



## **EPISODE 227 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**

Hello, everybody, and welcome to this segment of Two Bees in a Podcast. Today, we are joined by Dr. Neloy Chakroborty, a Senior Assistant Professor at Thapar University in Punjab in India. We're really excited to interview him today to discuss beekeeping in India and some of the work that he's done. Dr. Neloy, thank you so much for joining us today.

### **Dr. Neloy Chakroborty**

Thank you. Thank you.

### **Amy**

So, Neloy, can you tell us about yourself and how you got into the beekeeping world, and just give us a little bit of information and background on the research that you've done?

### **Dr. Neloy Chakroborty**

Yeah. So, I came to bee research in 2008 when I went to Germany, Freie University Berlin, in the lab of Randolph Menzel to do my PhD degree. Before that, I worked on other model systems in India, but never on honey bees.

And from 2008, I started developing different kinds of, you know, learning and memory related behavioral assays and imaging in the honey bee brain, which was really challenging at that time point. Still, now, it is very challenging to work on honey bees alive, and you are recording from the brain directly the responses for different type of sensory stimuli. And that gradually molded my interest in honey bee ecology, not just neurobiology, but how neurobiology and ecology are interacting. And you know, at the time point, Europe already had a problem called Varroa mites, which we all know is kind of a world problem and intricately associated with one of the most complicated syndromes in honey bees, like colony collapse disorder, which a lot of people we know that it's detrimental and it's just all of a sudden all the workforce of the colony vanishes.

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So, we actually saw a lot of Varroa issues during our time from 2008 to 2012, 2013, until I completed my PhD. And I had, at first, no such particular communication between the research communities working on honey bee diseases.

Rather, it's more fundamental neurobiologist community, which was my target community at the time. But then, as I started developing my communication with people working on the health and well-being of honey bees, I started developing interest into bee pathogens and other type of, you know, environmental factors that are responsible for the decline of honey bees worldwide.

In fact, quite an intimidating decline for the past 20 years, the world has experienced all around the world. In the United States, in Florida, 2006, CCD, colony collapse disorder was first founded. From that point onward, we also see as the time is progressing, new type of honey bee pathogens are coming.

So, my association with honey bee diseases was around 2012-2013, and then, gradually, I molded my interest in other parts of honey bee work or other types of honey bee work. You know, like honey bees neural imaging at the very depth of the brain using [inaudible] microscope. I went to Italy, and I worked with a person called [inaudible] in the University of Sorrento. We developed tenacity to report from the mushroom body, but not on the surface mushroom body, recording like inside the brain of the beast.

When I came back to India after all this, I started my career as an assistant professor, junior assistant professor, of course, in the beginning, and from that point onward I started a small research group. And now, the last couple of years, my research group has increased and we have much focused interest into the effects of insecticides and how insecticides are detrimental for the honey bees cognition, honey bees immune system, physiology overall.

So, the journey started in 2008 with Randolph Menzel's lab, and then with different people I came into contact throughout. Finally, I started my own lab with two PhD students who are still working with me, and we submitted a couple of papers recently. And now we are focusing on some types of organophosphate pesticides, rather to say insecticides, and [inaudible] also planning to work on neonicotinoids, which is a problem worldwide for the past 8-9 years.

And a lot of people are working on new neonicotinoids and interaction between different types of insecticides, and how such kind of, you know, synergistic or non-synergistic interaction on the effect of new type of fungicide, how much risk they are eliciting for the honey bees?

And by honey bee, I specifically mean the European species of *Apis mellifera*, on which I actually work now. There are so many different types of bee species, approximately 22,000 bee species worldwide. India has honey bees which are much smaller than *Apis mellifera*. They're smaller than *Apis cerana*. Much bigger than *Apis mellifera*, it's *dorsata* and a few other types of mountain region specific bees.

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I'm also interested in the future to expand my research from *Apis mellifera* to these kind of native bees in Asia and India. *Apis mellifera* was always in the limelight because of the reason our managed agriculture depends heavily on *Apis mellifera*, because they are the most domesticated type of honey bees and we see that agriculture associated and agricultural chemicals or agrochemicals, they are one of the biggest driver of bee decline, honey bee decline worldwide, which includes, of course, the insecticides.

So, we are actually dragging *Apis mellifera* straightaway to the field where they can die. Now, that's unfortunate because of the different lags in policy making in different countries, implementation and proper education of the farmer of how much concentration of insecticide they should use for their pest control.

