lab that was studying learning and memory in paper wasps. And that introduced me to the really fascinating world of social insect behavior. And I sort of decided to study honey bees in grad school, because I've been hearing a lot about honey bee population declines and that they were happening, in part, due to widespread pesticide use. And I'd heard that some of the pesticides were impacting learning behavior. So I figured that that would be a good way to kind of use the experience I already had to, hopefully, help solve a relevant conservation problem.

**Amy 04:18**

I feel like that's so cool. I think honey behavior and their learning behavior is just fascinating. I mean, that's one of the things that beekeepers really love to learn about is honey bee behavior. Jamie and I, we've discussed this on the podcast in previous episodes of just the different stressors that honey bees have. While we have Varroa and nutrition and queen issues, another thing are our pesticides sometimes, right? Pesticides are being used in agricultural settings, and that includes fungicides. And so there's this fine balance between keeping our food growing and also keeping the honey bees healthy. And so you've recently conducted research on a fungicide and its effect on honey bees. But before we kind of get into your research, I guess, can you just discuss a little bit more about using fungicides in an agricultural setting? So, when are they used? And why are they used?

**Guest 05:20**

Yeah, so fungicides, in brief, they're applied to a really wide variety of crops, and they're used to kill fungi that can cause diseases and plants. And you can sort of contrast fungicides with insecticides and

herbicides, which are also both used in agriculture to boost productivity, but insecticides target insect pests and herbicides target weeds. So people have been reporting the negative effects of insecticides on honey bees for a really long time now, and it sort of makes sense that insecticides would be bad for the honey bees because they're designed specifically to kill insects. But fungicides actually beat insecticides in terms of tons applied each year in the US. And they're also more likely to be applied during bloom, which is obviously when you'd expect honey bees to be foraging on those crops. And recently, there have been a number of studies that have demonstrated negative effects of fungicides, specifically on honey bee health. So our research group has gotten really interested in the fungicides that are used to control fungal diseases in the almond orchards. And we're especially interested in almonds because almond pollination is a huge event in California each year, with large numbers of commercial hives traveling there from all over the US. So we're focusing on the fungicide Pristine, which is a formulation containing two active ingredients, boscalid and pyraclostrobin. And it has commonly been applied to almond orchards during bloom.

**Jamie 06:44**

So yeah, I've heard a lot about fungicide impacts on bees over the years. When I first started doing research here at the University of Florida, we were also interested in some fungicides, and I remember specifically, folks beginning to look at almonds, given just what you said, right? So many bee colonies are taken to almonds every year just to pollinate that crop. And it was interesting, one of the things that you said was very interesting to me, this fact that there's more tonnage of fungicides put out each year, than there are insecticides and the fact that these things can be put out, oftentimes, while crops are in bloom, meaning that the bees might get exposed to it directly because they're going while they're in bloom. But in your paper, the research that we're discussing today, you're looking at the impacts of Pristine which, as you mentioned, is composed of two different fungicides. You're looking at its impacts on olfactory associative learning performance. Could you tell us what that is and how its measured, so that we can understand a bit more about what you did?

**Guest 07:44**

Yeah, so it's really pretty cool. When people are trying to understand what associative learning is, I usually try to use the example of Pavlov's dogs because that's, a lot of times, more familiar. So in that experiment, Pavlov basically rang a bell and fed his dogs immediately afterward. And then soon, they learned to associate the bell sound with the food, which is this really biologically relevant stimulus. So it was causing that to salivate in anticipation every time the bell rang. So we're using the exact same principle here, except instead of a bell, we are training the bees to recognize an odor. And bees have this really cool natural reflex called the proboscis extension reflex or PER. And basically, this means that when you touch their antennae with sugar, they automatically stick out their tongue, or proboscis, in anticipation of the food. So we took advantage of this reflex with our protocol. We basically blew an odor toward the bees and touched their antennae with sugar immediately afterwards, causing them to stick out their tongues. And then after a few repetitions, the bees who had successfully learned the association would stick out their tongues anytime they smelled the odor, even if there was no sugar present.

**Amy 08:58**

Okay, so I think our listeners are really going to love your example that you just used with getting honey bees to stick out their proboscis when there's no sugar present, right? Basically, let's tie this together. So you were looking at fungicides, you were looking at Pristine in almond orchards and looking at how that affects honey bees, right? And so, if I got that wrong, you can totally correct me, but can you just tell us about your design, how you kind of brought this all together?

**Guest 09:31**

Yeah, so we basically have five different treatment groups including four different doses of Pristine and one control, which was not exposed to the fungicide. So we exposed whole colonies to the Pristine by mixing it with the pollen patties we were feeding them, and then we sampled individuals from those colonies.

