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SPEAKERS

Guest, Honey Bee, Stump The Chump, Amy, Jamie, Dr. Cameron Jack

Jamie 00:05
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. Welcome to another great episode of Two Bees in a Podcast. In an effort to continue to internationalize our program, we are going to be interviewing a beekeeper from Barbados: David Smalls. David is a friend of the University of Florida Honey Bee Research and Extension Laboratory. We've partnered with him with beekeeping educational opportunities in the Caribbean, and he's going to be talking about beekeeping in Barbados. That will be followed by a visit from Dr. Cameron Jack, who's a lecturer and researcher at the University of Florida Entomology and Nematology Department. He is our laboratory's expert on oxalic acid. I get tons of questions about oxalic acid and Cameron will be here today to talk to us all about it. We've got an exciting segment for you here on Two Bees in a Podcast. Just for purposes of introduction though, I'm Jamie Ellis, accompanied by Cameron Jack. Hey, Cameron.

Dr. Cameron Jack 01:39
Hey.

Jamie 01:39
Are you excited about this segment?

Dr. Cameron Jack 01:41
I'm so excited. I got goosebumps.

Jamie 01:44
You should have said bee bumps.

Dr. Cameron Jack 01:45
No, because there's a strict no bee bump policy.

Jamie 01:48
That's right, I forget. So I'm excited because we're going to talk about beekeeping in the Caribbean and we have with us a guest from Barbados, who is a beekeeper himself, Mr. David Small. David is a beekeeper for the National Conservation Commission in Barbados. David, welcome to Two Bees in a Podcast.

Guest 02:09
Thank you for having me, Jamie.

Jamie 02:10
Absolutely. We are fortunate because we've known you for many years and you're always coming to the University of Florida to see our Bee Colleges. I know we've done some educational events in Barbados. For some reason, I've never made it down to Barbados myself. We need to change that. But we're going to start just kind of from the beginning. David, tell us a little bit about how you got into beekeeping. Before we started recording, you told me you started keeping bees in 1977 -- and something else great happened that year. That was the year I was born. So as long as I've been alive. So how did you get into beekeeping?

Guest 02:40
I got into beekeeping when I first started working with the Ministry of Agriculture Soil Conservation Unit. There, we had about 100 hives, 60 in one location and 40 in the next.

Jamie 02:54
Wow. So you just kind of jumped right in. That's a lot of bee colonies for someone, usually, in the islands to have.

Guest 03:00
The thing about that, when I first started, there was just a veil. No shirt. I got murdered.

Dr. Cameron Jack 03:08
At least you had a veil.

Jamie 03:09
Well, you persisted though. I mean, that was 42 years ago, and, for some reason, you're still doing this.

Guest 03:14
Because, as a kid, I was always interested in bees.

Jamie 03:17
Really? So you had seen other people keep bees?

Guest 03:20

Not really. We made fun. We would take a bee and put in a matchbox and a piece of grass and put it into your ears.

Jamie 03:32
So you put a bee in a matchbox, put a piece of grass in it, and then stuck it on?

Guest 03:38
But sometimes, you will get stung.

Jamie 03:43
You guys find interesting ways to entertain yourself.

Dr. Cameron Jack 03:46
That's just kids in general.

Jamie 03:47
Yeah, I guess, at least, you weren't pushing over colonies or something like that. Alright, so we've got some questions that we came up with behind the scenes, and I'm curious the answers to these myself. So when did beekeeping in Barbados start? Honey bees aren't native to the Caribbean either.

Guest 04:03
They were brought in from Europe, by the European settlers when they first discovered Barbados in about 1650.

Jamie 04:10
I'm assuming they were brought over in log hives or skips, similar to way it was introduced -- the way they were introduced in North America.

Guest 04:15
Yeah, I believe so.

Jamie 04:17
Yeah, that's only like 30 some odd years after the introduction to North America. That's pretty interesting. They were getting down there that quick. It's also interesting to me, was Barbados a major sugarcane producer?

Guest 04:27
Yeah. We were also producing cotton at the time.

Jamie 04:32
Interesting. So it's like they brought over with them a sugar source in the bees, but there was already a significant sugar source on the islands given that there's so much cane growing. Interesting. So, today, how many beekeepers are in Barbados?

Guest 04:46

I think about 50+.

Jamie 04:48
What's the population of Barbados?

Guest 04:50
280,000.

Jamie 04:51
So out of 280,000 people, only 50 of them are cool.

Guest 04:57
What's happening now is a lot of Barbadians are now becoming aware of the importance of the bees. So that's essentially the expanding beekeeping population.

Jamie 05:09
It's so interesting you say that because I've been to a few Caribbean islands and it's always in the neighborhood of 50 to 100 beekeepers. You go around the islands and think that there's so much potential for more beekeepers, but why do you think there's only 50 beekeepers or so in Barbados?

Guest 05:22
That is registered.

Jamie 05:24
Okay. So you think there are probably more and they're just not registered.

Guest 05:27
Yeah, because I'm doing work where I go to visit beekeepers to give them advice. There are some on the radar that are not registered beekeepers.

Jamie 05:37
Okay. Okay, so how many colonies does the average beekeeper keep?

Guest 05:42
There is one beekeeper on the island. He has about 200. Then there's some between 10 to 15. And then you have some between one to 10.

Jamie 05:51
So, you've got one who's got 200. So that would --

Guest 05:55
He's the largest, probably the first commercial beekeeper on the island.

Jamie 05:59
Would that be a full-time job, managing 200?

Guest 06:02
Yeah, for him. He has two or three workers.

Jamie 06:06
Okay, so what what colony number is your cut off for commercial? Like if I have 50 colonies in Barbados, is that enough for me to be a commercial beekeeper?

Guest 06:14
Probably ten.

Jamie 06:15
Ten?

Dr. Cameron Jack 06:17
So I mean, what do the commercial beekeepers primarily do? Are they there for honey production?

Guest 06:22
Yeah, just honey, basically.

Dr. Cameron Jack 06:24
Honey, basically, because I mean, I'm sure pollination happens, it's just they're not moving bees around to pollinate.