So, there is a lot of things that we need to do. Of course, one avenue of research, which is quite old and I'm also pursuing my research in that avenue, which is trying to understand the toxicity mechanisms elicited by different types of insecticides and that includes deciphering mechanism at different levels from behavioral, cognitive level to directly neuronal activity level to the molecular level,

if I look at in a top down. But then there is another avenue which is developing and I'm also working in it rather recently. How to ameliorate this kind of chemical toxicity that we see in honey bee, especially *Apis mellifera*, elicited by this kind of insecticides. Because finally we cannot limit ourselves to look at only toxicity mechanism when we're going to save the bees. So, people started working on different strategies, for example, feeding *Apis mellifera* with probiotic bacteria. That works, that doesn't work also. Both ways.

So, it's not that effective till now. Then people started working on nutritional, you know, sufficiency, like, there should be copious amount of nutrients in honey bee food. So, people started working, developing artificial bee food. And in fact, recently, just a few weeks back, a paper came in Nature by Geraldine Wright.

I think Geraldine is currently in Oxford, and they made a superfood. They're calling this bee superfood. So, I'm also working on feeding strategies that if I feed the bees with certain kinds of phytochemicals and maybe food supplemented with phytochemicals, can they ameliorate this kind of toxicity?

And these phytochemicals include, you know, coumaric acid, gallic acid, abscisic acid, those kinds of phytochemicals that are common in plant pollen and nectar and honey bees are exposed to. It's like philosophically, one can think about, it's kind of a frivolous example maybe, but one can think previously that we need a paracetamol for honey to reduce all the problems related.

But, of course, paracetamol kinds of molecules won't work. So, we go back to nature, what honey bees are exposed to and try to fish out those important phytochemicals. So, these are two



avenues of my research, deciphering toxicity mechanism, deciphering, you know, toxicity reducing mechanism or I would say toxicity ameliorating mechanism. And now I'm trying to expand my research and trying to collaborate with others. Also, I'm a member of Poulos and a member of the task Force World Honey Bee Health.

**Dr. Cameron Jack**

Yeah, that's great. I'm learning that, just listening to you to talk, we've never met in person, but I feel like we do a lot of the same thing. So, we probably need to touch base a little bit more and collaborate. I mean, I know that there is lots of great research that's being done from Thapar University in Punjab.

I've talked with other researchers that have come from that university and, and it seems like you've had some really great experiences all over. I was curious to know a little bit more. You'd mentioned some of the different honey bee species that are present in India.

How much beekeeping are you able to do, or do you collaborate with other beekeepers to do your honey bee research?

**Dr. Neloy Chakroborty**

The basic research with the beekeeper is limited, very limited. My research is most like purchasing honey bee colonies from the bee breeders, from the beekeepers and performing this kind of, you know, academic research. But you know, I tried. It worked for a while with the beekeeping organization locally, who actually, they were seeking some kind of expert advice from me, how to increase the honey production during the flow season.

And we know that in Europe and United States, especially United States, of course, I will say, because still one of the largest honey producers worldwide in different, different corners of the United States, they produce enormous amount of honey. In US, and also I see in Europe, people take the strategy to take off the honeycomb during the flow season, a part of the honeycomb so that we don't starve the bees.

And then the workforce recruits a new scout for scavenging more amount of honey within a quicker period of time because they might be quite surprised by seeing that all of a sudden the honey storage has been depleted because someone took the combs away.

So, this was one of the strategies. Then, there are strategies that other people have taken like, you know, floral diversity. For bees, sunflowers are more suitable than others. Like, for example, Linden or sunflower or canola red seed, they are better flowers.



Their nectars and pollen are not contaminated by amygdalin type of, you know, plant toxins. Rather to increase the honey production, a lot of strategies, they deliberately plant these kind of, you know, flowers.

So, I spoke with them, to the beekeepers in this part of the country where I am, Punjab, which is in the northern corner, a border state with the neighboring country, in fact. And they started applying because in this joint venture, the horticulture department also kindly participated.

After repeated requests, I could convince part of the horticulture department to participate a little bit on it. So, we discussed about it, but it turned out that it's very difficult to convince farmers or people having apiaries and bee breeders to change their established protocol.

