Episode 5_Final_mixdown PROOFED

Thu, Sep 08, 2022 9:48AM • 54:00

SUMMARY KEYWORDS

control, plant, bees, brazilian, honey bees, invasive species, beekeepers, humberto, invasive plants, florida, pepper, people, jim, colony, issue, insect, combs, years, invasive, population

SPEAKERS

Dr. Boncristiani, Amy, Guest, Cameron, Honey Bee, Jamie

Jamie 00:05
Welcome to Two Bees in a Podcast brought to you by the Honey Bee Research and 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 episode of Two Bees in a Podcast. I am your host, Jamie Ellis accompanied by co-host, Amy Vu. Amy, sup?

Amy 00:55
What's going on?

Jamie 00:57
Not too much. We're doing a podcast. That's what's going on. Where have you been the last five minutes as we prepped for this?

Amy 01:02
I don't know.

Jamie 01:04
Anyway, Amy and I hope to lead what we believe is going to be a good episode for you today. We have a couple of segments, the first of those being with Dr. Humberto Boncristiani, our very own Applied Research Specialist here at the University of Florida. We are going to be interviewing him to discuss colony dead-outs, what they are, what to do about them. Our second segment is going to be equally intriguing. We have this issue as beekeepers where our bees, our honey bees, that bee that we love to keep, goes and collects nectar and pollen from a lot of different types of plants. Sometimes those plants are invasive species. So we have brought to our episode today Dr. Jim Cuda, who's a professor of entomology at University of Florida who's an invasive species specialist. And we're going to be talking

to him about pollination of invasive species, honey bee perpetuation of invasive species, and all of the issues at that interplay between those two issues. And we will conclude today's episode with a segment of questions and answers, and I'm sure all of you believe, really, it's just Stump The Chump.

Amy 02:11
But that's part of the podcast really.

Jamie 02:13
Who's the chump?

Amy 02:14
I don't -- not me.

Jamie 02:15
Not it. I think you got me.

Amy 02:17
So how many followers and listeners do you think we have by this point?

Jamie 02:22
I don't know.

Amy 02:23
Ten million?

Jamie 02:24
Easily. I know there's like, what 7 billion people...

Amy 02:27
I'm really bad at math.

Jamie 02:28
At least half of them are listening to us right now. Alright, so guys, don't worry. We're going to clean up our act a bit and go into these topics that are of great relevance to you. So thank you for joining us today. We are happy to tell you now that we are accompanied by Dr. Humberto Boncristiani. Hey, Humberto.

Dr. Boncristiani 02:52
Glad to be back.

Jamie 02:53
All right. Humberto is here to discuss dead-outs. It's a scary term, right. So a dead-out?

Dr. Boncristiani 03:07

Yes.

Jamie 03:08
Well, that was weird. It's a weird phrase, right?

Dr. Boncristiani 03:10
What is the dead-out?

Jamie 03:11
What is the dead-out, Humberto?

Dr. Boncristiani 03:13
Dead-outs are colonies that die in a beekeeping operation. And normally, people don't know exactly why, and they need to handle with that.

Jamie 03:21
Yeah, it is totally a term that you hear beekeepers talk about all the time, especially sideline to commercial beekeepers, you'll hear "We had so many dead-outs, and we're not sure what to do with them, what to do with the equipment," etc. And so you mentioned Humberto, one of the keys to a dead-out is something killed them but you're not quite sure what.

Dr. Boncristiani 03:40
Well, yeah. Lots of times the colony dies and the beekeeper doesn't know exactly why. And there's always that big question in the air, what's going on? Is whatever is going on in that hive is going to spread to the other ones? What am I supposed to do with this hive? Should I burn? Should I freeze? Should I treat with something? So like things we're doing?

Amy 04:04
So when people are talking about die outs, Humberto, what's happening there?

Jamie 04:10
Amy, it's a dead-out.

Amy 04:13
I understand that. But do they go up to their colony, open it up and just find a bunch of dead bees on the bottom or are they finding any bees? They left? What is it actually? What does it mean? What are and how are they defining a dead-out?

Dr. Boncristiani 04:29
Well, a dead-out is a colony that you open the hive and it's everybody's dead, or a beekeeper can see just a few amount of bees that we [know] for sure is going to be dead in a couple of days.