Guest 06:32
I think it's because of the size of Barbados, which is 14 by 21 miles. So then, you know, bees travel between three to five mile radius. So then there's no need for pollination services. But up until Sunday, there was a guy, we had our annual Agriculture Exhibition. There's a guy who wants bees like one every three months now for pollination. So it's expanded.

Jamie 07:01
So, it's 14 by 21 miles, you've got 50ish beekeepers, how many bee colonies are on the island? Roughly. I know it's hard to know since there's --

Guest 07:10
Yeah, yeah. We had some research done by students from McGill University, And it could be over 100-200+ wild bee hives.

Jamie 07:21
Wild beehives. But how about managed bee hives?

Guest 07:23
Managed bee hives, could be, well, close to 500.

Jamie 07:27

So there's somewhere in the neighborhood of 500 to 700 when you roll in the managed and the wild / feral bee colonies. Do you think the island can support more bees?

Guest 07:38
Of course.

Jamie 07:39
Oh.

Guest 07:40
Why I say that is because our flora is diverse. It's not mono as such.

Jamie 07:50
Yeah. Can you make kind of year-round in Barbados?

Guest 07:54
I believe so. Because when we first started, we got honey twice here. Sometimes, you get honey in January.

Jamie 08:02
Wow.

Guest 08:03
You get honey in July and probably October.

Dr. Cameron Jack 08:06
Interesting. David, can you tell us a few of the big nectar sources that are on the island?

Guest 08:09
It is seagrape, [inaudible], fat pork, and then this one, we call it Christmas bush. Yeah, that probably blooms for about three months.

Jamie 08:24
Does it bloom in winter? Why is it called Christmas bush?

Guest 08:30
I think because of the white flower it produces. And has the leaf shape like a Christmas tree.

Jamie 08:36
Okay, would it be safe to say then that the majority of your honey is kind of multifloral?

Guest 08:45
Multifloral, yeah.

Jamie 08:46

Okay. Is it a lighter honey, generally, or darker honey on the island?

Guest 08:51
You could get light. I mean, we'll call it very light. And then anywhere in the dark. Depends on what the bees are working. These are going to be called coralita. In other Caribbean islands, some call it graveyard.

Jamie 09:08
I guess it grows in graveyards.

Guest 09:10
Because you find it at cemeteries a lot, right? But I think, though, as far as our flow starts, I think we are good in that direction.

Jamie 09:20
Barbados is has a lot of topography, right? There's a lot of mountains and hills, so it may be a 14 by 21 island, but it goes up.

Guest 09:26
Mountains and hills are highest as well. 1104, which is more.

Jamie 09:30
Okay.

Dr. Cameron Jack 09:34
Well, so what are some of the challenges that the 50 or so beekeepers are facing in Barbados?

Guest 09:41
Our challenges are Varroa, like the disease. And then I think there's a lot of lack of education. So my job at NCC now is to try to educate people on the importance of honey bees and why we should not, say, kill them.

Dr. Cameron Jack 09:58
Sure. I mean, probably a lot of training to help beekeepers learn how to manage, how to treat for Varroa. So what are some of the ways that they're controlling Varroa?

Guest 10:11
Funny enough, I don't think we ever treated for Varroa. But looking at the beekeeping industry after 2003 or 04, I know the bees sort of developed a trait or became tolerable to the mites.

Jamie 10:27
Naturally tolerant.

Guest 10:29
Because we did a little sample. Some of the bees were less than 4% interest.

Jamie 10:39
I want to put this into a broader perspective. So what you're saying is, is after the introduction of Varroa, because you did not have access to treatments, and really, you what you've had are populations building a natural tolerance. When you've sampled them before, you were finding four mites or more per 100 bees, but the bees I guess, weren't dying.

Guest 10:59
No.

Jamie 11:00
But they were suffering in other ways. Sure. So that's interesting. You kind of hear -- I've heard this from, for example, from Puerto Rico, you know, they have an African bee strain there. They believe it's quite tolerant to Varroa and other pests or pathogens. And this idea that, on islands, you can get pretty intense selection, especially in islands maybe like in the Caribbean, where there's not easy access to treatments. You kind of just have to let nature take its course, and then not not so long after that, you get this bee population that might show some tolerant traits.

Guest 11:01
Again, it's a funny note. I went to the Ministry of Culture last Wednesday. Examining some drone brood, I find some had a visible 10 mites out of 20 samples taken, which, to me, they look pretty healthy. I think, well, that can be what's happening in Barbados. Normally, well, the first time we knew about treatments for Varroa is when I came up to my first Bee College, which was in 2013. Not knowing that there were treatments out there for Varroa.

Jamie 12:14
Really? So they weren't even aware that there were options to treat Varroa. Interesting. So, you've got Varroa as an issue, it sounds like maybe it's flatlining as an issue. You guys were able to manage it in other ways. You mentioned education is a big issue. And Cameron was asking you some questions about educating beekeepers and that's important, right? But what are some other issues that you see for beekeepers in Barbados?

Guest 12:40
Pesticides with the farmers.

Jamie 12:41
Okay, so pesticide exposure.

Guest 12:42
The farmers, just everyday you pass you see some farmer spraying and it's probably taking a toll on the bee population.

Jamie 12:52
You had mentioned, behind the scenes too, access to beekeeping equipment.

Guest 12:57
Yeah, because we have to import all of our equipment from North America. Right now, this is a challenge because the NCC who has equipment to sell it beekeepers, it takes us three, four months to get the order out and then another couple of weeks to get the equipment. But I mean, if you love beekeeping, you love bees, you want to help save your country in terms of food shortages, then I guess that's the way to go.

Jamie 13:15
Okay. So, I actually I see this trend across a lot of Caribbean islands when I visit. It's very common to have a lack of access to beekeeping equipment. It's almost always the case that it has to be brought in from North America, which usually makes it relatively exorbitantly priced. So it's more expensive, maybe, for you to purchase it than it would be for me, and then you have to get it down, and the resources to build your own colonies, access to Varroa treatments. I mean, there's all these kinds of things that compound to make it difficult, but you guys still persist, still keep bees.