So, I would not say they're very reflective, but I would say that, still, I could not convince them in with respect to changing some of their existing strategy to increase the honey production as well as, you know, taking care of the health of the honey bees. Because I tried to, in a lucid language, you know, carried on my discussion with them that, you know, the solution is not spraying miticide or insecticide or herbicide or other kind of, you know, agents.

The solution is more vegetation, more flowers, less insecticide on the field. And also, you know, we need to find out alternative pollinators, not just honey bees. And honey bees standard can be more secured by incorporating foreign colonies into a certain region.

So, these things which we know are established techniques, or not established, but potentially significant impact they may have. So, the issue here is that it's still far from what I want it to be with respect to the honey bee beekeepers working here.

But beekeepers are aware of small hive beetle problems. Varroa, of course, they are quite aware of Tropilaelaps. So, they are educated to some extent, but kind of not very easy to convince them even if they seek your advice. They did, in fact, yeah.

### **Amy**

Neloy, you know, it's interesting whenever we speak to a guest that's from outside the United States, and it's always interesting because we all do have very similar challenges. I mean, you know, Varroa is not any different than what we deal with. Small hive beetle is not anything different that we deal with. Foraging, right, and planting a diversity of plants, pesticides, miticides, all, all of the above.

And so, it's always, I guess it's not a good thing, but it's interesting to know and, I think, a good thing in the sense of we all are kind of struggling with the same pests and diseases. So, we can all work together, you know, to try to combat and share the research going on. So, I think it's really important from that point. As you're speaking about, you know, the beekeepers that you work with, you've mentioned honey production, that's primarily, you know, what they're doing.

Is this a full-time career for many of them or, you know, I've been to countries where the beekeepers are farmers and they bring bees to bring on to pollinate. I've also worked in other countries where the beekeepers are full-time beekeepers and they bring their colonies, they work with a farmer to place colonies. So, I guess I'm interested in that aspect as well of the beekeepers that are there. What services are they providing? Is it a full-time thing? What does that look like with the beekeepers that you work with?

**Dr. Neloy Chakroborty**

Excellent question, Amy, because this involves, of course, there's interest because it is directly related to their socioeconomic status. So, it's both sides, I saw both sides, meaning there are beekeepers who are also farmers at the same time.

And it's like in the family, maybe there are two brothers, one brother takes care predominantly farming around the year and less on beekeeping and the other brother does the reverse and focuses on beekeeping. I saw even, I know even one family of that kind.

But also interestingly, I have one person, Mr. Jasveer Singh, who is actually currently providing me bees. And his full-time interest in the family also includes the family members, his father, he, himself, I think his brother also, on beekeeping.

Their full-time interest is beekeeping. I mean, they maintain, I guess, approximately 400 - 500 colonies. And you know, my kind of requirement is very rare for them. I'm a rare customer for them who purchases only two or three colonies once in a while for academic purposes.

But otherwise, they give their colony on rent for the farmers during the time of particular crops, cropping season. And I mean, I saw that there are beekeepers of this time within my locality and the villages surrounding and the suburb surrounding the city where I am.

I'm in a city called Patiala, and there are a lot of suburbs and municipality, as well as village areas. So, there are beekeepers who actually give their colonies to the farmer during the cropping season for higher pollination, higher yield. And during that time, also, they try to build new colonies from older ones, from weaker ones, they'd raise queens.

So, this is a full-time job. So, it's both kinds at present. And this is, I'm talking about the North Indian story. But actually, I'm from an area which is near to the metropolitan Calcutta. It's the eastern state of West Bengal. And there I saw the same thing, that there are people who are simultaneously farmers as well as beekeepers, and also beekeepers and honey collectors, wild honey collectors.

They say that you know the family budget, the amount of money that we are earning is not sufficient from one type of task. And we need to go to the remote mountain to collect some



remote mountain honey because there we find some specific subspecies of *Apis dorsata* or mountain bee species.

There are a few mountain bee species. Some mountain variants of *Apis* are also there. And those honeys are very expensive. Sometimes they even sell it on Amazon like platform or other, you know, online sellers. And also, there's a neighboring country called Nepal, which is actually a friendly state to India.

They have some very special type of honey called psychedelic honey, which is from the rhododendron plant flower. A lot of beekeepers from Nepal and from India also go for this collection or some special flower honey in the remote corner because they can sell it at a very high price.