**Jamie 09:53**

So I'm really glad, Nicole, that you did this with colonies. Is Pristine more often found in pollen than in nectar, was that the case? Or I mean, I truly don't know. That's why I was asking that.

**Guest 10:04**

Okat, so, the answer is we worked with Gloria DeGrandi-Hoffman at the USDA lab in Tucson, and a few years ago, her team had done a measurement of the amount of Pristine found in corbicula pollen in bees that were actually foraging in almond orchards. So we used her measurements to decide on the doses because we wanted to make it a field realistic dose. So I think that might have been the reason why they went with the pollen patties.

**Amy 10:37**

Yeah. Can we talk a little bit about the field realistic, what did you just call it, a field realistic dose? I know that when I was reading part of your paper that it said that it was field relevant. I guess, what does that look like in a laboratory setting? How do you make it so that it's similar to a field dose?

**Guest 11:00**

Right, yeah. Field realistic can always feel a little bit of a tricky concept, because it's really hard to figure out exactly how long bees are foraging on the treated crops for, then you also have, potentially, even weather conditions that can wash out the amount of a certain substance. So there are just a lot of different factors that go into that. But we sort of landed on these doses after doing a search in the literature, and then also with some experimental data that one of our collaborators collected, where they actually measured the amount of Pristine in corbicula pollen in bees that were foraging in treated almond orchards.

**Jamie 11:41**

So, thanks, Nicole, I think that's a really good explanation. I like the idea that you're treating colonies through pollen patties, and then you're essentially harvesting the worker bees, and then seeing their response to sucrose sensitivity through the PER assay that you were talking about earlier. So we're kind of on edge now. So you put all this together, you got this research project, you're looking at the impacts

of Pristine on this particular behavior. What did you find? What are some key findings from your research?

**Guest 11:41**

So we found that our two highest doses, which were 23 and 230 parts per million of Pristine, negatively impacted the learning performance of these bees. So while around 60% of the control bees successfully learned the association after eight trials, only about 20% of the bees in the two highest treatment groups have learned. So this was a really interesting result because no one had ever really studied the effects of a fungicide on honey bee learning before. And around the same time, we had some other results coming in from our research group that was also conducting experiments on Pristine. So they also showed that there were negative effects, including lower adult worker populations, precocious foraging and increased pollen foraging in exposed colonies.

**Amy 12:59**

So with that, how do you see beekeepers and growers working together? What should they know or do differently? What are your recommendations for beekeepers and growers?

**Guest 13:11**

Well, for growers, we often recommend things like applying pesticides at night when bees are likely not foraging, and also reducing or eliminating pesticide application when the flowers are actually blooming. I also recommend just doing some research on the pesticides you plan on using. You might be able to find alternatives that are less toxic to bees. Also, use pesticides according to the directions and avoid using more than you think you absolutely need. For beekeepers, the advice is a little different. I think it's a little trickier because, to a certain degree, you can't really control where your bees are foraging all the time. If you're a commercial beekeeper, you can work with your grower to make sure they're following the best practices for pesticide use that I just talked about. I also like to remind beekeepers that colony loss usually happens because of multiple stressors acting simultaneously. If your bees are struggling due to poor nutrition or parasites and are also exposed to pesticides at the same time, that could be the thing that pushes them over the edge. So try to keep your colonies as healthy as possible all around and that way they'll be better equipped to handle stress stemming from pesticide exposure.

**Amy 14:23**

I feel like I should just take what you said and just send it to everybody that emails me all the time.

**Jamie 14:29**

I was thinking the same thing. That's like sage, succinct advice. Growers, this. Beekeepers, this.

**Amy 14:34**

Yeah, yeah. I mean, it's really nice, well, I say it's nice, it's not actually nice, but when someone emails me asking, like, "Why did my bees die?" or, "What happened?" There are so many different factors and so many different stressors that come into play. And so I think it's important to take all of them into consideration. And so how do we best minimize the stressors for honey bees so we can keep them healthy?

**Jamie 15:01**

So Nicole, I want to follow back up on one of the things that you were talking about in your materials and methods. So you said Pristine has these two active ingredients. And one of the things that I've learned when I started doing pesticide research about a decade ago is that a lot of folks do research with just the active ingredients, and in the case of Pristine, the two that you mentioned. But research, in my opinion, is better done with a formulation because that's what the bees actually get exposed to. A formulation would be the two actives, the inert ingredient, all the way that the label says the product has to be mixed and delivered. So when you were putting this stuff into pollen patties and feeding it to bees, were you feeding the formulation, did you do any research on either fungicide by itself? Or did you just do strictly the active ingredients?

