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EPISODE 220 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.

Hello, everyone, and welcome to another episode of Two Bees in a Podcast. Today, we are joined by Dr. Ashley Mortensen, who is a scientist for the Plant and Food Research Group, the Institute of Bioeconomy Science in Hamilton, New Zealand. Hey, Ashley, thanks for joining us on this episode.

Dr. Ashley Mortensen

Kyota, everyone, it's great to be back.

Jamie

Yep, we had you in the past. And you know, Ashley, I'm really terrible at this. I forgot what we discussed, but I'm sure it was amazing. And we brought you on this time to discuss physiological responses of colonies to apiary population density, which, when you emailed us like a couple of different options, I'm like, well, gosh, I want to talk to her about all of those things, but this is the one that rose to the top.

And so, we're going to spend some time chatting with you about this. But before we do that, and I know you've been on before and folks know you, it's still good to remind our listeners who you are and how you got into the honey bee world.

Dr. Ashley Mortensen

Yeah, that's a great place to start, and it's a story that I like to share anyway, so nice to make sure that anybody new hasn't heard it or anyone I'm new to, I guess, that hasn't heard it.

And then also just to remind everyone because it's a bit of a non-traditional path into a research science role and into honey bees. I actually always grew up liking animals. Was told, oh, you're going to be a vet, and I didn't want to be a vet so I was a little unsure for a while. I ended up being a zookeeper, so I worked with primates and big cats, and I moved around with my partner at the time and ended up working at a vet clinic as a vet nurse and picking up wildlife rehab.

And through wildlife rehab, met some people who were keeping bees. And I'm a serial hobbyist and so anything new to learn and try, I was like, yep, I'm going to keep bees now, and took, actually, an extension course through the South Carolina extension program, and then won a beehive for scoring the second highest in the test for that course's year.

I caught a swarm immediately afterwards. And then I, two years later, was moving from South Carolina to Florida and emailed you, Jamie, about how to move my beehives, and then worked in a research lab as a technician and decided I really liked research and I really liked bees and I wanted to do something more. So, then I came to you for graduate study in honey bee research and haven't left yet.

Amy

OK, sorry, I'm laughing because I'm like, you never left Jamie's side. OK, no, let me start over. I'm like, you haven't left the honey bee world.

Dr. Ashley Mortensen

Fair. Well, I guess I haven't really left Jamie all that much either because I'm in monthly meetings with you at like 1:00 AM New Zealand time.

Jamie

That's true, yeah. We're both on a committee, an international committee together. We do both meet at times that are inconvenient for both of us but convenient for many of the other members on the committee.

Amy

Well, before I go into asking you a question that we were going to ask for the interview, I do want to say, Ashley, you know, this has probably been brought up, I don't know, four or five times in our podcast. And it's the story of Jamie going out to do field work with you, you know, on that rainy, thundery day.

Dr. Ashley Mortensen

We talked about this on the episode I did because it was about the DCA project, Jamie, and you sitting by that dead raccoon during the lightning storm.

Jamie

And I was like, this is me, this is the dead raccoon is just what I'm about to be.

Dr. Ashley Mortensen

Jamie probably never goes out in the field with grad students now because that ruined it.

Jamie

That's enough.

Amy

It kills me every time it gets brought up, and I'm sure if we had like a Two Bees in a Podcast trivia, that would be one of the most memorable things, I think.

Dr. Ashley Mortensen

It's even better that it's on like Disney World property as well.

Amy

Was that on Disney? Oh, gosh.

Jamie

Yeah. It was. A long time ago.

Amy

All right, Well, I wanted our listeners to, you know, be reminded and reintroduced to you, Ashley, in that, you know, dead raccoon scenario with Jamie. All right, so we are interviewing you today about physiological responses of colonies to population density. So, basically, you know, the number of colonies in an apiary. Can you elaborate what this means and maybe provide some background behind the project that you're working on?