Yeah, in India, I think the motivation for beekeeping is a bit heterogeneous. Sometimes, it is dedicated for beekeeping purpose, sometime it's a mix between beekeeping and taking care of the family socioeconomic condition by doing something else, which is producing some steady amount of money around the year, like farming.

#### **Dr. Cameron Jack**

So, Neloy, you've convinced me. I really want to go to India. I want to go see all these bees. In the United States, anyway, I mean, there's so much going on with *Apis mellifera*, but that's it really, like as far as honey bees go, right? There's no variety in species. It'd be so neat to go see all of that and experience the differences there. So, I guess, maybe my final question for you, Neloy, is what's next? What kind of future directions do you plan to take your research?

#### **Dr. Neloy Chakroborty**

Yeah, I think this to the best of my current planning, the second avenue of research to mitigate insecticide mediated toxicity, and also not just insecticide, I have planned also to work on the synergistic action between some fungicides, which are really interfering with honey bees ergosterol metabolism.

And then, they are escalating the toxicity of the existing insecticide by thousand-fold, kind of very intimidating data. From the West, actually, it is coming largely from United States labs or from other, you know, European labs. So, I really want to see this kind of interaction between insecticides.

And most importantly, as I'm saying, we need to find a paracetamol for the bee. Paracetamol is a small example that we need to find a medicine, which is a herbal one, a natural one, and it may not be a single chemical, it may be a mixture or maybe this strategy won't work alone.



Maybe we need a combination of multiple strategies like complementing particular type of, you know, gut bacterium like *Lactobacillus* or *Bifidobacterium* and to strengthen the immunity. And to further bolster the whole system of honey bees by feeding them this kind of super food that Geraldine writes has developed mixed with these kind of chemicals that we are working on. In Argentina, also, a couple of groups are actively working on phytochemical and feeding them to the bees. And there are papers in PLOS One last year, also I saw by Rivera Group, Andre Rivera and they show that Fipronil, which is a complex, very complicated chloride channel inhibitor and insecticide, that toxicity can be reduced at multiple levels if you feed the bees with kind of phytochemicals.

So, my current planning for my future is I would really like to dedicate the next 10-12 years of my life, if I'm alive, on this particular problem, not just to understand the toxicity mechanism because that's really insufficient.

Currently, the challenge is much more heightened and it's the right time to work on it, to find out some form of, you know, mitigation strategy. Either feeding one thing or feeding multiple things or maybe something else we need to find out by ourselves and to mitigate the toxicity of the honey bee.

Now, this is something I can only say a bit superficially. Now, I started reading articles few years back on the vibroacoustic communication of insects, not just bees but also other types of insects and of course for obvious reasons, honey bees.

Vibroacoustic communication attracted my interest because I'm associated with honey bee research for some time. Although, in between, I worked on other animal models, even on humans. But then I started my lab again with bees, and now I'm also collaborating with some engineers and computer science persons,

Computer engineers, and this is one other revenue that we just started, in fact, just started meaning like a month ago, we found a small amount of grant money for this particular project. And we are interested to know that what kind of communication bees do inside their colony through this vibration and acoustic mode of communication which tells us about their health.

Because there is extensive research on climatic change and honey bees' changes in behavior, which includes, also, collection of pollen, nectar, blooming behavior and other important honey bee behavior. So, research showed from last century, even, that honey bees change their vibroacoustic communication a little before 72 hours before the mating flight when the swarm will fly away from the colony.

Now that is really interesting. So then, this such a significant biological event is followed by a change in vibroacoustic communication. So, is there any clue hidden in this communication



about the bees' health? Like the bees are very, you know, anxious about the temperature because it has reduced down or it is raining continuously.

Or, it's a different communication when there is nutritional crisis outside sometime of the season, maybe end of fall or, you know, kind of a, I don't know, maybe beginning of spring when the floral resources may be still very low and bees are suffering from lack of nutrition.

Or when the disease burden is really high. For example, summertime, the disease burden is little bit higher. Or even around the end of spring, bees are exposed to obnoxious pesticides and these pesticides they're carrying on their whole body and also regurgitating the same pesticide contaminated nectar.

And are they really changing their communication that, oh my God, there's a toxin inside the colony and it is affecting the entire community. So, this is also my future. I see this avenue, which I just started, and I have very little experience about it.

Rather, I worked on the amelioration strategies a bit more for the past one year. So yeah, these are the two future avenues that I really look for. And I would really like to, you know, spend my 10-15 years of next of my life to understand the language they're communicating with each other, what are hidden in this language which are kind of health signatures, and of course, phytochemical mediated amelioration.