**Guest 15:52**

Right, so we used the formulation for the study. Yeah, so the Pristine, if you actually just go out and buy it, it's a solid, it's like these little pellets. So you can mix that in water, just kind of dissolve it. So we mixed that solution into the pollen patties that we were already feeding the bees.

**Jamie 15:55**

So you said you did the formulation, that means you purchased Pristine, you followed the label, you created it as if you were going to apply it to the field. How do you do that? Is that dissolving it in water for the label? What did the labels specifically say? And what did you mix into the patty? Was it a liquid? Was it a solid? Great, thanks. I think that's one of the things that will make this study useful and unique is because, like I said, a lot of folks will just use the raw active ingredients, kind of the laboratory-grade active ingredients. But here you've got an example of a formulation being tested. And Nicole, one of things I really appreciate and like is that you guys fed field colonies and then harvested the bees from those colonies to do these tests on. I really think that that's a really good approach.

**Guest 16:55**

Yeah, it's really interesting. I've been reading a lot of other papers that also show effects of various pesticides on learning and honey bees. And really, a lot of them, like you said, just focus on the active ingredients, and they focus on individual exposure. So I'm also hoping that that'll make my study stand out a little bit.

**Jamie 17:16**

Well, Nicole, that was great. Thank you so much for stopping by our podcast and chatting with us about your research.

**Guest 17:22**

Yeah, thanks for having me. It's really awesome.

**Jamie 17:25**

I look forward to seeing more of this type of work that's coming out of your lab with you and your colleagues. So thanks again. Everyone, that was Nicole DesJardins, who's a PhD candidate at the





School of Life Sciences at Arizona State University, talking with us about fungicide impacts on olfactory associative learning performance in honey bees.

**Guest 2** 18:02

For more information about this podcast, check out our website at [www.UFHoneyBee.com](http://www.UFHoneyBee.com).

**Amy** 18:26

We have two guests. Here we have Lara Milligan and Shannon Carnevale. They are both UF/IFAS County Extension faculty. Lara is a Natural Resources Agent with Pinellas County here in Florida. And Shannon is a Natural Resources Agent here in Polk County. These two have just started a brand new podcast. It's called UF/IFAS Naturally Florida. And they're here today to discuss the history of the podcast, bringing the podcast together, how listeners can benefit by listening into this podcast. And without further ado, I will go ahead, and Lara, why don't you go ahead and tell us about yourselves?

**Guest 2** 19:07

Oh, where to begin? I mean, like you said, I'm the Natural Resources Agent for Pinellas County, which, I know you guys have people from all over. So that's kind of the central west coast of Florida, and we are actually the most densely populated county in the state. So it's somewhat ironic that there's even a Natural Resources Agent position here. But my position was actually created because people thought we really need to protect what remains of our natural resources. And so, that really plays into a lot of my work, focusing on conserving what is here and what's left and teaching people how to coexist with the wildlife because, I mean, we often hear this term wildland urban interface a lot, like people interacting with wildlife because our backyards back up to these wild lands. And that's like our whole county. The wildlife doesn't have a lot of land left. So that's a lot of my job is just teaching people how we can coexist, how we can help improve the habitats that are here or enhance them or add to them. And so that's my professional side of things. I don't know how in depth you want us to go there, if you want to touch on the personal side, but that's in a nutshell, my job, anyway.

**Amy** 20:26

That's fair. We're happy to hear about your personal life and professional life. Not an issue. So we actually do have a lot of beekeepers, I think, in the county that you're in as well. So that's kind of cool. Shannon, what about you? Tell us about yourself, how you got into your position and what you do in your county.

**Guest 3** 20:46

Sure. So as you mentioned, I'm in Polk County. For those of your listeners that are not familiar with Polk County, we're about halfway between Disney in Orlando and Tampa on the coast, so just south of I-4 there. And our county is on the cusp of being very developed. So we have a lot of rural land left, which makes being a Natural Resources Agent a lot of fun and very exciting. We have a lot of ag land, a lot of beekeepers and still have a lot of very beautiful natural areas as well. My background is in forestry. So one of the challenges and opportunities of being in Polk County is I do a lot of work with our water quality and our lakes. We have over 550 water bodies within the county. So I do a lot of balancing between aquatic ecosystems and upland ecosystems. And naturally, Florida is a wonderful way to

share some of the unique aspects of Florida's ecosystems with some of our residents that maybe don't get out into nature very often. But also, we think this is a wonderful opportunity for people who aren't living in Florida to learn a little bit about it, if they're planning on traveling here in the future, if they've got a vacation planned, so that they hear a little bit more about Florida than whatever's happening at Disney World or on the beaches. So that's pretty much my story.