Dr. Ashley Mortensen

Yeah. So, when I first moved to New Zealand, one of the first big questions that was posed by beekeepers, and I'm know I've also heard it in conversations in the United States, but specifically around honey production and Manuka honey production, where so many people are trying to take colonies into these distinct areas to collect as much honey as possible at the same time.

What does overstocking look like in honey bees? And in New Zealand and in the Waikato where I'm at, dairy is a huge industry. You know, we have a fairly good understanding of what type of grass or plants you have out in your paddock, how many cows you have in your paddock, what that nutritional intake looks like and how that relates over to how much milk they're going to produce and that stocking rate, and then when you tip over into overstocking and you start to lose productivity per animal. So, what does that look like in a honey beehive?

The more we thought about it, the more mind boggling it becomes because the landscape that every colony is in and what forage is available and what pollen versus nectar and the quality of that and the density of that and what other animals are in any given environment, and how could

you possibly come up with like a number that is accurate to more than just this one specific location? And how do you practically get something for beekeepers that helps them to start to understand what's a good stocking rate versus a bad stocking rate in an area before the end of the honey flow when they realize they made a lot of honey or not.

So, one of the ways we started thinking about that was, well, what can we look at in beehives in real time? Where do we see indications from the bees themselves that they're experiencing stress due to population density? And would some of those things be something that over time we could refine to be able to – obviously, it's not as good as knowing this is how many we put in there, but while you're there in the first couple weeks, is there some way to look at it and be like, oof, too many hives and do something about it before you find out at the end of the season? So, we've kicked that around a little bit and then are trying to come up with what those indicators are. And right now, they're maybe not super practical for use, but you got to understand what they are to be able then to refine to something that's like a usable tool.

Jamie

Yeah. So, when you posited a couple of options for us to discuss with you on this podcast, when I was looking at this particular project idea, it was intriguing to me, right? Because commercial beekeepers can stock a lot of colonies in a yard or a few colonies. I routinely get asked a few times a year if I'm keeping bees in this area, how many colonies can I put per acre and how far apart do they need to be? And you think about things like honey production, stuff like that. But you guys are looking specifically at physiological responses.

Our listeners around the world are going to think, what is a physiological response mean? And then which ones did you look at and why?

Dr. Ashley Mortensen

Yeah. So, the fun thing about a beehive, which you'll know, everybody, and this is something that you've really, you know, hooked me into from the beginning, Jamie, is the concept of the superorganism, right? So, you have the individual honey bees and kind of how their bodies are functioning and performing, and then you have the colony itself and how that overall is functioning as an organism. So, it's really, I think, fun in bees that you get to focus at both levels.

We've done a little bit of looking at both, but the colony is where my real interest is. And so, I had one master's student a few years ago who looked at things of the individual bees that might indicate, so she looked at metabolic rate of the workers and kind of how much air they're moving and how that relates to their function.

She also looked at glycogen reserve, which is like the amount of, basically, energy that each worker bee had stored in their body as adults and as immature larvae and pupae. And then she also looked at heat shock protein across individual bees in apiaries at different locations.

But the one that I guess I was planning most to talk about today is that colony level one, and that one we're actually looking at drone production and how drone production changes with population density.

Amy

So, Ashley, I would love to hear more about your study design and how you measured the responses, you know, of drone production. I'm very intrigued by this.

Dr. Ashley Mortensen

Yeah, I think it overlays with a lot of interests of mine. I think it's a pretty charismatic idea to talk about. And so, obviously, the last time I was on here, I talked about drones and DCAs, and collecting drones at drone congregation areas when I did my master's study with Jamie. So, it really is kind of my heart place in the bee world is fun things to do with drones. I think they're pretty silly and goofy and often overlooked in their role besides going out and mating, but what they represent and what they indicate in terms of colony function and colony maturity and stability in the beehive. And when I was still studying at the University of Florida, Jamie was obviously my lead advisor. But Dr. Christine Miller was also on my committee, and her lab does a lot of things in male-male competition, reproductive competition, in other types of insects, in other bugs.