**Amy**

Well, thank you so much for sharing. You know, it seems like your future is bright and you've got lots of research that you plan to have in the next 10 to 15 years. I'm excited to see what comes out of that. You know, Cameron and I do a study abroad trip to Thailand to look at different species of Apis, and we've always kind of discussed incorporating India and Nepal into that as well. So, maybe we'll bring a group out and visit you sometime and learn about the beekeeping in India.

**Dr. Nelay Chakroborty**

That would be really great because after I associated myself with COLOSS and Jamie and other members of the task force, they invited me and now I am more interested, you know, if there is a possibility to collaborate, there is possibility to go for a trip somewhere to collect specimen or a few people would like to come to India.

Because I think that we are focusing too much on Apis mellifera, which is, of course, for obvious reasons, but then there are other honey bees which contribute enormously to our pollination. And also, to say that there are non-honey bees which also contribute a lot.



And sometimes maybe we don't see that. It's beyond the capacity of a single group even to look for more than two species. It's difficult, I understand, but we have to open – our frame of mind needs to be more open that the diversity of pollinators will only increase our chance to avoid a pollination crisis.

So, in place of just depending on mellifera, if we start working on domesticating cerana, or the very difficult one, dorsata. We tried here to domesticate dorsata. They just stayed there for a week in the wooden boxes, then the entire colony flew, including to take the queen and everything.

So, yeah, I think that would be really great and we need to look forward to take actionable, you know, plan because the problem of bee decline will only increase as the time is progressing unless we take some, we contribute and we do something, we take some necessary measure.

**Amy**

Absolutely. You know, Neloy, I can see my photo here. We usually record on Zoom, but the photo that I have on Zoom is a picture of me holding an empty Apis dorsata nest. So that was taken in Thailand, and I love dorsata. It's one of my favorite species of Apis.

But, you know, we could go on and on about the different species, but we'll end it here. So, thank you again so much for joining us today. We look forward to having you in the future.

**Dr. Neloy Chakroborty**

Thank you, Amy. Thank you, Cameron. Thank you so much. And thank you University of Florida, and of course, the Two Bees in a Podcast.

**Stump the Chump**

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

**Amy**

Welcome back to the question-and-answer segment, Jamie. The three questions that we have today are actually from an e-mail that we received from a beekeeper in Australia. And as you and many others know, Varroa just was found within, you know, the past couple of years in Australia. And so, all the questions are kind of catered towards the introduction of Varroa and questions about that. So, we'll go ahead and get into it.

The first question is, how dangerous are Varroa specific synthetic miticide treatments from a scientific perspective?

**Jamie**

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Well, first of all, Amy, I'm really excited about the fact that we get questions from beekeepers around the world. I mean, this one coming in from Australia, how awesome is that? We're so grateful that our listeners just are everywhere. That's really exciting to us. Now, let's zero in on a really sad topic, which is about, you know, the discovery of Varroa in Australia. This beekeeper, you and I have more information than we're letting on because we've seen a much longer e-mail.

Essentially, this beekeeper is hearing information about treatment-free beekeeping and Varroa controls and chemicals and ethics and all that stuff that we're going to hash out here. But the first question that this beekeeper asked, how dangerous are those Varroa specific treatments? And she asked a couple questions, but she also made a few statements.

And that first statement was, synthetic treatments are deadly chemicals that should never be used. It will negatively affect you, the bees, and everyone around you. And she's not making that statement as something she believes. She's saying, she's hearing this from advocates of this idea. So, the first point is, how bad are Varroa treatments?

And are they really dangerous for us and bees and everyone around us? Well, there's a lot of sensationalism in that statement. First of all, I realize that we are really talking about something that's going to get people potentially riled up. In fact, you know, I know that people feel very strong about treatment-free beekeeping, and I know that people feel very strong about pesticides and chemicals and big pharma and all those things.

But, you know, I'm a data guy and so I like to see data. Feeling is nearly meaningless to me. I like to see data. I like to see numbers. I want to see how things work, and when we look specifically at miticides that are labeled for use in honey bee colonies, I've got a few statements about their safety. Number one, if you use them according to label, it maximizes the impact of that compound, that treatment on the target.