Jamie 04:40
Is it possible that you can go into a colony and find no bees? Does that also qualify as a dead-out?

Dr. Boncristiani 04:45
Yes.

Jamie 04:45
I mean, so basically the absence of all bees, or the presence of exclusively dead bees is a dead-out?

Amy 04:54
It's a pretty general broad term.

Jamie 04:56
Yeah, it's just dead. This segment is now over. Now, that was clarity for you, Amy. All right, so Humberto, what's confusing to me is one of the things that you said earlier though, is you said essentially the bees are dead or gone right? Which we assume that means they're dead too. So, but a beekeeper doesn't know what happened, often. You didn't say that it's always the case. But it's often the case that a beekeeper didn't know what happens. How in the world with someone not know what happens?

Dr. Boncristiani 05:26
Well, beekeepers cannot be observing the hives every single day. When the hives are in the field, they're exposed to many different variables, to many different pathogens, or different environmental factors that can affect the health of the colony. When beekeepers go back to the yard and see one of those dead there is always a question what happened here? And it's very hard to make sure of things.

Jamie 05:51
Yeah, I think that's absolutely hitting the nail on the head, right? You're not in your colonies every day. And sometimes it's every week, sometimes it's every other week, depending on season, right? You go back two or three weeks later, you find these conditions that are what we would call a dead-out but you scratch your head and not sure what caused it right?

Dr. Boncristiani 06:09
It is hard, it could be somebody spraying things around, could be some pathogen in the region could be a bear.

Jamie 06:18
That is so key, Humberto, the first thing that you said was it could be someone spraying which of course alludes to pesticides. In my experience, when someone has a dead colony and they can't explain it, that's almost always what they default to is believing that it was some sort of pesticide kill. That's true. And I tell people that we really need to set the bar high for what we're willing to accept as a pesticide kill. There's a big checklist of things I like to go through first and say, well, did this happen, did this happen, did this happen? Because to me, a lot of those other things are actually more likely causes, so in addition to pesticides, and some of the weather issues that you might have noticed, what are some other things that can lead to a dead-out? What can cause a dead-out?

Dr. Boncristiani 07:02
Pathogens, for example, mites, or all these factors combined can create a situation that the colony is going down.

Jamie 07:11
Yeah, I think one of the head-scratchers for beekeepers is when you find dead bees, it's a little easier to maybe do some thinking about what killed them. It's when you find no dead bees, that people start getting really mysterious with their description, right? That's what came up with Colony Collapse Disorder. But it's really just dead-outs that we've had for a long time and that we can't really explain. Correct. So is it really possible for mites and pathogens to take bees down that fast?

Dr. Boncristiani 07:44
Yes.

Amy 07:44
Did you guys see my social media post on Facebook? There's a video that I added and I had shared it from someone but it goes into slow motion of this Varroa mite. Two of them are on this bee, and it just takes one little thing to just have been passing by, just passing through and just jumped on to the second bee and it was such a quick thing that was happening.

Jamie 08:08
That's the thing I struggle with though, with this concept. A lot of beekeepers, I was just in there a week ago, and I came back and now everything's weak or dead or dying. And I just struggle with this idea that colonies can collapse that fast. But I think they do.

Dr. Boncristiani 08:25
They do and people avoid to see the fact that a mite is a problem. If you do not keep an eye on it. You're gonna have problems.

Amy 08:34
Yeah, there are lots of different factors into a dead-out. You've been doing a lot of research on how to handle dead-outs. And that's something that the commercial beekeepers really wanted to see you focus on. So do you want to talk a little bit about what you've done as far as research?

Jamie 08:50
I think that's key. If you think about it, commercial beekeepers lose their bees, but don't want to lose the hive, and they're coming to you. And if you don't know what's killed the bees, you're scared, right? Should I reuse this equipment? Is it going to be safe to future colonies? How can we clean this? And that's what they came to you asking, right Humberto?