And there was a seminar speaker who came, and he was talking about reproductive competition between males. He was saying that when you have increased population densities in populations where males have to compete for mates – obviously we know of things like having big antlers or protecting territorial patches and things like this that you recognize. And maybe like deer or in a lot of different birds, but, also a lot of different species, you'll actually see increased sperm production in the males when they perceive that there's increased reproductive competition. So, if they're able to mate, they have the best chance of being successful and being the one that's actually like fathering the offspring.

And so, when you think about a colony of the bees, obviously we have drones, and those drones themselves produce sperm, but as the colony as a whole, the drones kind of individually represent the sperm of the colony, each one of them.

So, we've kind of joked before that they're like flying gametes. So, if you look at the colony level, do we see changes in the amount of drones that they're producing based on the population density? And outside of reproductive competition, you might think if there's a whole lot of

competition, you're in an area that has way too many bees in it, probably nutritional resources are going to be limited to that colony.

You're not going to have as much food. You'd assume that something like drones that aren't contributing to the work that's being done in the colony, they're not going out and collecting food, they're not taking care of brood, they're not building comb, they're not defending the hive, that you would reduce your investment in those because they're pretty big.

They have a long larval period. Like, they require quite a lot of resources to raise. And my favorite things are things that feel a little counterintuitive as well. So, we were like, if we looked at colonies, would we see something where they reduce drone production when they're in a density stress situation?

Or would we see this pattern of reproductive competition where, if they're in a high population density, where they actually increased drone production? And what would that look like or mean?

Jamie

OK. So, that's really fascinating. You've said a lot of things that I'd love to follow up on, but I'm sitting here thinking the whole time you're talking about this. So, you're essentially interested in looking at does colony density influence total number of drones produced per colony?

Dr. Ashley Mortensen

Yes.

Jamie

OK. And so how did you set up that study and what did you find?

Dr. Ashley Mortensen

So, I guess the biggest limitation to say out front is, this was obviously quite an effort to set up a spectrum of apiary densities, in terms of having enough colonies, so there is low replication. So, all of this that we're going to talk about from here would be considered as like a case study or preliminary study that just indicates if the hypothesis is sound and worth following up on.

Jamie

Good caveat.

Dr. Ashley Mortensen

We set up three apiaries. The first apiary only had eight colonies in it, the second apiary had about 60 colonies in it, and the third apiary had at least 120.

There was a little bit of flux over the year, so I think it went up to like 150 at one point and went back down to 120 just because we only have so many spaces that are ours to set colonies up in, and we had some colonies that came back from a trial and needed a place to hang out for a while. And those numbers, obviously that 60 apiary in the middle is still kind of a high number.

But when we had done the other work looking at individual worker bee responses with the previous master's student, 40 was our middle apiary, and we weren't quite seeing differentiation between the 8 and the 40 apiary. So, we just pushed it up to 60 so that we would be able to have three points that we were assessing across to look to see if any one apiary was just an anomaly or if it seemed to be meeting a trend.

And then in each of those apiaries, we had eight colonies that were our focal colonies, and all eight of those colonies had been established that spring. They had new queens. They started in a single 10 frame brood box out of the same location, and then they were all transported to their three different focal apiaries and allowed the period of one brood cycle before we started any assessments on those eight specific colonies within those other apiaries.

Each of them was given one of the plastic drone cell frames that was partially drawn out. I mean, ideally, they would have been fully drawn out, but we've had a couple seasons now of trying to get all of our beehives to draw out all of those frames for us, and they're all maybe, like, 75% drawn.

So, we gave them a frame of drone brood, but we also gave them a top bar with no foundation and no comb on it at all for them to decide what type of comb they were going to draw on that. And then the rest was standard worker cell for the other 8 frames in that hive box.

And so, then we went out and we quantified the amount of drone brood on any frame in the colony with a little grid that we overlaid over each frame and specifically noted how much drone brood was on that green drone cell frame and how much drone brood was on that drawn wax frame.