In this case, the bee. Statement number two, if you use it according to label, it minimizes the impact of that compound or that treatment to the thing that you're trying to protect, right? It's not going to hurt the bee as much. It's not going to hurt the folks who are safely using it.

The label will talk about how you're supposed to use it safely, the types of personal protective equipment that you're supposed to put on. So, if you use it according to label, it maximizes the impact on the Varroa and minimizes the impact on bees and you. And I'll just kind of add a second point. And I've said this many, many, many times on the podcast.

And that second point is, nothing that is labeled for use against Varroa in honey bee colonies is as bad for bees as Varroa is for bees. And the reason I make that statement is people really dance around this idea of using these compounds or these treatments because they're worried about putting these things in colonies.



Listen, there's been a lot of research behind these treatments. If you use them in ways that are contrary to label, you might put yourself at risk or the bees at risk. But if you use them according to label, it's safe for bees, deadly for mites, and safe for you. So, from a scientific perspective, how dangerous are Varroa specific synthetic miticide treatments?

From a scientific perspective, when used according to the label, the danger is incredibly small. It's reasonably mitigated. And this is the same for pesticides, really, around the world. If you use them according to label, they're supposed to be safe, or as safe as they can be. If you use them contrary to label, then you might have problems. I think the things that are available for Varroa treatments are safe to use and certainly not as bad for bees as Varroa are.

**Amy**

I think I'm going to start using that now. That's great. Thank you. Thanks for that. Thank you.

**Jamie**

Absolutely. Use it as much as you want to.

**Amy**

All right. The second question that we have, OK, so you know, obviously, this is all within the same e-mail that we received. So, we just talked about treatment-free beekeeping. The question is, is it practical for beekeepers in the United States to go treatment free? But before you answer that, I guess I, can you explain what treatment-free is, right?

And then the second part is, I guess, is it practical for beekeepers, whether it's a backyard beekeeper or commercial beekeeper in the US to go treatment-free? What are your thoughts?

**Jamie**

Yeah, so you know, the definition is in the name, right? Treatment-free implies that you're not using treatments to control things in colonies. And honestly, Amy, people say treatment-free all the time, but they're really talking about using Varroa treatments. There are fewer treatments available for small hive beetles and, you know, chalkbrood, and viruses.

There are antibiotics available for foulbroods. So, sometimes when people say treatment-free, they're lumping in all that stuff. But really the vast majority of stuff that goes into colonies from a control perspective is going in to kill Varroa. So, when people say treatment-free, they're saying we're not putting any synthetic compounds into colonies to control any of the diseases and pests that bees encounter.

So that's kind of how I define it. And often, people who adopt this kind of treatment-free approach might take the next step and call it natural beekeeping where they're not practicing

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swarm control and other things like that. But we're focusing specifically on not using treatments to control, at least in this series of questions, Varroa.

Now the question is, is it practical for beekeepers in the US to go treatment-free? This is kind of an unfair question because the answer is incredibly nuanced. Yes, you can go treatment-free because that just simply means you don't put treatments in colonies.

So, what are the pros and cons? Well, pros are that you're not putting in treatments in colonies. But honestly, to me, this is where we get into trouble, so I'm snickering before I say things and I know it will get us a little bit of backlash, but to me, there aren't many other pros associated with it, right? You're just taking a stance that you don't want to put chemicals in colonies. That's absolutely fine. I'm completely OK with people taking that stance, but there are potentially a lot of cons.

You'll have, potentially, a lot of high turnover in colonies. And I know that people are going to argue, no, we don't lose as many colonies as people who do treatments. But honestly, Amy, every time I have conversations with people who, quote, go treatment-free, they're still losing lots of colonies and they often deny it, and they'll often couch it under other things, but they're still losing colonies. Treatment-free doesn't mean no dead bees. It just means no treatments. So, is it practical for beekeepers in the US to go treatment-free?

Maybe some beekeepers. And I remember when I first moved to Florida and I brought colonies with me, I didn't treat my colonies for years. But even though I was quote, unquote, treatment-free, my colonies were not thriving and I still had turnover. So, it's not like it solved all my problems miraculously.

And the other thing I'll add to that is it's nuanced because we're talking about level of beekeeper. A person with two or three colonies, a person with two or three hundred colonies, or a person with two or three thousand colonies, or a person with 20 or 30,000 colonies. And just when you start to scale up the treatment-free, and I hate to say this, but it really loses momentum because it's just hard to keep lots and lots of colonies that are under high pressure from diseases and pests and nutrition stress and queen quality issues.