Dr. Cameron Jack 13:59
Do most of the beekeepers that are actively making honey, I mean, are they just selling at local markets? Or is the beekeeper you mentioned that has 200 hives, is he selling or exporting honey and or is it mostly kind of everything, all the beekeeping operation kind of stays on island?

Guest 14:19
He sells in the supermarkets. But when there is honey available, it just disappears at stores.

Jamie 14:28
Really? So you can just get rid of it that quickly.

Guest 14:32
It's in high demand, especially Barbados honey.

Jamie 14:36
That's pretty incredible. Do you guys have any queen industry, or if I were to move to Barbados, which I can't, my wife would make sure I have to stay here and finish up my years working with the University of Florida, but if I were to move, and I wanted to purchase bees, how does that happen? Where do I get my bees? Where do I get my queens?

Guest 14:51
Well, there is no queen breeding program. If I may mention again, David, he came down, he's trained to get beekeeping, queen breeding program.

Jamie 15:03
Sure, and you're referring to David Westervelt, who was the former Assistant Chief of Apiary inspection here at the Foreign Department of Consumerr Services. He flies down quite a bit and does some education on Barbados and so you said he's trying to maybe develop a beekeeping or queen rearing program down in Barbados.

Guest 15:14
Yeah, this is true.

Jamie 15:20
Okay. And so what characteristics would you go after with Barbadian queens? Did I say that right? Is something from Barbados?

Guest 15:27
Barbadian.

Jamie 15:29
Okay, yeah, that's what I get for trying.

Guest 15:35
There is a need for a vibrant queen breeding program on the island. I was doing some research with Arista Bee Research out of, I think, the Netherlands. What was done is they looked at the purple-eyed brood and the worker cells.

Jamie 15:55
Okay, purple-eyed brood and the worker cells. Yep.

Guest 15:59
We looked at bees that had the VSH trait.

Jamie 16:03
VSH trait, yep.

Guest 16:05
Also... how should I put it?

Jamie 16:09
Do they have hygienic behavior as well?

Guest 16:11
Yeah, but we never really see if they open back the cell.

Jamie 16:17
They will open back the cell, okay, yeah, sure. So you've lived in Barbados your whole life. You've seen beekeeping in America. You just love what you do down there? You just enjoy working the bees? The island life is good for you?

Guest 16:32
Get into some good fishing.

Dr. Cameron Jack 16:36

Well, great. I mean, this is really interesting, David. I mean, it's just a very kind of unique perspective from this island and from the beekeeping there. If there's anything I can do, if you want to invite me over, I would be more than happy to come.

Jamie 16:54
Do some educating, right?

Dr. Cameron Jack 16:55
I'd be happy. I can bring some students. We'll go down, we'll talk bees and and maybe talk Varroa because I want to know what's going on over there.

Jamie 17:05
Cameron, that's a grand offer. I think that's really generous.

Dr. Cameron Jack 17:08
Thank you. I mean, I'm a generous guy.

Guest 17:14
We are trained to have Dr. Ellis, Jamie Ellis, to see if he can help us boost our educational system as far as beekeeping is concerned.

Jamie 17:27
Let me ask one more question with regard to islands because I see this a lot, too, on the islands, when I when I travel around down there working with beekeepers. Do you feel that beekeepers in Barbados have a good understanding of the diseases and pests? For example, if there were a national survey of diseases and pests in Barbados, do you think that you guys would find things that you weren't aware of? For example, do you have American foulbrood? Do you have European foulbrood? Do you have deformed wing virus? Do you have chalkbrood?

Guest 17:53
We saw some deforming in a sample, but apart from that, I haven't seen any Nosema. Nothing.

Jamie 18:05
Because what I see a lot in the Caribbean islands is that they just don't know what they do have because there's been no proper disease and pest screens, you know, molecular screens looking for the different viruses and bacterial disease.

Guest 18:16
Exactly. That is why we need someone like, you, maybe Cameron, to come down and sort of point us in the right direction in terms of looking for pathogens and diseases.

Jamie 18:30
I think that's a significant need in the Caribbean. A lot of the islands I visit, they know they have Varroa because that's the thing everyone talks about. Some of them know they have small hive beetles, as an

example. But some of these other diseases in the past, they're just not known if it's there or not, because there's been no proper screening to see.

Guest 18:45
The bees are healthy so we see any bees --

Jamie 18:47
Exactly, exactly. Well, David, you've been a great interview. I really appreciate you joining us.

Guest 18:52
Thank you.

Jamie 18:52
That's David Small, a beekeeper for the National Conservation Commission in Barbados talking about keeping bees in Barbados. Thank you for joining us on Two Bees in a Podcast.

Guest 19:01
Thank you for having me.

Jamie 19:02
Absolutely.

Honey Bee 19:06
For additional resources, visit the podcast page on our website, UFhoneybee.com.

Jamie 19:16
In this segment of Two Bees in a Podcast, we are going to deal with more issues related to oxalic acid. I'm your host Jamie Ellis, accompanied by Cameron Jack.

Dr. Cameron Jack 19:26
Thanks for having me back.

Jamie 19:29
Having you back and Cameron Jack kind of rhymes.

Dr. Cameron Jack 19:31
It's always a party with Cameron Jack.

Jamie 19:35
But that doesn't rhyme.

Dr. Cameron Jack 19:36
No, I'm not a poet.

Jamie 19:38

Cameron, you're here because, of course, you work here at the University of Florida, but also you are our resident expert on all things oxalic acid. I was just sharing with Amy behind the scenes before we started this segment that I write a column for the American Bee Journal. It's called The Classroom. And so beekeepers send me lots of questions that I'm supposed to answer, and without question, ha, without question, a lot of the questions deal with oxalic acid. People are just interested in this topic. I know that we already had this discussion in an earlier podcast, but it's come up again. And the reason it's come up again is because one of your research papers for your PhD dissertation has been published online. So it'll be published in print pretty soon. It's entitled, "Evaluating the Efficacy of Oxalic Acid Vaporization and Brood Interruption in Controlling the Honey Bee Pest Varroa destructor." So you and a colleague did this work, you've got some data, and we got a lot of listener questions about it. It's great, number one, that beekeepers are out there reading our research and, presumably, research from other labs. But it's also good to know that they're wanting to know more about it. So Cameron, if you don't mind, we can talk about this some.