**Jamie 22:14**

So, Shannon and Lara, thank you so much for joining us. So you guys recently came out with a new podcast. So can you tell us a bit about that podcast, how you came up with the idea for the podcast, what you hope to accomplish with it, etc.?

**Guest 3 22:27**

Yeah, we came up with Naturally Florida, which is the name of our podcast, as we were working on our webinar series. So Lara and I have been working on a webinar series for the past several years. It's been called Wildlife of Florida or Wildlife Wednesday Webinars. They're all available on YouTube if people are interested in watching those. But they were 45-minute lunchtime webinars that really did a deep dive on an individual species or on an ecosystem or habitat. When we were planning those at the beginning of the pandemic, we were thinking, "Hmm, is this the best use of our time? There's a lot of other webinars coming out right now. Maybe we can reach a new audience by trying something new." So we decided to jump on the bandwagon and start a podcast. There wasn't a lot in the podcast arena that was broad, natural resources, and specific to Florida. So it was something that Lara and I felt uniquely positioned to speak on. And so far, the feedback has been pretty great. Lara, did I leave anything out? That's definitely a good overview of how it came to be. And I think, for me and Shannon, one of our hopes with this podcast is to reach a broader audience and reach those people that might not think about the environment all the time. I was just teaching a program about like, how do we create behavior change? And reaching these people that again, literally, they go about their day not thinking about the environment, and so, having these short little nuggets of information that is just raising awareness, that's kind of the level. These aren't, like Shannon said, our webinars were very in depth. So this is just like, how do we just generally raise awareness? And then if people want to go dive deeper, we do have the webinars available. We're obviously always available as a resource. And we include a lot of detailed information in our show notes as well. So we do also want to reach that behavior change level, but I think if nothing else, we increase awareness of Floridians in the state and their relationship to natural resources, we're doing our job.

**Amy 24:37**

Yeah, I think that's really great. One of our, I guess, beginning podcasts, one of our original podcasts at the very beginning of 2020, we discussed extension, extension education, what that meant, communicating science and so we always touch on that in every episode. How do we communicate the science that's happening? How do we communicate the research with the public? Right? And so you all have this podcast. It's on natural Florida. And I think one of the questions that Jamie and I asked at first we were like, "Okay, so how do we tie this into beekeeping? How do we tie this into beekeepers? We do have migratory beekeepers that are looking for land, sometimes, in our state, right? And also, we have beekeepers looking for different floral resources that are blooming and what time are they



blooming? Actually, I guess I just answered my own question, but how do you envision your podcasts serving as an inspiration for others who are either, one, from around the world and are beekeepers, or just, two, interested in protecting their natural resources? I just asked you a lot of questions, I think, at one time, but I'll go ahead and let you answer it the way you want to.

**Guest 2 25:53**

Yeah, well, that was a lot. But I think between me and Shannon we can tackle it. Yeah, so I think, and you did answer it as you were asking your question. That's kind of where I went too, is like, beekeepers can't have their jobs if it's not for the natural resources that help them to do their work. And I know beekeepers, so I'm not even going to attempt to use any beekeeping language here. But we talked about this idea of conservation, so anything we can do to inspire any aspect of conservation, whether it's people planting native plants in their yard, that's ultimately going to support all aspects of pollinators, the honey bees and our native bees. So I think there's at least that level of connection, which you alluded to. But, again, no matter where you are, we all have natural resources. We should all be educated on our natural resources because that supports all aspects of life. So again, it's kind of just another avenue for me and Shannon to reach people with environmental education, I think, is really how we see our podcast. But anyway, Shannon and I will keep bouncing back and forth and, hopefully, answer both of your questions.

**Guest 3 26:59**

Yeah, where my mind when was Lara and I were talking the other day, and we were describing to each other how our podcast episodes kind of fit in the fun fact category. So you have beekeepers, they're out in our beautiful ecosystems, or say they're out on ag land, and they're leasing space for their hives. Either way, you're out in nature. And one of the things that we're trying to accomplish with this podcast is that you spend a little bit of time looking at what's there. Perhaps, you never noticed the little frog that goes by or the grasshopper that jumps on your pant leg. And maybe you've just listened to a 15 or 20-minute podcast about the role that little critter plays in the ecosystem and how biodiversity can influence what's going on in that ecosystem. So you mentioned how beekeepers might be interested in a diversity of floral resources. If we have a lot of ecological challenges going on, there's a good chance that we have a monoculture of an exotic plant species in that ecosystem, which means it's all going to flower at the same time and then not flower for the rest of the year. If we can educate people a little bit about some of our beautiful wildflowers, perhaps, on those yards or people's fence lines, maybe we can get some of those wildflowers planted back in and that would lengthen, I imagine, that would lengthen the pollinator season of that area. So there's so much to unpack with natural resources. But this podcast and what we're trying to do, we're just trying to inspire people to look at the world around them, to value those green spaces, perhaps, in a new way, and to look for more information. And I'm totally fine being in a fun fact category where you're walking in the woods with your friends and you're like, "Oh my god, I just learned about this. Here. Let me tell you about it."