It's really hard to keep those without doing something to control Varroa. And I'll just kind of stop my comment there, because I know some of the things that are coming up around the corner that you're about to ask me to allow me to elaborate on some of these issues.

**Amy**

Yeah, definitely. Well, just quickly before we move on to the last question, the beekeepers, I think, that I've worked with that are, quote unquote, treatment-free, a lot of them, you know, incorporate integrated pest management, right? And so, they're like constantly doing splits or



having a brood break or there are other things that they're doing that's helping. They're not just leaving their colonies where they're at and not treating or doing anything, right? Like it's not a no maintenance way to go.

**Jamie**

100% Amy, I love the fact that you interjected with that because you're 100% right. Treatment-free usually means chemical-free. If you are splitting colonies to control Varroa, then you're practicing a treatment, right? So, really treatment-free means chemical-free. Chemicals of any type going into colonies.

And that's why I said, sometimes it takes that next step, which becomes natural beekeeping. And those folks often are allowing swarms or splitting colonies. So, you're right, it's not that they're not managing. They might be drone brood trapping. They might be using bottom screens, they might be using resistant stock.

And all of those things, I 100% advocate, I'm not against drone brood removal and all that stuff. But the question is, are we at a point – really the fundamental question is this, are we at a point in beekeeping, and let's scale up and think commercial beekeeping, where the non-chemical controls are enough?

And I argue that we're not. And so, that's why I would say treatment-free, certainly gaining steam, it might be doable on a small scale, but you're still going to lose bees, and you know, you're still going to have to manage very heavily to try to mitigate those losses due to these other things.

**Amy**

Definitely. All right. So, the last question from this group of questions, well, it's not even really a question. There are some claims that were sent to us, and so I thought maybe I'd just read some of the claims and then you can let me know what you think.

**Jamie**

100%

**Amy**

All right. The first one is: The claim includes that treatment-free beekeeping is the only safe and ethical choice.

**Jamie**



OK, great. Great, great question, because I know the next statement that you're going to read me is going to enforce what I'm about to say. In regard to the idea of it being safe, the implication is chemical beekeeping or beekeeping using synthetic acaricides and other things is not safe.

And I've already argued that it is safe, when used according to label. So, treatment-free can't be the only safe choice because there are other safe choices as well if you follow label and do other things. Now, their second point is it's their only ethical choice. And the idea behind that is putting chemicals in colonies because it quote, unquote, it harms bees, it's not doing them a favor.

And I argue that if you use it according to label, you're not really getting measurable and significant impacts of these chemicals on bees, not nearly as much as doing nothing at all and letting the Varroa munch on your bees. And you could argue that treatment-free is a less ethical choice because Varroa are doing significant damage.

And I don't want to follow that mindset. I think what's really important is the second part of that statement. You know, treatment-free is the only safe and ethical choice, sometimes illustrated with emotional imagery, you know, pictures of sad children and conspiracy theories and big pharma, etc.

And that's where treatment-free is really winning the day. It's winning the emotional argument related to honey bees and beekeeping. And again, I'm a data guy. You've got to show me data. You've got to show me what your loss rates are, what your Varroa populations are, what your resistance are, and your honey production and your ability to make splits.

I'm not arguing that these things aren't possible with treatment-free. I know that they are because I did it in my own backyard for a few years at a small scale. I'm just arguing that there needs to be more data to support these claims. Let's move past the emotional arguments and start putting data in.

I'm going to pause there because this last statement says it all. So, I just want you to read this last statement that I have to address from this e-mail and just listen to it out loud.

**Amy**

If left untreated, hive losses will only be 80 to 90%. If you keep doing this, breeding from survivors each year, you're basically going to have less and less losses through time.

**Jamie**

So, tell me, Amy, in what scenario is it more ethical to lose 80 to 90% of your colonies a year if you have controls in your hand and could have done something about it?

**Amy**

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Yeah, that's true. I mean, you know, I have a fish tank and that usually happens.

**Jamie**

Do you understand what I'm saying? And that's the thing.

**Amy**

I do, yeah.

**Jamie**

People are making emotional arguments, but they're not going to the data. And I know this is such a dangerous Q&A to have because, I mean, we've had books sent to us because of these kinds of discussions that we've had. And I'm so grateful and I love it. And this is good. These are the discussions we need to have. But I need to address this idea about breeding from survivors.