Dr. Cameron Jack 20:50
Yeah, great.

Jamie 20:51
So, we'll just kind of start from the beginning, I'm going to ask a couple general questions before we get down into your research. What are ways that oxalic acid can be used legally at the moment?

Dr. Cameron Jack 21:04
According to the label, there are three legal ways to apply oxalic acid to your colony. So the first one that probably has been around the longest that probably most people are familiar with is called the trickle or the dribble. I mean, people call it different things. But basically, you're mixing oxalic acid dihydrate into a sugar syrup that you are then trickling between the frames.

Jamie 21:35
Using one of those big plastic syringes.

Dr. Cameron Jack 21:37
Just a big old syringe, yeah, and it's only like five milliliters per frame. So you're putting 50 milliliters per colony, but it's been pretty effective. People have been using it for a long time.

Jamie 21:48
How often do you do that? Is it a single treatment? Or do you do that multiple times?

Dr. Cameron Jack 21:52
I think that kind of depends on the year. You can do, usually, up to three, once per week. But, I mean, best case scenario, the beekeepers are sampling and monitoring their Varroa populations. They don't over treat, but do what is going to be effective.

Jamie 22:10
So listeners, it's important that you hear me say this: It doesn't really matter what Cameron and I say on this podcast, what matters is what the label says. So the label's the law. So regardless of what we talk

about, research from behind the scenes or our perspective, the label is what you legally are obligated to follow. So I just want to throw that out there before we get too far. So oxalic acid is best used in the dribble method, probably when colonies are broodless, right? Because at any given time, a lot of the mites are in the brood and therefore, not exposed to the oxalic acid treatment, therefore, the treatment once a week, three weeks in a row or something like that.

Dr. Cameron Jack 22:43
Yeah. I mean, I think you can make that statement for pretty much any Varroa treatment. I mean, it's going to be most effective on the colonies that are broodless, but especially so for oxalic acid people. Definitely want to use it during the winter months when colonies are broodless.

Jamie 22:59
Okay, so that's the trickle method, what are the other two methods?

Dr. Cameron Jack 23:02
The other one is similar to the trickle method, this is just called the spraying method where you'd mix the same solution, but you apply it by spraying it to the sides of the frame.

Jamie 23:16
Okay, so both of those are just topical exposures. Got it.

Dr. Cameron Jack 23:20
So then the third method is vaporization. If you think back to your chemistry days, vaporization is taking a solid to a liquid to a gas, whereas sublimation is taking something from a solid straight to a gas.

Jamie 23:37
Cameron, that's very important, before you go any further, because I hear beekeepers routinely call it, "We use oxalic acid sublimation," or "We use oxalic acid vaporization." And people are always asking me the difference. So I want to see if I can get it correct based on what you said. Vaporization is taking something from a solid to a liquid then to a gas. Sublimation is basically, you are skipping the liquid phase and going straight from the solid to the gas. So my question to you is, do we actually sublimate oxalic acid in the US or do we vaporize oxalic acid in the US?

Dr. Cameron Jack 24:12
So it depends on what you're using. So if you're using oxalic acid, straight, just pure oxalic acid, which most people don't, if you're using straight oxalic acid, you will take it from a solid to a gas. So you're doing true sublimation. If you're using oxalic acid dihydrate, which is what you're supposed to use, according to the label for the United States --

Jamie 24:35
So the thing that's actually illegal to use.

Dr. Cameron Jack 24:37
Oxalic acid dihydrate, which is going to vaporize.

Jamie 24:41
Okay, so the vast majority of beekeepers who are using the label treatment, they're actually achieving vaporization. Not sublimation.

Dr. Cameron Jack 24:48
I would say the vast majority across the world are using oxalic acid dihydrate. And so in a lot of the research papers that we would read from old studies, they say they sublimated OA, but then they'll still say that they used oxalic acid dihydrate.

Jamie 25:03
So they're just wrong.

Dr. Cameron Jack 25:04
They're just wrong. I mean, this is something that we've learned fairly recently as well. I mean, just through some research, somebody actually corrected me. And I went back and really focused on this. And I'd said, "You know what? They're right." So I'm learning too.

Jamie 25:18
So those are the three kind of labeled ways in the US. And again, if you're listening, labels change all the time, so you have to follow the label, and if application changes, you need to change with it. So let me give a little bit of background, then. Some years ago, I was visited by an Italian colleague, who said that in Italy, a lot of commercial beekeepers, will create artificial brood breaks at times of the year that colonies would not otherwise be broodless. In fact, he was saying that the Italian commercial beekeepers were doing this in summer. And they would create these brood breaks by caging a queen for X number of weeks, so she wouldn't be lying, and then you'd get this natural brood break. And towards the end of that brood cycle, when all the brood has emerged, then they would treat with oxalic acid per labeled rate, and they were saying they were getting very good control. So that's kind of the background. Then you came here to start your PhD, you're now a faculty member, but you came here start your PhD, and one of the projects you did is you wanted to look at just what the Italians were doing, this combination of oxalic acid treatment and brood breaking on the impact of Varroa populations in colonies. So for the listener, we're recording this podcast in February 2020, so that when you're listening to it, you'll know, but that paper just came out online. It's going to be in print soon, and some beekeepers are already seeing that paper and asking us questions related to oxalic acid vaporization and the control we got in that particular experiment. We thought this would be a good time to go over this project, which I think would help beekeepers kind of understand the strengths and benefits, as well as the limitations of using oxalic acid treatment, as well as allow us to discuss a little bit about this brood break right here. All right, so can you give me an overall setup for your experimental design? What did you do? What was the purpose of this study? What did you do? And then I'll start reading for you some of these listener questions that we've had.