Dr. Boncristiani 09:08
Yes, beekeepers came to me as for solutions for them. Because if the people at home doesn't know wax is one of the most expensive thing for the bees to build up. And beekeepers want to reuse the equipment and the wax from those frames. So we need to find ways to reuse safely. So beekeepers

reached out and asked me to find different solutions. So here in the lab, we are testing different compounds now to see if we can clean that in a safe way. So testing different kinds of compounds, testing on the bees to see if it's safe to the bees, to see if the queen is still laying in those environments. So we're doing different kinds of test to make sure we're going to provide information for the beekeepers.

Amy 09:51
And of course you're trying different methods that would be applicable to beekeepers.

Dr. Boncristiani 09:56
Yes, everything I do is applicable and we're gonna have a solution for beekeepers soon.

Jamie 10:01
But even beyond your research Humberto you know this is an issue that people have tried to address for years. Since 2006, since Colony Collapse Disorder, or CCD, or what now everyone calls colony losses, since that happened, you know people have really invested heavily in research. I see regularly a paper here and there on radiation, irradiation of equipment, I've seen people try to use ozone to sterilize wax. I've also heard of heat sterilization, you're looking at it more from a chemical perspective.

Dr. Boncristiani 10:32
Well, I like to talk [from] a beekeeper perspective, because it needs to be something - I work for commercial beekeepers. So it needs to be something fast and easy and not costly. So that's why I'm focusing right now to find different compounds make it very cheap.

Jamie 10:50
Umberto, that is so key, right? Because irradiation works. But you usually can only irradiate a small amount at a time and it's costly.

Dr. Boncristiani 10:58
It can cost $20,000 a year in a commercial beekeeper operation.

Jamie 11:02
Yeah, and the efficacy of ozone is not that great. And you have to have a really good generator and a really thorough saturation. So really the stuff you're looking at is, is hopefully practical and ethical to beekeepers in the field and low costs. I think that's key. Usually, what I tell beekeepers who ask, "Can I reuse equipment?" I say, usually, that most of the time you can. I work under the assumption that whatever killed the bees is likely not able to survive without them. Of course, there are some exceptions. American foulbrood is one of those right? You really just need to burn colonies. But fortunately, you can look at the combs and see if it was American foulbrood. We'll talk about that in future podcasts. However, maybe pesticide residues could be a reason that people didn't want to reuse equipment. But pesticides have half lives. So I always tell people, maybe, perhaps, most of the time you can, but how stable are viruses and some of these other pathogens on comb, in the absence of bees.

Dr. Boncristiani 12:02
Viruses are very stable. They were built to survive in their environment until the next bee passed around or they have some level of toughness. Let's put it this way.

Amy 12:16
Do you have a time?

Dr. Boncristiani 12:19
That's, that's hard.

Jamie 12:21
Let's say you're a commercial beekeeper. You go into an apiary that has 30 colonies and they're all dead. And you just assume it's not pesticide related and you've checked your boxes and there's no clear evidence of American foul brood. When would you be comfortable reusing that equipment in the absence of some sort of treatment that you applied to sterilize it?

Dr. Boncristiani 12:44
Oh, that varies depending on the organism, like you just mentioned that you said, In absence of American foulbrood. This is the extreme case the spore forming bacteria, they can stay for a long period of time. But other organisms can stay pretty long time. Viruses is complicated because it's correlated independent of the transmission by Varroa the virus in the comb itself. There is not much data is still showing that bees can get viruses directly from recycling wax, for example. But we don't know what happened with those viruses in wax. So it's always good to keep an eye open on this thing.

Jamie 13:23
Can I ask a dumb question? This is truly because I don't know the answer. You know, the sun is a powerful sterilizing agent for many pathogens. Is it possible to just open the box and expose all the combs to solar?

Amy 13:36
Right? Yeah, they do like solarization on soil? Sure. Yeah.

Dr. Boncristiani 13:40
I would say that would help a lot. But I would not close my eyes to the possibility for some of these organisms to be evolved to be protected against that.

Jamie 13:50
What about freezing?

Dr. Boncristiani 13:51
So freezing, we know that works for a couple organisms, like eggs of small hive beetles can be killed with freezing but viruses? We put them in a refrigerator to keep them alive. So freezing doesn't work with viruses.