This is not a new thing. There's this really good analogy that I've heard people use. And I'm going to do this with animals. So, let's just say that you've got, you know, I don't know, 100 dogs. I hate to use dogs as an example because I know you love them so much, Amy, but I need to use something.

**Amy**

That's all right. I do. OK, all right. Use it.

**Jamie**

Let's just say, you know, a bomb goes off in a kennel and the dogs closest perish as a result, but the dogs furthest away, maybe behind the wall, they survive. So, we breed from those dogs that survive. And the next year, a missile hits and we breed from the survivors. And the next year, it's a food shortage and we breed from the survivors.

In survivor breeding, it's directionless, because what they're surviving from year to year is not always the same stressor. So, my point is, this idea of breeding from survivor stock, from Varroa, if the bomb goes off the first year and a missile hits the next year and a food shortage the next year, and then a bomb and then a disease, and then this and this and this, you're not really producing a line of individual dogs that are resistant to any one thing.

Because every year the stress that's causing the biggest problem can change, right? So, what is it that the survivor bees are being selected for? What are they surviving? Well, this year, it might have been a bad cold winter, so you breed from those.

And the next year, it's a significant Varroa issue so you breed from those, and the next year, it's a nutrition shortage, so you breed from those. Well, you're not really getting stock that's resistant to

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any one thing because it's kind of directionless. When we say survivor stock, that's just the slow man's way of breeding, right?

And there are breeding efforts out there to create better bees, resistant bees to Varroa. You could argue in the bee world that survivor stock might be a reasonable way because Varroa is always the biggest stressor and it's always the thing that bees are having to survive.

But that's not true. Sometimes, there's hurricanes, sometimes there's nutrition. And so the point that I'm making is survivor breeding is directionless and won't get you quickly to where you want to go, and that's why we have breeding programs. No other commodity out there, Amy, just says, well, we're going to let the corn survive and whatever survives, we're going to breed from it, or we're going to let the cows – we're going to breed from the survivor cows.

That's not the way any other commodity does it. It's all done with targeted directional breeding. You're breeding towards something. So, if you believe in survivor stock, why not just use lines of bees that were bred for resistance? And I'm not saying survivor stock will never get you there. That's not true. That's evolution, right? That's natural selection among part of that. But it won't get you there, I would argue, quickly enough for you to benefit on a year-to-year basis.

So why not invest in stock that's been selected? So, let's go through this line of reasoning just to kind of bring this to an end, because I know I'm rambling forever. Number one, essentially, Jamie, what do you think about safety related to Varroa treatments?

I think they're safe when used according to label, and they're certainly not as bad for bees as Varroa, and you're not letting your bees die. Number two, is it practical for US beekeepers to go treatment-free? Yes and no. Some folks can pull it off with enhanced management, but at the commercial level, I just don't think we're there yet. Number three, synthetic chemicals are deadly and should never be used.

They'll negatively affect you, bees, and everyone around you. I think that's hogwash. I think the data supports my stance more than the data supports the contrary. The next thing, treatment-free beekeeping is the only safe and ethical choice. Well, I would argue that if you're allowing 80 to 90% of your bees to die every year when you could have done something about it, that doesn't seem ethical to me.

So, I would say it's not as safe as making these broad emotional claims. I think treatment-free beekeepers, natural beekeepers, and people who use chemicals all have something to bring to the table to push us in the direction of healthy bees and sustainable beekeeping practices. No one side is all right. I'm arguing we've got to get away from these emotional us versus them, and all come to the table with solutions to address bee health. There you go, Amy.

**Amy**

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I think that's fair. You know, Jamie, that's part of our job is to try to collect as much data and the facts that we can and share that information as best as possible. Even though your analogy was really intense.

**Jamie**

I'm sorry about all the dogs that perished in my analogy, but maybe we got some survivor dogs now.

**Amy**

That's alright. Yes, now, now we do. All right, everybody, like I said, like Jamie said, you know, we are open to everybody sending us emails. Let us know what you think. We are here to answer the questions as best as possible.

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](http://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](mailto:honeybee@ifas.ufl.edu). You can also submit questions to us on X, Instagram, or Facebook @UFhoneybeelab. Don't forget to follow us while you're visiting our social media sites. Thank you for listening to Two Bees in a Podcast.