Dr. Cameron Jack 27:13
So the first thing I want to say, oxalic acid has been tested a fair bit in the United States, mostly actually by Marion Ellis' group out in Nebraska, kind of in the late '90s.

Jamie 27:22

Cool last name, but no relation. Uncle Marion. Actually, believe it or not, Cameron, he came from an area in Tennessee where a lot of my father's family came, because maybe we're related. But at the moment, we don't know. Maybe 23andme. Maybe it's time.

Dr. Cameron Jack 27:39
So there's been some oxalic acid research that has happened the United States, but nobody's ever really looked at vaporization. It's not necessarily a new application method, but it's more recently, in the last few years, caught on in popularity, so we wanted to test that one. But we also wanted to kind of, as you mentioned, test this way that a lot of the Italian beekeepers were claiming they were getting a lot of success by creating these brood breaks. And then the idea is, when you get rid of all of the brood inside of a colony, that there is no place for those mites to hide, I mean, they're going to be on the bodies of the bees. So the idea is they're more exposed, and so in one fell swoop of a good treatment, you should be able to knock down all the mites because there's no nowhere for them to hide, right? So that's the idea. So what we wanted to do was to kind of test all of the different scenarios, basically. And we did this by creating a full factorial design. So we were testing every single combination of OAE treatments and queen gauging or this brood break, right? There's also different schools of thought too. Some people will say, "Well, you don't need to cage your queen, you just need to treat once per week for three weeks." And then the idea is that as the mites emerge out of the cells with the emerging bees, that they will eventually be accessible through treatment.

Jamie 29:12
Okay, yep. So Cameron, you approach this by doing kind of a factorial experimental design, where you cage some queens but not others, and you treat it with OA one or three times, but not others. So can you explain to me kind of this design?

Dr. Cameron Jack 29:25
Sure. So I mean, basically, we either caged the queen and then treated with one time with OA or with three times with OA, or we chose to not cage the queen and then treat with one treatment of OA or three times with OA.

Jamie 29:41
Let me see if I understand this correctly. There are six treatments. So you either gave no OA, one time OA, or three times OA. That's three treatments. And you did all three of those in colonies that you caged the queen and in colonies you didn't cage the queen. So three times two is six.

Dr. Cameron Jack 30:03
That's it.

Jamie 30:04
Alright.

Dr. Cameron Jack 30:04
So we got it. And then just to make things relevant to what current beekeeping practices are, I mean, we wanted to have what we would consider kind of a positive control. So we also had a seventh treatment that was just treating with amitraz.

Jamie 30:20
So the industry standard.

Dr. Cameron Jack 30:21
Industry standard, exactly. So we have seven treatments, we had 10 colonies per treatment. Field experiments are kind of hard. I mean, you want, obviously, best case scenario, I mean, we could have as many colonies as we could possibly manage. For this experiment, at this time, we had 70 colonies to work with. And so that's what we did. 10 colonies per treatment.

Jamie 30:46
Sure. Yeah. I mean, that's an important point, listeners. We are always limited in time, people, and money. If we had unlimited time, unlimited staff, and unlimited resources, we could do 100 colonies per treatment. But in this particular study, Cameron, we used 70 colonies, so we were able to allocate 10 colonies a treatment.

Dr. Cameron Jack 31:05
Great. And so along with that, we started this experiment in September, which if you've been in Gainesville, Florida in September, I mean, it's still crazy hot.

Jamie 31:17
Yeah, September, October, November are all summer months for us.

Dr. Cameron Jack 31:20
Yes. So we start this in September. For those that we were caging the queen, those treatments that received that treatment of having that brood break, we caged the queen for 24 days, exactly 24 days. So some people have asked me since this paper has come out, "Why 24? That seems like a really long time." Well, if you think about the time that an egg is laid to the time that a drone would emerge is 24 days, so we essentially, in that 24 day period, have cleared out every possible brood that could be in that colony.

Jamie 31:54
No brood left for Varroa to hide in. That's the premise behind queen caging or brood break. Yep.

Dr. Cameron Jack 31:59
And so those treatments that received the one time OA treatment, they were treated on day 24, when it should be all cleared out. On the ones that were treated three times, we treated them every eight days. So you'd treat them basically once a week.

Jamie 32:15
Sure. So that makes sense. And then you follow those colonies for X number of weeks or months to look at Varroa populations in them to see how they respond to the treatment.

Dr. Cameron Jack 32:24
Exactly.

Jamie 32:24
All right.

Dr. Cameron Jack 32:24
We did that for three months.

Jamie 32:25
Yeah. And so if you had to summarize, just very quick summary, because I've got some more specific questions for you, but it's very, very quick, succinct summary of what did you find?

Dr. Cameron Jack 32:34
So basically, what we saw was that colonies that were treated with OA, I mean, they looked pretty weak, they didn't actually recover, even if they were treated three times. And if we caged the queen, they looked even worse. None of the queens died during this experiment. I mean, they lasted those full 24 days of being caged. We would release them and they'd go right back in and they would start laying again. But, they just couldn't quite recover.

Jamie 33:13
So essentially, the take-home message is neither brood breaking, nor OA, nor a combination of those two things reduce Varroa loads appreciably.

Dr. Cameron Jack 33:22
Yeah.

Jamie 33:23
Okay. All right. So, first of all, that's research right? Now, it's interesting. Anytime you do a project, it's limited by the conditions under which you do it. The number of colonies, you use the time of year, the location, how you set up the study. So there's a thousand reasons that we might expect that we actually got those results. In my experience, and this is not a negative, listeners, but in my experience, oftentimes, when papers get in the hands of beekeepers who are reading these things, they'll believe in OA so much that they are kind of upset that we didn't find that it works, so they'll try to find all the reasons it didn't work. So I want to talk to you, maybe, about some of the reasons OA didn't work. I'm gonna seed you with the first one. So rather than pick on the study design or anything like that, the first thing I'll say is it is just possible that that level of OA doesn't work. I mean, the simplest answer is, it just doesn't work. It's not effective.