We also quantified how much drone cell had been drawn on that wax frame and how much worker cell had been drawn on that wax frame as well. We did that at three time periods; one mid spring, one late spring, one early summer, and then an additional at the early summer point, we collected drones during the mating flights at the entrances of each of those colonies and then also looked at sperm viability in those individual drones.

Amy

What were the results that you found from this?

Dr. Ashley Mortensen

Yeah, so, excitingly, and also in a way that kind of ruffles a few people's feathers, we ended up seeing that the high density apiary appeared to be drawing the most drone comb and producing the most drone brood, and then the low density one was producing the least drone comb and the least amount of drone brood.

And then the middle one, the middle one kind of wafted around, but it still fit the trend. So, it was just really exciting. There's obviously the caveat that it's low numbers, they're in three different apiaries that are in three different foraging landscapes, but all three of them were forging landscapes that were Waikato attic adjacent.

So, it's a lot of Clover and grasses, maybe a little bit of blooming shrubs nearby. And all of them were areas where there weren't any known apiary sites nearby. And actually, that high density one was right here by our work building.

So, we know the area really, really well in terms of what was nearby. And then the 8 apiary one was in the driveway next door to my house. So, we're pretty confident on what the landscapes are that they were in as well. It really appears that there is this variation in the amount of drones produced, with the ones that were in those really high-density colonies seeming to produce more drones in response to, presumably, reproductive competition at the colony level.

Jamie

So, Ashley, that's really fascinating. So, I'm sitting here thinking to myself, and you've given all the great scientific caveats, you know, local conditions and the number of colonies and blah, blah, blah, right? The stuff that we would all say interpreting any of our stuff conservatively. But let's just say that this trend remains true. And if you did it again and again and again and again, you found that colonies and high-density apiaries produced more drone comb and reared more drone offspring. Let's just say that trend that you've seen is true. How would they – like, what feedback are they receiving that? I mean, I know you thought about this, right? And maybe you don't have to share if it's trade secrets.

Dr. Ashley Mortensen

No, it’s not trade secrets. It’s more questions.

Jamie

What are you thinking? Yeah. What are you thinking here about how they would perceive that, what information they're using to do this?

Dr. Ashley Mortensen

Yeah. So, I mean, obviously the biggest thing you think of when you're overstocking or oversaturating area is that it would be something related to nutritional intake, right? And you

know, obviously they ought to be able to perceive that there's a lot more competition at floral resources, but it would – It seems really strange for that to be what would be feeding back to modify drone production. But one of the things that is on the docket of further things to test looking forward would be to be able to set up this smear of apiary densities, but then provide supplemental feeding so that we know that all of them are having all of their nutritional needs and feedback just fully covered in a really neutral way so that we could eliminate that variability from it. There's still, of course, a lot of logistical things to figure out and overcome as to how to do that without just creating robbing mania and a whole bunch of other problems in your apiary. But some way to ensure that you're eliminating that variable in terms of just food consumption.

And I mean, maybe, it doesn't necessarily have to be eliminated because if that's the answer, then that's the answer, but to be able to at least tease that out. One of the other things that in earlier conversations with Lee, Dr. Lee Simmons at Western Australia, had looked into or had a postdoc really cursorily kind of do a preliminary trial on looking at smell.

So, they tried to pump the smell of other colonies into bee colonies to then make them think there's more hives around or not. That was only with three or four colonies. So, there's not really clear data to come out of that. But obviously those odor stimulants are reasonable. And then, also, we've done it at an apiary because it's easy to manipulate an apiary scale. But what's the radius away from that colony that that is relevant to? So, I have more questions than answers for you, but it's a really fun brain teaser to really think through. And this is the place that we're at with it right now is actually in this enjoyable but daunting brain teaser phase.

Amy

As you're going through, I'm just thinking of all these questions, and of course, I'm thinking like with honey bee research, we just kind of sit here and think about logistics, you know, of like how we can put together a project and how do you know that that's actually what we're looking at, right? There are so many factors and it will keep us all up at night, I think, thinking about that for too long.