Jamie 14:07
Well, Humberto, you have been a great guest as we talk about dead-outs. This is an issue that must be addressed. It's a widespread issue around the world to beekeepers, and I appreciate you looking at it and I look forward to seeing how other scientists are addressing it too.

Dr. Boncristiani 14:20
Happy to be here.

Jamie 14:21
Thanks, Humberto.

Amy 14:22
Thank you.

Honey Bee 14:23
For more information about this podcast check out our website at www.ufhoneybee.com

Jamie 14:32
Welcome back to Two Bees in a Podcast. I'm your host Jamie Ellis accompanied by co-host none other than the Cameron Jack. Hey, Cameron.

Cameron 14:41
Thanks for having me.

Jamie 14:42
Anytime. Well, you know you're a co-host so you can come anytime you want to, right Cameron?

Cameron 14:47
Glad to be here.

Jamie 14:47
All right, fantastic. Well, Cameron we have a really good segment here. We are accompanied by professor and Fulbright scholar Dr. Jim Cuda. He is a professor here at the University of Florida Entomology and Nematology Department. Welcome, Jim. It's great to have you.

Guest 15:03
Good morning, guys. It's so nice to be here. I appreciate it.

Jamie 15:06
Yeah, Jim. So the reason we brought you in to our podcast today is because we need to discuss a topic that is a little bit difficult. When we mentioned this around beekeepers, we almost always get dirty looks. And the topic is this, beekeepers, we are all aware that our bees forage from a lot of plants out in the environment. Sometimes those plants are invasive plants. And there are occasions across the US, and the world for that matter, where invasive plants are important nectar resources for honey bees, or

important pollen resources for honeybees. So from our perspective, bees benefit significantly from these things. But on the other hand, we're the minority, a lot of governments, local officials, individuals, various environmental organizations, etc, obviously, want to control a lot of these invasive species. So we find ourselves here kind of at this interface, where there might be management strategies put in place for a plant that is otherwise very important to the beekeeping industry. And so Jim, you're here, because we have an example of that here in the state of Florida, then we're going to talk about that we're going to talk about more examples across the country. And I'm just going to let Cameron lead off on the questions as we kind of dive into this very issue, this interplay between honey bees and invasive plant species, Cameron?

Cameron 16:28
Sure. I think probably most of the people listening maybe are at least a little bit familiar with invasive species, but can you give us just a simple basic definition of how you would define an invasive species?

Guest 16:41
Well, in my view, invasive species is kind of any organism that does not occur here naturally. It's been brought in either by humans directly, or it's something that migrated here. But it does come to our system. And then once it gets here, it generally comes through without the natural enemies that normally keep it in balance, in its native range. So what it does is it takes the resources that are available, it maximizes its growth, and it basically starts to displace the native species.

Jamie 17:11
So that's an important thing. So not everything that moves outside of its introduced range would be considered an invasive species.

Guest 17:19
No, there are some that come here, basically, that probably would not be an issue. But some that do come here, like Brazilian peppertree, for example, they have the reproductive strategy, such that they produce a lot of these berries that are dispersed by birds. And once those birds get a hold of those berries, that's when it starts to spread. And I think, it's that interaction between our native bird populations or native mammal populations, once they start feeding on those berries, then things start to explode.

Jamie 17:49
So listeners, what Jim's referring to is we have an invasive species here in Florida call it Brazilian pepper, and it's a plant that occurs on the southern half of the state. We're going to talk about it in great detail with Jim moving forward. But this idea is that a lot of things can come into the US or escape their native range and not be invasive. They're just there, but not necessarily a threat. But in the case of invasive species, they're displacing native species and causing sometimes environmental and even economic damage.

Guest 18:15
That is correct. Like Brazilian peppertree. I would say currently, there's about 700,000 acres established here in Florida. And what's happening now that you have like state and federal agencies,

for years now, have been trying to manage it and keep at least in check. Now, like you said, currently, the population is probably restricted to Central and South Florida. But over time, we've seen it along the coast, we have it as far up in Franklin County in the panhandle, we've have it as far north as Brunswick, Georgia. So along the coast, where the temperatures are kind of moderate. But what's going to happen, I think, if you subscribe to the idea of climate change, as things warm up, it's very possible this whole thing could move further north. We've done some research along those lines, looking at some modeling, niche modeling that showed yes, in fact, based on the types of gene, the genotypes that we have here, that's another issue I can get into as well but the genotypes we have now are sort of like pre adapted to move north.