Dr. Cameron Jack 34:14
Absolutely. I mean, when I would go share this research with different organizations, different groups around the state and around the country, people would say, you know, what? OA vaporization works great for me. And then I will ask them, did you do one gram for OA? And they always get that smile on their face? Like, no. So I mean, the point is we were doing what was according to the label, I mean, that was the treatment that we use, and we just didn't see --

Jamie 34:45

And what people don't know yet, because you haven't published it yet, but you also did a study where you looked at multiple levels of OA, and in that study, multiple doses of OA, and in that study, the labeled rate, one gram, also did not work. Now, we do know a level that does but we can't talk about it at the moment. We'll talk about that when that research paper comes out. But the point is that that one gram of OA is probably not sufficient to control Varroa. That's just what we're seeing here in the south. Now, you are right. I also have a lot of Northern colleagues who will talk about OA working for them, but I just want to ask you some some questions. I mean, obviously, what do you think besides -- let's just say, can seasonality have an impact on efficacy? Can the duration of queen caging have an impact on efficacy? These are questions that we're getting straight from beekeepers who have read this paper. Do you think the dose had an impact? And we've already talked about that. I think dose does, in fact. But what about seasonality, duration of queen caging? What do you think? What are some other things that could kind of come in play here?

Dr. Cameron Jack 35:47
Both of those, I think, seasonality and duration of queen caging, kind of have more to do with whether we can call the artificial brood break, I mean, whether that can be effective. I think, you know, I guess hindsight is always going to be 2020, so ideally, we probably would have started this experiment a little bit earlier in the summer. But we just didn't have the colonies ready at that time. And in Florida, like we already said, September, we have three months of what we would be considered summer, but nevertheless, seasonality may have had an impact. Maybe our colonies would have bounced right back after we released the queens if we had done this in the spring or summer, right? But we just don't know that yet. As far as the duration of the queen caging, same thing, it's like, maybe 14 days would have had less of an impact and those queens could have jumped back in, started laying. But, at the same time, then we would also have run the risk of still having capped brood in the colony, and then we wouldn't have known if our treatment was being effective or not.

Jamie 37:02
I think what was interesting to me when I was having these discussions with my colleagues years and years ago, and this is something that commercial beekeepers in Italy do, now I'm not suggesting that they're necessarily to the scale of the beekeeping operations that we have here where we've got tens of thousands of colonies. But it was interesting to me that a hundred or a few thousand colonies, that they were actually caging the queen. And what they would do is they could cause queen caging to last shorter periods of time because what they would do is they would go into a full-size colony, cage the queen, and instantly remove all the brood, right? With that brood, they created new colonies, like nucleus colonies, and they would argue that these new colonies that were growing quickly would outpace the Varroa. So these nucleus colonies that had the brood didn't necessarily need an instant treatment. So that, then, would leave behind a parent colony that's now broodless with a queen caged for a week or two weeks that you could do these treatments. So you get a much shorter queen caging period by manually removing the brood. But if you do that, you've got to have a home for that brood, and their strategy was just to use that brood to create splits to grow more colonies. I thought that was interesting. But they were doing that, again, in the middle of summer, which is not when, traditionally, we think about OA applications in the US. You typically hear it preached as a winter treatment, but it can be done, presumably, if you have brood breaks, and so they were forcing it with queen caging or forcing it by physically taking out all the brood. I think that's another listener's question. Are there other ways that we could have maybe reduced that 24-day caging period? I've just mentioned one right there,

just physically removed the brood on the same day that you cage the queen. However, I struggle to see this being applicable to someone who's got thousands of colonies, right?

Dr. Cameron Jack 38:51
Yeah, the amount of time that it takes to find and cage the queen. I mean, a skilled beekeeper can hopefully do this within a few minutes. However, when you multiply that by thousands of colonies, I mean, it's going to be a lot of time and time is money if this is your business.

Jamie 39:09
Sure, and we'll talk about this on a future podcast. I think you and I both believe what it's really going to take is a change in label rate.

Dr. Cameron Jack 39:17
And truthfully, I mean, that's what I hope happens. From all this, what I want to do is I want a legal treatment that is effective, so people can use it and rotate that into their arsenal against Varroa.

Jamie 39:32
I think that's what's going to happen. I think your other data, plus some data from colleagues who we've been talking to about this suggest that it's going to take a higher label rate. Listeners, I know you want to know what that is at the moment. But if I said it, you'd all be doing it and it's not been published yet, and it's currently illegal. So, we'll get that published, and as soon as it's published, we'll talk about it on a future podcast. So I don't think OA is useless at all. I feel like it's got an important place. Now, one of the things that makes me nervous is I know, and I don't want you to go into too many specifics, but I'm aware that there's a lot of fogging with OA. It just being pumped out, you know, like a fogger, into colonies. And so can you talk about maybe some of the drawbacks or dangers in doing that?

Dr. Cameron Jack 40:15
Yeah, sure. There is definitely -- there are different ways that people are applying this and fogging makes me a little nervous for a couple of reasons. I mean, one is that you're mixing your OA into an extremely high ethanol content. I mean, it has to have a really high alcohol level so that the fogger actually will work. And the idea is that you've got a propane tank and a heat source and you're blowing this into the colony, but the idea is, obviously, it's controlled, you're not just using it as a flame thrower. But you're spraying in this pure OA. The problem that I have with the fogging is that you really don't have as much control over how much you're putting in.

Jamie 41:01
Yeah, you can't control those.

Dr. Cameron Jack 41:02
You don't really know. I mean, beekeepers have told me they've maybe drawn a line on their jar, and they can kind of see, but at the same time, you just don't know. I really like vaporizing for the sense that you weigh out ahead of time, and you can put the exact amount that you want to treat with and then that entire thing is treated. I mean, that entire amount of OA is applied to that colony. So you have more control of the dose because this is, like you said, I think there is a place for OA, but I think it has to be done carefully.