Dr. Ashley Mortensen

Yeah. So, the thing I didn't mention yet that's also another fun little add to it is that in the individual drones, when we did the sperm viability analysis from these colonies at the different apiary densities, the sperm quality of the drones in the higher density apiary was less.

They had a lower percent of viable sperm than the drones in the lower density apiary. So, you do start to see where potentially they're making more drones to have those greater numbers out at the DCA to compete with mating with a queen. But in doing that, you are compromising the amount of attention, care, nutrition that can be delivered to any one of them.

So, you saw a reduction in the sperm quality in those drones, but there were so many of them out there. And in the world of honey bees where you have single mating, there's so much, you know, like the sperm volume from anyone drone is as much or more than any queen actually stores in her spermatheca.

So, really, like the number of viable sperm maybe isn't as important because she's going to mate with upwards of Tarpy's recent thing, not recent anymore, it's been a while, was like upwards of 50 drones. And so, it's more important to have the numbers there to successfully mate potentially than to have that really high sperm viability, which is a tradeoff that you see in other species as well.

So, in other species, which is why we check the sperm viability, in other species where you see this increased sperm production, it's not uncommon to also see a decrease in the quality of any individual sperm as well in that kind of numbers game that's happening in this male-male post copulation reproductive competition.

Amy

So, I recently just took an insemination course not too long ago, and I kind of like delved in and, I don't know, I just have more and more interest in drones these days too.

Dr. Ashley Mortensen

Because they're super cool.

Amy

They're so – yeah, they're very cool.

Dr. Ashley Mortensen

And their big eyes are hilarious, and they're so clumsy flying around. Like, when you're sitting at an entrance trying to count drone comings and goings or catching them and you're just watching them come and go from the hive. I'm like, there's nothing not to like about you guys.

Amy

Yeah, they're pretty great. That leads me, well, that doesn't lead me to my next question, but –

Dr. Ashley Mortensen

We're going anyway.

Amy

Yes, I'm going to ask the next question, and that is what implications do you think your results have or might your results have for beekeeping?

Dr. Ashley Mortensen

Yeah, that's a tricky one in the applied space as well because what beekeeper going out into a high production scenario is like, let me leave two frames of open space for drone production. So, again, as I said at the beginning, it's not necessarily the most immediately applicable, but it is us starting to kind of unpeel that onion to figure out what type of responses are we able to find.

And then, what would that look like as we got further and further down to a quick assessment? One of the things that Epernay also looked at was that heat shock protein, and there was also some variation in the heat shock protein levels across apiary densities.

The heat shock protein did show some variation across population densities, which is not actually about heat. It's a stress response protein that's synthesized across a whole bunch of different species in response to physiological stress.

And so, that's one of the things that showed some promise even in the worker larvae that a previous master's student looked at, and then also seemed to show some promise in this drone study that Epernay had done as well. So, finding some of those things that are more achievable, because you could collect a sample and send that off rather than having to give your colony a frame of, quote, wasted space to make drones and then just have to go back and look and be like, oh, do I have more than one frame of drones?

Let me do something about it now. Because, of course, when we talk with beekeepers about this, they're like, this is the most impractical thing ever. And I'm like, yeah, I haven't said it's practical yet. I promise.

Jamie

Yeah. So, Ashley, that's one of the things I think, you know, we've got a lot of beekeepers from around the world listening to us and they're always looking for that applied angle. What can I gain from this? But sometimes it's like projects like this that start you off in the right direction that ultimately lead to that information. So, I think you've talked about this being a lot of student work. You've got a lot of ideas and more questions and answers. So, I'm assuming you guys have some follow-up projects planned?

Dr. Ashley Mortensen

I mean, I have follow-up projects planned, I just also have to get the funding for follow-up projects planned.

Jamie

Of course, spoken like a true scientist.

Dr. Ashley Mortensen

I mean, I have an indefinite number of projects planned, Jamie.