**Jamie 29:05**

So you guys discuss environmental issues in your podcast, environmental stewardship, things like that. Do you think beekeepers have a role to play in the arena of environmental stewardship?

**Guest 3 29:16**

Yes. 100%. Beekeepers are, I mean, Lara mentioned it a little bit ago, beekeepers, like so many of our other ag products and just residential perspective, they really value our spaces that are not concrete. And so anything that draws people to those natural areas, and natural doesn't have to mean pristine ecosystems untouched by humans, natural areas, to me, are just anywhere that we are not manicuring to the nth degree. So a little spot on the side of a park that's maybe unmanicured, that can be a natural area. Beekeepers, in my assumptions of where I have seen hives leasing out land and home beekeepers is they really value biodiversity, they really value a lot of the structure, the vegetative structure that we have in our natural areas. And so as a whole, all of us that are interested in those parts of our conservation lands and our little untidy edges of properties, everyone plays a role in that. And the alternative, in Florida, is often a shopping mall and a paved parking lot. So I think beekeepers are very important to the arena of environmental stewardship.

**Guest 2 30:38**

Yeah, and I would just add to the financial aspect of it is it's hard, it does cost money to maintain conservation lands. There's still management involved. And so the economic side of beekeeping, with the leases, that's income for these conservation lands as well. So it's almost, in that sense, helping to conserve our natural areas. I know that's the case, I'm stationed within a preserve area, and a portion of our preserve is actually leased out for cattle ranching. And so it's like, if that wasn't leased out, perhaps, the county couldn't afford to maintain that portion of the preserve, and it would be developed. So I think that in itself is a huge benefit to the natural resources.

**Amy 31:23**

I think that's a really interesting perspective, actually. How do we balance the natural resources with agricultural land? And now, you're basically saying they're kind of one in the same. I mean, they kind of help each other out when it comes to that. So that's a pretty cool perspective.

**Guest 2 31:37**

Yeah. And that's something Shannon and I haven't done any particular episodes focused on agriculture, because we just haven't gotten there yet. But a discussion we've had when we're talking to other people about this podcast that always seems to come up is the value of agricultural lands. And I'm not going to go down on a tangent on that. But there's huge ecosystem services that they provide that Shannon and I hear this all the time as Natural Resource Agents, people always want to point the finger at ag for causing all the problems. But we always like to stress and emphasize all of the amazing things that they are doing for our natural resources as well. So, of course, everything's balanced. There's different perspectives to everything. But that's something we like to try and at least keep in mind and fit in when and where we can.

**Amy 32:21**

Yeah, absolutely. So if I wanted to listen to your podcast, one, where would I be able to find it? I'm going to share it in our show notes if you send me the link. The other question I had is, what should listeners expect to hear? What should they expect? How long are your podcasts? How often do they come out? Things like that.

**Guest 3 32:43**

The best way to find out about where you can listen to our podcast is to go to our website, NaturallyFloridaPodcast.com. Or you can just search for Naturally Florida on any of the major podcasting platforms. There aren't a lot of other podcasts with similar names so it is pretty easy to find. As to what people can expect to hear, they're short episodes. So we try to keep them pretty focused. Our average right now is about 18 to 20 minutes in length. We're trying to keep it to 15 to 20 minutes. So we're doing pretty good there so far. But some of our past episodes have focused on individual species, both insect wildlife, and we're going to also talk about plants, some of the other things in natural resources, and one of the reasons we're so excited about this format, is it gives us an opportunity to build on some of the more complex topics by subdividing them into smaller, easily digestible chunks. So we had an episode a month or two ago about stormwater and water quality. And that issue alone is gigantic. So we're going to come back to some of those topics and dive into different pieces of them. But my hope is that each episode is going to have a very focused purpose and recommendations for how listeners can work to improve their behavior related to that topic. So there'll be a call to action at the end of everything. And there will also be links to more information if they're interested in learning more about the short subject we talked about.