Jamie 19:15
So Jim, Cameron asks, what is an invasive species? But really another thing that people struggle with is why should the general population care? I'm going to ask as a citizen and not as a scientist, I know the answer to this question, but why do I care if Brazilian pepper is all over the place in South Florida? It's not hurting me. The price of my food hasn't gone up, my gas prices haven't gone. Why should I care?

Guest 19:37
Well, I would say something like Brazilian peppertree and perhaps other invasive plants and maybe even animals as well. 40% of our endangered species are affected by invasive species, they pose a serious threat. So now you have native populations that are at risk already. And you have some other organisms coming in like Brazilian pepper or some other invasive species, and now they start to move in, particularly some of the threatened plants. And we lose that biodiversity, period.

Jamie 20:06
That's important because when people talk about loss of biodiversity, you don't know really what you have in a population. There's all potential, just looking at it selfishly from human perspective, there's potential human uses for plant and animal species that we don't know that we can use them yet. So to lose those things would be a travesty. Bu also just environmentally, it can be detrimental to lose species. Entire ecosystems could fall depending on a species that falls.

Guest 20:32
That's correct. That's great. And I remember not too long ago, I happened to go to the museum here, and they had a display of a mount of the last passenger pigeon, here. And I'd read about it for years, and basically, to see something like that, to see it was the last one had died in the Cincinnati Zoo. And to see it and say that, for what? At one point in time they blackened the skies. It's just, it's heartbreaking, really.

Cameron 21:01
So do we, in your opinion, should we spend the money and the time to control the invasive species? I mean, is it beyond our reach to even control some of these?

Guest 21:14

Well, I've heard people say, we're part of a global community now. And things are just going to move and say, why should we care? Well, again, I think because we don't really know, a priority, what the ultimate effect of something like an invasive plant when it comes to how bad it could be, or an invasive insect. And so what would happen to our native flora and fauna once these things get here, I think we'd be hard pressed not to do something.

Jamie 21:45
You know, Jim, I'm a taxpayer. And most taxpayers who aren't thinking about these things probably would not struggle with the idea. Yeah, it's fine with me if a few of my tax dollars go into controlling invasive species, that's fine, and most people are oblivious. But there are times that of course, this is a honey bee podcast, there are times where the control of an invasive species while monumentally a good idea can hurt a particular segment of the industry, or the population. In our case, it's beekeepers. Let's dive into this Brazilian pepper idea. Brazilian pepper for beekeepers in Florida is a very important honey plant. Beekeepers move their bees from all around the country to get this plant and the reason it's quote "so good" for honey bees and beekeepers is because it blooms at a time of the year, kind of August / September ish when there's nothing else really available for honey bees. So as a result beekeepers move their bees down to South Florida in droves because there's this abundant honey crop. They may not be so palatable, it's not a great tasting honey, but it's marketable. Or they can build up their bees and prepare their bees for winter. So while in theory, most people on planet Earth are probably okay with resources going into controlling an invasive species. We've got this one segment in Florida, that says wait a minute, this is an important crop for us. And for you listeners who aren't from Florida, don't worry, Cameron and I are going to expand this discussion to include other examples. But we want to use Brazilian pepper. Jim, since we have you we want to use Brazilian pepper as a case study to explore this specifically. So tell us a little bit about Brazilian pepper. You've already mentioned it. When does it bloom? Where did it come from? What has it been doing specifically in the Florida ecosystems?

Guest 23:26
Okay, Brazilian peppertree is native to South America: Brazil, Paraguay, Argentina, and in Brazil, primarily which is the source of our Florida Brazilian peppertree occurs along the coast, all the way from northern Brazil down to southern Brazil. And what's made it kind of interesting is that we discovered, because we couldn't rear some of our insects that we were studying, that we had two separate introductions of Brazilian peppertree here in Florida, and we were able to track this genetically. I think you know, with the molecular tools we have now, we were able to discover that one source came from southeastern Brazil. And of course, if you think about that, southeastern Brazil is furthest from the what is it?