Jamie

So, Ashley, that's fascinating. You've respiked my interest in drones. I mean, I know they're not just those lazy guys that only have a mating purpose. I'm sure there's some great value to it. Maybe that will be one of your lasting legacies is allowing us to be more sympathetic to this bee in the hive that doesn't get a lot of positive press, right? So, thank you. Thank you for continuing to work on this topic. It's really interesting. I can't wait to see where your team heads with this.

Dr. Ashley Mortensen

Thanks. Yeah, it's really fun. So, it's exciting to get to share it with people and just have a bit of time enjoying the novelty of it instead of worrying about where to go next.

Stump the Chump

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

Amy

All right, welcome back to the question-and-answer segment. We have something unique going on the next three or so Q&A's. We're going to do a three-part series on OA, oxalic acid. And the reason we're doing this, to be quite honest, is because we have our specialist, Dr. Cameron Jack, on with us today. Hello, Cameron.

Dr. Cameron Jack

Hello, thanks for the invitation. I'm more nervous than ever to answer specific OA questions.

Jamie

Today you are the Chump, Cameron, that everybody's trying to stump, so good luck with it, man.

Amy

That's exactly right. That's what I was going to say. Cameron, we've actually brought you on today because you're the, you're going to be the Chump, or people are going to try to stump you.

Dr. Cameron Jack

I feel like I should be more used to being a chump, but I'm still quite sweaty over here.

Jamie

Cameron, we get so many questions about OA, and Amy and I just kind of had these questions on our list for a long time and we're like, you know, Cameron knows about this stuff, so maybe we should just ask him to join us on two or three Q&A's in a row. And we've got a ton of OA questions. So, we're like, hey, let's just make it a three-part series and you be the guy who helps us out with that.

Dr. Cameron Jack

All right, well, I will do my best.

Amy

OK, well this is the first of the three-part series. The first question that we have today, Cameron, is that this person has heard of experimentation using oxalic acid with glycerin on a sponge. Is this to prolong a treatment period? Why would someone do that and what are your thoughts on this?

Dr. Cameron Jack

OK. So, yes, you're right. The reason somebody would use oxalic acid, mix it with glycerin, put it in something like Swedish sponge is to prolong the period of treatment.

Oxalic acid definitely can be effective at controlling Varroa. The thing about it is when it's applied according to the label, it breaks down very quickly. So, it's like a good flash treatment. So, people have been working to extend it to basically make it an extended release treatment that will last a bit longer.

So, now, there are different products that are legal products that are being released out there, such as VarroxSan, which is, again, kind of using glycerin as a carrier to kind of make a slow release, kind of a treatment. People kind of before VarroxSan had been also experimenting with this and using this in their colonies into a Swedish sponge.

So now that there is a safe, effective treatment in the United States with VarroxSan, and then other countries have also other products like Aluen Caps. And so now that there are some other products out there, people really should be using what is, you know, labeled in their countries and using these treatments according to the label.

But yeah, the idea of it is to make it an extended-release product. I have kind of mixed feelings about this. Actually, I am thrilled that there are products now that can be used to make oxalic acid effective over a longer period of time. My only hesitation, maybe, I would have with something like this is because, you know, right now we do not have any resistance to oxalic acid that has been reported around the world, and it's been used for a long time.

And I think part of the reason for that is because OA has always just been such a flash treatment. It's there for, you know, a few hours and then it's gone. But the way that we're making this, if we just get over reliant on these extended-release OA treatments, then we definitely still have, probably, a greater likelihood of Varroa developing resistance to them. So, we just need to be judicious and smart and not just over reliant on one method or one treatment for controlling Varroa.

Jamie

Cameron, I love that you said follow the label. We didn't even prompt you beforehand to say that, so it's nice that you said that.

Dr. Cameron Jack

It’s tattooed on my chest.

Jamie

Good. I'll just take your word for it.

Amy

We're learning so much about Cameron.

Jamie

We should have had you on earlier, Cameron.

Amy

I know. We've known for you for how long and learning about this just now.