**Amy 34:25**

Yeah, thank you. That sounds awesome. The extension nerd in me is super excited for you all. I could talk about extension forever. That'll be a different topic for another day. All right, everyone. Well, there you have it. Thank you so much, Lara and Shannon, for putting this podcast together. I'm really excited to see how you move forward with this. And I'm eager to hear, I guess, what our listeners or your listeners have to say about the podcast and what they end up doing with it. So I hope to see that behavior change for you. I just used some extension lingo in there. But thank you so much for joining us today on this podcast.

**Guest 3 35:05**

Thank you so much, Amy and Jamie. I really appreciate you guys having us on. And I look forward to hearing from your listeners if they tune into Naturally Florida. Our next episode comes out next month. It's released every month.

**Guest 2 35:19**

Yeah. I want to reiterate too, thank you so much for the opportunity. And you can geek out on extension with me and Shannon any time.

**Guest 3 35:27**

Yes, any time.

**Amy 35:29**

I will do that. Well, there we have it. That was Lara Milligan and Shannon Carnevale. They are both UF/IFAS extension faculty. They both work as Natural Resources Agents. Lara is in Pinellas County and Shannon is from Polk County. Thank you so much again for listening to this episode of Two Bees

in a Podcast. All right, we are at that Five Minute Management time. And today, we are going to talk about how to collect wax. And Jamie, I don't know, what are you going to tell us? Are you going to tell us to just scrape the wax off the frames? I'm not sure, but I'm going to start the timer right now.

**Jamie 36:23**

Gosh, Amy, I feel bad because I was just going to tell you to scrape the wax off the frames.

**Amy 36:27**

Oh, really?

**Jamie 36:30**

It's funny, right? I knew that we were going to do this Five Minute Management, right? So I just put down a few notes for myself to make sure that I said a few things and one of those was keep the scrapings from your frames. But let's start at the top. So one of the ways beekeepers most collect wax would be through the cappings that are generated through the honey extraction process. The cappings are actually prized wax because bees make that stuff fresh to put over the top of the cells of honey. And because it's only been in the hives for a very short period of time during the honey production season, it remains clean white wax. And so when you run your combs through the uncapper, or you manually uncap the frames yourself, you generate all this really white wax. And it's really the best of the best wax. This is the wax that tends to get rendered for use in candles and other things that consumers will purchase. So it's really nice wax. Of course, as beekeepers, we know all you have to do when you are uncapping frames is you allow the honey to drip from those cappings for a period of about a week. A lot of commercial beekeepers will actually have capping spinners. You put your wax in there and it'll spin it around and sling the honey off. But getting all the wax associated with the extraction of honey is a really great way to get high-quality wax. A second good way to get wax or to harvest wax is through keeping burr comb. So burr comb is that wax that bees build throughout the hive in places where we don't want it. For example, it might be between supers, it might be underneath the frames in your brood box, it might be between your frames and the queen excluder. My mentor actually told me, when he was recommending to me how I should manage colonies, he always told me to keep a small pail with me, a small bucket, so that when I work colonies, anytime I was scraping burr comb, I would just throw the burr comb into the bucket. And that's a good idea because once I started doing that, I realized how common it is for me to scrape wax off of combs. Think about it. When the average beekeeper works a hive, he or she is usually scraping the top of a frame or scraping something in order to be able to put the frames of the boxes back together as appropriate. So if you were able to keep all that burr comb that you throw on the ground, you can render that similar to how you would render wax cappings, which takes me, then, now, to my next part. Anytime a colony dies or any time combs go into storage, there's that scraping frames, scraping boxes, anytime you're cleaning equipment, you generate a lot of wax waste. I always recommend scraping it, throw it into a bucket and saving it for later rendering, which brings me kind of to my final point with regard to ways that you can collect wax. Anytime a colony is dead, anytime you've got frames that are destroyed or damaged, you might have to throw away the wooden ware. There may be a problem with the box, maybe it's broken, maybe the frames are broken, but you still want to harvest that wax prior to discarding the frame because that wax can be valuable to you later. So I always tell people you should consider having a solar wax melter. A solar wax melter is

just a box with a glass lid that you keep in the sunniest spot in your yard and you throw broken frames, queen excluders, empty supers, anything that you want to render, you can throw in there and the sun will melt the wax. If the solar wax melter is appropriately constructed, the sun will melt the wax off of those old combs, off of those boxes, off of those queen excluders, and it will collect in a little tray at the bottom of the solar wax melter. So, if you as a beekeeper don't have a history of rendering wax and selling wax or processing wax into candles or other things, this is really a good additional way that you can find ways to add revenue to your beekeeping operations. And if you just invest a little bit of time in harvesting and keeping the wax that you are naturally going to generate or accumulate as a beekeeper, it might pay dividends down the road. So, again, just to summarize those four things, collect the wax cappings associated with honey production; anytime you are in a colony and scraping away burr comb, rather than throwing it on the ground, throw it in a little bucket; anytime you're cleaning old hives or dead outs or things like that, keep the wax scrapings, keep any of the stuff that you cleaned from frames; and fourth, consider having a solar wax melter that you can use to help you collect even more wax than you would when you're doing things like disposing of frames or trying to clean a queen excluder.