Jamie 41:16
Yeah, I did have a question in one of my columns from the American Bee Journal that I asked you already, I think we've already answered it through ABJ but I wanted to ask it here on the podcast. When you vaporize with OA, you'll often get these residues of OA crystals kind of scattered throughout a hive, right? You'll get some on the cappings of cells, etc. Is there any residual efficacy of OA after this? Or do you think the efficacy that you get is through the vaporization? Like, once the vapor's gone and those crystals form throughout the hive, it's over? What do you think there?

Dr. Cameron Jack 42:11
So that's a good question. And I don't know if I have an amazing answer. But we do know that OA will break down, kind of dissipate, within the colony fairly fast. It would have to be, when you do see it, that means it was probably, it just didn't dissipate very evenly or very well. I mean, there's definitely some residual effect because we don't know exactly the mode of action on a molecular scale of what is happening, but we do see when Varroa are walking, and they are walking on OA, it kind of basically clogs up or prevents their -- they basically have suction cup feet, and it keeps them from being able to hold on and they fall off. It also increases a grooming response from the bees when OA's applied. And so the bees are grooming themselves like crazy, the mites can't hold on as well, they're gonna fall off. But there's definitely another mode of action because I strap an OA down with a piece of tape and I put --

Jamie 43:14
A Varroa. You strap an OA down?

Dr. Cameron Jack 43:16
Well, no, that's a little bit harder.

Jamie 43:18
Wow, that's impressive, Cameron.

Dr. Cameron Jack 43:19
No, that's hard. But --

Jamie 43:20
You know you're a PhD when you can do that.

Dr. Cameron Jack 43:21
But if you strap down a Varroa and then you put a small amount of OA on, they will still die. I mean, there's definitely something happening that we haven't figured out the exact mode of action for that. But as far as it staying within the colony and lasting for a long time, we really don't see that. I mean, it'll go away. That's one of the benefits of OA, I mean, in my opinion.

Jamie 43:45
Yeah. And given the interest in OA and the desire of people to use it, do you kind of have any last recommendations for us? If someone wants to use it, what are you going to recommend to them?

Dr. Cameron Jack 43:56
So I'm not going to recommend any specific brands because nobody's paying me to say that or anything.

Jamie 44:02
Well, even if they were, we shouldn't be. Which they're not, by the way, guys, so don't panic.

Dr. Cameron Jack 44:08
Which they're not. But there are some new models of vaporizers that just really seemed to speed up this process. And I think that is what draws a lot of people towards fogging is because they say, look, I just mix this once and I just have to give it a few puff puffs, and I can go on. I get that. I mean, it's nice to have something that just speeds up because just the traditional vaporizers are just like a hot metal spoon that you're sticking in that colony and it takes a few minutes. So you have to have multiple --

Jamie 44:09
You're heating white crystals on a hot metal spoon.

Dr. Cameron Jack 44:15
It seems like it should be something that --

Jamie 44:34
We're talking about oxalic acid.

Dr. Cameron Jack 44:36
You put on your magic crystals, yeah. So it seems like it should be illegal podcast. But it is a legal treatment.

Jamie 44:52
OA.

Dr. Cameron Jack 44:53
But my point is, that takes a long time. OA is a legal treatment.

Jamie 44:57
Yeah, we need to get back on track.

Dr. Cameron Jack 44:59
That kind of method of application takes a long time. So there are some newer models that just heat this up faster. And it's not necessarily like the temperature's going like crazy high through the roof, it's just that it kind of spreads out the OA a little bit faster and kind of heats it a little bit more even. And it does get it to a little bit high of a temperature, but you don't want it to be like insanely high or else you can actually basically combust the OA into something else, formic acid and carbon monoxide. You don't really want to be pumping that in your colonies.

Jamie 45:34
So I hear.

Dr. Cameron Jack 45:37
So these models do help you kind of speed it up, because you can kind of pre-weigh out your OA, and then, you can within just about five seconds, you've treated that colony. So there are ways to kind of speed this up that I think are going to make it more accessible, especially for commercial beekeepers or sideliners that have a lot of colonies that they need to treat.

Jamie 46:01
Well, there you have it folks. OA information from our OA expert, Cameron Jack, here at the University of Florida Honey Bee Research and Extension Laboratory. Thanks, Cameron.

Dr. Cameron Jack 46:09
Yeah, glad to do it.

Jamie 46:10
Guys, if you have more questions about oxalic acid or its use, you can continue to listen to us on Two Bees in a Podcast, you can go to our social media sites @UFhoneybeelab and post those questions, and we will try our best to answer those questions in the question and answer session of Two Bees in a Podcast.

Stump The Chump 46:37
It's everybody's favorite game show, Stump the Chump.

Amy 46:47
Today's question and answer time is going to be all about drones.

Jamie 46:51
It's about time that guys get some attention. I feel like everytime we're with bees, we just keep talking about all the great females and all the cool things they do.

Amy 46:59
I mean, they're pretty awesome. But drones, I guess, they deserve some credit, too. They do things sometimes.

Jamie 47:05
Yeah, they do play a seemingly important role in the life of a hive.

Amy 47:09
Seemingly, yes. So we actually got questions from someone named Dan. He's a field ecologist for the National Ecological Observatory Network. He sent us an email and he kind of had a few questions about drones. So I'll just go ahead and ask them, and hopefully, Jamie, you can provide me some answers.

Jamie 47:25
Well, I'm just impressed that he's a field ecologist for such a prestigious organization. That's cool. Maybe I should ask him some questions.

Amy 47:32
Seriously. We'll be emailing him. All right. So the first question we have is, should I selectively and time consumingly remove drones? I've been toying with this idea.