Dr. Cameron Jack

I don’t show it very much.

Jamie

Yeah, that's on your chest and OA is on your back, right?

Dr. Cameron Jack

Not my proudest moment.

Jamie

All right, so next question. 4 grams of OA treatment. Now, again, only can follow the label, but how long does it last as an acid vapor in the hive? The questioner said, is it 2 hours, 6 hours? Do you have any idea how long OA, when vaporized in the hive, lasts?

Dr. Cameron Jack

Yeah. OK, so this is maybe me being a little bit of a chump. I have an idea here, but I don't know exactly, you know, at the molecular level, like, how much of this OA breaks down over time. I do know that we have done some trials where we put in sticky boards to measure the mite fall after we apply, and we've done those in 24-hour increments, and we'll see the biggest drop within 24 hours, a little bit after 48, and then a little bit after 72, but basically nothing after 72. And so, you know, applying OA as a vapor like you're describing here, the beauty of it is it coats kind of everything on the inside of that hive, but it just doesn't last for too long. So, I don't really know kind of less than 24 hours how long it's lasting.

My guess is probably it's not super long just given what we have in terms of mite drops. It's probably in the first 12 hours or so is where it's doing the vast majority of dropping the mites. But I just haven't really gone into that level of detail yet to look for it.

But we know that OA is very water soluble, especially where we're here in Florida with high humidity. Especially in the summertime, you know, I bet that it's starting to break down rather quickly. But we know that it works. The OA vapor is really going to work the most effectively in the first 72 hours and then after that, the treatment is essentially gone.

Amy

All right, So, for the last question of this series, Cameron, I've not heard of this one before, but some people will spray packages with an OA sugar solution. So, they'll spray with plain sugar solution at first. So, then they go through and I guess spray with OA. First of all, is this legal? And second of all, do you think this is an effective treatment?

Dr. Cameron Jack

Yeah, so, good question, and it is a legal way to apply oxalic acid to packages. I mean, it is. Originally, when the EPA released kind of the emergency use permit for oxalic acid, they mentioned this specifically, spraying away sugar syrup to packages as a method of treatment. So, it does work.

It's not super ideal in my opinion, because you still have to spray a decent amount on these bees in a concentrated area, and you'd still have to kind of bounce them around a little bit, I feel like, to get enough of a drop for the mites. You just got to make sure those bees inside the package are coated.

And it's not super easy to get to all of them when they're all kind of bunched up in a package. So, yes, it can work for sure. It's not my preferred method of using OA, and I don't think it does a really great job given the other options.

Even just, you know, trickling on full hive or vaporizing the hive or using any of these extended-release or using the extended-release treatments like VarroxSan or Aluen Caps. They're going to do a better job than just applying it to packages. I do know some beekeepers that will do this as they purchase packages and kind of bring them into their apiary.

They just want to try to get them off on the right foot and make sure their packages are clean before they get them installed. But I feel like your bees, after shipping and stuff and transportation, they're already quite stressed. It's just not usually something that I would recommend unless they really had levels of concern.

If you're in an area, a part of the world or something where you're very isolated and you don't have, you know, a lot of Varroa in your area, then maybe that's something you would do. I just don't know that it's worth it, at least where we are, where we have high reinfestation rates with Varroa. So, you might as well get your bees set up and help them get established and then start worrying about Varroa.

Amy

I think that's fair. Well, this was a very fun OA set of questions. Stay tuned for the next two that we're going to have as part of the series. And of course, listeners, when you have questions, if you have follow-up questions, maybe we can give Cameron even more series of OA. So, you know how to find us, you know how to ask us questions. Don't forget to send us a question on either e-mail or one of our social media pages.

Dr. Cameron Jack

OK, well thanks for having me on.

Amy

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

Jamie

Visit the UF/IFAS Honey Bee Research and Extension Laboratory's website, UFhoneybee.com, for additional information and resources for today's episode. Email any questions that you want answered on air to honeybee@ifas.ufl.edu. You can also submit questions to us on X, Instagram,

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