**Amy 41:16**

You know, what Jamie? You had six seconds left in that five minutes. I'm very impressed. And we didn't even practice. Today is going to be a good day.

**Jamie 41:23**

Good, good day.

**Stump The Chump 41:32**

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

**Amy 41:55**

All right, welcome back to the question and answer segment. For the first question, this individual had two sick hives, and I guess they had collapsed from the viruses that Varroa transmit so they had deformed wing virus. Basically, what the person's asking is, if their colony had the virus, should or can they freeze the comb? Or what should they do with the comb that they have right now?

**Jamie 42:24**

Amy, we get these kinds of questions so much. There absolutely needs to be research on this topic. It's such a tricky thing. Because a lot of people, okay, so let's just start from the beginning. If you lose a colony to small hive beetles, you freeze the combs, and then you reuse them. No big whoopee. And the reason you freeze them is because you want to kill the eggs and larvae that are in there. If you lose a colony to Varroa or wax moths, you freeze the combs just to kill the wax moths in one case, or maybe the Varroa in the other, but it's no big deal. But when you suspect you have a pathogen-related kill in your colony, what do you do with the combs? And the short answer is we just don't know. We don't know how long it would take, how much freezing is necessary to, for lack of a better term, immobilize or kill a virus. We just don't know. I do know earlier on our podcast, one of our podcast episodes, we were interviewing some folks from the Bee Informed Partnership, and their research suggests that when



you've got colonies that are dead outs or things like that, things that correlated with longer term survival is just reuse the combs immediately, which is almost counterintuitive, right? Why would we do that if we think it was a pathogen? But their research showed it was the case. And I remember, specifically, them saying, but if you can't reuse them immediately, freeze the combs until you're able to reuse them. So, given those data and those recommendations, I listen to this question, and I would say, if you need the combs now, just reuse them and don't worry. I just don't think the virus levels on those combs would contribute to a worsening virus situation in your living colonies. But if you don't need the combs now, throw them in the freezer over winter until you can use them next spring to have a new colony own. And I think that's the best recommendation we have at the moment. Given the number of times I get these questions, it just seems like one of those low hanging fruits that some labs need to reach out, maybe our own lab. Some of that some of the work is kind of outside of our ability to do things, which is why we've kind of been hesitant to jump into it but it certainly seems like something that needs to be addressed. I appreciate those questions, but my recommendation is if you have a need for those combs now, use them. If not, throw them in the freezer until next spring rolls around, pull them out and put a new colony on and move forward.

**Amy 44:52**

Alright, so for the second question that we have, this person has been in a rural part of Louisiana and so they've introduced lots of different queens, they've purchased their queens, they've purchased packages and nucs over a variety of different companies, people, etc. And they've also caught swarms. And basically, they're wondering, what has this done? And how has this affected the overall population of the feral bees in the area, specifically, genetics? Is this person getting better genetics or what? What are your thoughts on this?

**Jamie 45:29**

Oh, goodness. A great question, first. Yeah. But it's a messy answer. And so let me just tell you why. If you're not practicing swarm control, then you're putting bees in the environment. That's just the way it is. And even if you are practicing swarm control, you're putting bees in the environment because no swarm control is perfect. So if you have 10 colonies, and you're actively working to control swarming, one of them's going to swarm despite our best efforts. So we, as beekeepers, put honey bee colonies in the environment. Now, research suggests the vast majority of those don't make it two years because of Varroa and the viruses they carry. If there is a relatively large resident population of feral bees, feral honey bee colonies, which is what they are. Honey bees cannot be wild in the United States, because wild implies they're native there, and they're not. So the, quote, wildest bee we have, honey bee here we have is actually a feral colony, which means it has some history of domestication at some point in its past. So these feral colonies that are in the environment, there are certainly some evidence that some of these can develop natural resistance to Varroa. Okay. But that often happens in more closed populations, populations that aren't being influenced from the outside. So this beekeeper says, "Well, I'm letting my colony swarm. And so I know there are feral colonies out there, because I'm collecting swarms as well." But that's not a closed population. If you're buying nucs and buying packages and buying queens every year and your colonies are putting out swarms every year, then it would take longer, I think, for the feral population to develop resistance to Varroa. And given that the vast majority of those feral bees are dying within two years anyway, I don't know that there's anything being