Jamie 47:46
Okay, that's a great question. So for the benefit of the listeners, the motivation, probably, behind that question is that there are some recommendations out there that drone removal can confer some level of Varroa control. So let's think this through. First of all, drones are males, the male honey bees, and colonies tend to invest heavily in the production of drones in spring because that is when queens themselves are being produced. And when you have a flush of virgin queens hitting the wing, they need a flush of drones to mate with them while they're flying. Now, of course, we all know for biology reasons that drones from a particular colony do not typically mate with the queens from that colony. But nevertheless, drones are a huge energy investment from colonies, right? Colonies put a lot of energy into producing them. Drones also happened to be the favorite bee for Varroa to parasitize. Now, we know that Varroa feed on adult bees, but they have to reproduce on immature bees. So preferentially, they go into drone cells. Now, they will go into worker cells as well. That's obviously a big problem for us. But given the choice, they will invade drone cells, which will have a disproportionate number of workers in those drone cells. So all of this led to this idea that if we occasionally go in and destroy drone brood, then we are killing a significant, not like a huge chunk, but a significant piece of the Varroa population. So this has led to recommendations about using drone combs where if you've got a 10 frame hive, you can replace one of those frames with drone foundation. When the queen populates it with drone eggs and the larvae come out and develop to the point that they are sealed in their brood cells, then you can freeze that frame because there's lots of Varroa in it. Then, you can take that frame back to the hive and the bees will clean it out and the colony will start over. Some people who don't use drone frames, then, propose the question exactly asked now: Should I just go in and occasionally destroy some drone comb, hopefully to get a handle on Varroa? So it is labor intensive. I do feel it's a reasonable Varroa management strategy for hobbyists. I think once you get up to the sideline or commercial beekeeper level, it's not very practical. So my answer back is, it all depends on how much time you're willing to put into bees. If you're actually using a drone comb, there's not a huge time investment, it's just every time you work your colony, or once those cells are capped, you freeze it for a day or two before you return it back to the colony. But if you're talking about destroying drone cells systematically, every time you work your hive, I think that's not worth the energy. I would suggest controlling for other ways. But long story short, if you're chemical averse, and you've got a lot of time, and this is a strategy you want to use, it can certainly help. But most beekeepers find it a little too time consuming to try to use the strategy to control Varroa.

Amy 50:48
Got it. So with all the drones kind of eating away and coming in and using resources, could they be impacting the available food source for developing larva?

Jamie 50:56

Yeah, so obviously, this is another good segue question. So, we've just dealt with this idea, should I kill drones for Varroa control? And my general recommendation is, unless you're hobbyists and have a lot of time, you really probably shouldn't go that route. So now, the question is, well, do they consume a lot of resources? Maybe I should just get rid of them because they have no purpose, they consume a lot of resources. And I've seen wonderful presentations given at the state and national level about why drones are important. We've got this idea that they tax our colonies, they're an energy sink, we need to get rid of them, so that bees can put that energy elsewhere. But drones are important. We need good drones to go out there and mate with the virgin queens, even if they're not our own queens. We want to make sure the bees around us are the type of bees that we want to keep. And we can do that by producing good drones. I also tell people, bees are going to try to make drones anyway. And so if you're selectively destroying them, they're going to go through the process of creating them all over. So I'm not sure it's an energy saver for us to do that because the bees are going to keep trying and keep trying and keep trying. So I don't know that it's worth it, just to save a little bit of food resources for the bees.

Amy 52:07
Got it. Okay, so for the last question that we have, in one of his five frame nucs, he believes that he's seeing two distinct size classes of drones. Is this possible? And why, if it is?

Jamie 52:18
Yeah, so you can get different sizes of drones in the colony. I will tell you, there's a few reasons for this. One possibility is that it's a nutrition issue. Perhaps, some of the drones didn't get quite the level and quality of nutrition that the other drones did so they developed smaller. But honestly, Amy, a lot of it has to do with the cell in which they were raised. I want you to think about it from this perspective. When we give our colonies foundation, that foundation is worker brood-sized. So bees, in order to have drones in a standard colony, they will take a messed up area of comb and construct drone comb in that area. If you look closely at that drone comb, often there's a lot of varying sizes of those drone cells because they have a limited space to make it. So you'll get small cells and bigger cells. When you give bees unadulterated ability to make drone comb, it's very uniform, large cells. But in our colonies, you get these varying sizes of cells. So what you do is you get these queens laying eggs in cells that are just too big for workers, but not quite the size of a drone, and the drone that's developing in those smaller cells will get proportionately less food, will have a smaller environment to develop. So it could just be an artifact of, you've got some big cells in which drones are growing up and some small cells in which drones are growing up. So nutrition, cell size, and I know a lot of people wonder, too, if perhaps, there's some cryptic reproduction by worker bees, but I don't think that happens enough to where you would regularly see different drone sizes. And a last point to mention is that drones drift. They have a high propensity or likelihood of drifting. So if you have multiple colonies in your backyard and drones are freely moving between those colonies, then you may just be seeing different size drones because the drones are from different colonies. You can have some colonies producing bigger drones, other colonies producing smaller drones. If they're randomly spreading out when they return back to their hives and are going in the wrong ones, then you're just going to see different drones from different mothers, even in the same hive. So that can be responsible for these differing sizes. So great questions about drones. It's all about the males.

Amy 54:41

It's all about the males. We're giving all the males the credit today. Thanks for answering this question.

Jamie 54:46
It's funny, one thing though, Amy, is that I think he's getting at, we're useful -- we, here I am identifying as a drone. Drones are useful during the mating season. But when winter comes around a lot of temperate areas, the worker bees take care of drones themselves. As you know, they kick them out of the hive so that they won't, in fact, be a tax on resources. But I won't mention that, I'll just mention how useful and beneficial they are for hives when they're not being kicked out.

Amy 55:11
I'm sure the drones are very thankful for having you as their spokesperson.

Jamie 55:15
Yeah, there you go. We have to stick together.

Amy 55:25
We'd like to give an extra special thank you to the following: To our editors, Shelby, Hal and Bailey Carol, and to our audio engineer James Weaver. Without their hard work, Two Bees in a Podcast would not be possible. So thank you.

Jamie 55:41
For more information and additional resources for today's episode, don't forget to visit the UF/IFAS Honey Bee Research Extension Laboratory's website ufhoneybee.com Do you have questions you want answered on air? If so, email them to honeybee@ifas.ufl.edu or message us on Twitter, Instagram or Facebook @UFhoneybeelab. While there don't forget to follow us. Thank you for listening to Two Bees in a Podcast!