developed in the environment around you that you would find to be beneficial. Does that make sense, Amy? If it's a closed population, and this beekeeper did it once, brought in bees once, and from that point forward, he or she's putting out swarms, then, it's a relatively close population. So you can get maybe improvement upon it. But if you're bringing in bees and genetics all the time, yeah, you're diversifying your genetics, but I don't know if the feral population's moving in a direction, right? It's just like the introduction of new genetics all the time. And I'm not saying this is a plus or minus, I'm just saying that this is likely what's happening. So I do know that like I said, there's plenty of evidence around the world for that matter, that some of these populations out there in feral environments are starting to show resistance to or at least tolerance of Varroa.

**Amy 45:35**

There's a lot to that one. Alright, so for our third question, this individual, this beekeeper moved their colonies from Pennsylvania to Florida, and I really hope they registered with the Florida State Department of Agriculture. I'm just going to throw that in there. So this person moved their colonies from Pennsylvania to Florida. Suddenly, their colony became extremely aggressive and their attacks are lasting for several days. This person could not wait to requeen or for the bees to requeen and so they ended up destroying their colony. The question is, is it possible that they picked up some Africanized honey bees or if they had Africanized honey bees, and any advice on what this person could have done differently?

**Jamie 48:52**

Okay, a couple of things here. So the question the individual says, "I just moved my colonies from Pennsylvania to Florida." So, "just" is one of those very subjective terms. Does that mean like within the last two weeks, or does it mean within the last six months? If it were within the last month or two, I would really struggle to believe the feral African honey bee population in the environment in southern Florida would have any impact on those colonies' defensiveness at all, because in order for it to happen, your colony has to lose its queen, the bees have to make a new one, that new one has to mate, and she has to meet with at least some African honey bee drones, then she has to lay eggs, and 21 days later, those workers have to emerge, and then you have to get a critical mass of those workers that are now Africanized before the colony becomes defensive. So we're talking two months through the process here, and that's if they lost their queens the moment they got here. If they're talking six months, though, as in, "I just moved my colonies here six months ago," then all of that could have happened. When you're allowing colonies to requeen themselves in an area where African bees are present, you can get Africanized honey bees. And in a month or two, usually two to three months, the demeanor of those colonies can change. And you could have had very calm, European-derived honey bees that you're working, and now you can have more defensive African-derived honey bees that you're working. So again, it all depends on what you mean by the word "just." So that doesn't influence the second question, which is, what should I have done, maybe, differently? Okay, so let's just assume that you moved down and your bees are, in fact, defensive, what would I have done? So if this defensiveness is something that just came on very quickly, I would probably wait a week or two, two or three more weeks of working the colonies to see if that continues. Maybe the bees just were responding to the fact that they moved down, maybe there was some sort of aggravation in the environment that caused them to be defensive. Sometimes bees are defensive when they get attacked

at nighttime a lot by things like skunks or raccoons. They just have a heightened level of defensiveness that we then experience during the day. So I probably would have waited to see two or three more weeks to see if they continue this defensive behavior. And if they truly were more defensive than I wanted to work on a routine basis, I would have just requeened them. I wouldn't have destroyed the colony. But I would have just requeened them to try to get more calm genetics into those colonies. So that's probably the route that I would have taken.

**Amy 51:33**

Yeah, I think that's totally fair. That's something, especially in our state, any feral colony that gets picked up should be requeened. And I think it is required by law, right, Jamie?

**Jamie 51:43**

It's not required by law. But it's recommended, anytime you collect a feral colony in an area where African bees are present, that you requeen that colony. And it's just good management practices, right? Because if you look at the data, and I'm not going to put a number to it, but I'm going to say a reasonable proportion of the feral colonies in southern Florida, as an example, are, in fact, African honey bee colonies. So you have a reasonable chance, when you collect a feral colony, of bringing into your operation an Africanized honey bee colony. This is probably true in other areas in the US where African honey bees are present as well. So that's why that recommendation was kind of born. It's just this idea of trying to maintain that more general population, rather than the more defensive one.

**Amy 52:29**

Got it. All right. So that is our question and answer. Again, you've heard me say it once, and I'll say it again, if you all have questions, feel free to send us an email, contact us on social media. We look forward to seeing what questions you have. Hi, everyone, thanks for listening today. We'd like to give an extra special thank you to our podcast coordinator, Chelsea Baca, and to our audio engineer James Weaver. Without their hard work, Two Bees in a Podcast would not be possible.