Jamie 24:13
The equator?

Guest 24:17
Thank you, the equator. It's further from the equator. So that means it's in a cooler environment. Then we also had some from Northeastern Brazil. And that obviously is more adapted to the tropical area. So now we have two genotypes that are separated in their native range by over 800 kilometers. They were

brought here into Florida. One was around Punta Gorda on the West Coast, which was the the one from southeastern Brazil. And the other one from Northeastern Brazil was introduced into Miami, and these are all current. I think the one in Miami was around 1890s. So not far back. And then the one in Punta Gorda was 1926. So it's a little more recent, but again, once they got her the The plant is insect pollinated. So now they basically started to hybridize. And now what we have are these novel genotypes and again because we have these novel genotypes, this gives rise to what we believe is hybrid vigor. And we have some data from the field to show that, yeah, the hybrid actually produces much more viable seed, and even those that survive are actually much more vigorous.

Jamie 25:25
That's incredible. So the plant that was produced from the cross is potentially more invasive than either one. We see the same thing with African honey bees. We've got this hybrid vigor between the European stocks and the African stocks that created this hybrid bee the Africanized bee that's very good at taking over entire ecosystems.

Guest 25:41
So anyway, so once we had it here, it basically got spread throughout the region. And over time, like I said, the bird population particularly robins, were instrumental in dispersing it. Now, you have to think about when this all was happening. Why is Florida so prone to this sort of thing? Well, we have a mild climate, we have disturbed landscapes, we had a lot of construction going on during the 50s, and that's when Brazilian peppertree really started to become a serious problem, in the 1950s. And if you look now, when you drive along the interstates, toll roads, you can see Brazilian peppertree along the highway underneath the power lines where the birds sit, robins and such. So again, it's been a really incredible problem that, again, fortunately, up here in Gainesville, we don't have to deal with it that much. But I think it's just a matter of time.

Jamie 26:39
But surely the state has assigned some sort of economic value to the losses. They're not just saying, "Oh, we have a lot we need to control," they are basing this on a decision, right?

Guest 26:46
Well, absolutely, because again, it displaces, obviously, native species. But one thing is interesting about Brazilian peppertree, I don't know if it's a big issue now, but it also contributed to other invasive species problems. Things like the diaprepes root weevil, which was a major pest of ornamentals, and citrus. Of course, citrus has its own problems. But when you have a large population of Brazilian peppertree, now you increased the population of the diaprepes root weevil, which is another invasive pest. So you have this environmental or ecological flow out of that.

Jamie 27:18
Oh, wow, that's interesting. I had not heard that.

Guest 27:20

So now you have those. So then, Brazilian pepper, it gives the diaprepes root weevil, and if you increase those populations, you got a greater threat on ornamentals, and citrus because of the diaprepes root weevil.

Jamie 27:29
So we need to control it. Can you tell us a little bit about your research looking at control and the history of control and what people are doing now? I mean, this the reason we're interviewing you because something's been released to control it, and beekeepers are up in arms. Let's talk about that.

Guest 27:42
Well, I've been working with Brazilian peppertree biological controls since about 1998, when I first started in my current position here at the University of Florida. And at the time, we were studying about three different insects with defoliating. I guess it was called a soft fly, the thrips, which is now currently released, and we were trying to study, I think, a moth, which actually was released in Hawaii. So again, let me just back up and say that Brazilian pepper is not only a problem here in Florida, but it's a problem in Texas, California, and also Hawaii. Now, Hawaii actually started a bio control program in the 1950s. And they released this one moth that I was very much interested in because it's been established in Hawaii since the 1950s, but didn't do quite well there. And the reason being is that we discovered that Hawaii was like this magnet for biological control of agricultural pests. Over the years, they took a big interest in using insect bio control pests, parasites and predators to control some of their agricultural pests. What we found out also, doing the literature search was that some of these spilled over onto the the insect that was released during a control Brazilian peppertree. So it dampened its affect. Again, we tried, we studied this insect and we tried to get it released here because we felt like it's already been established in a new environment and didn't cause any serious environmental impacts, because it was only attacking Brazilian peppertree. And in fact, there's a native species of a plant that's very closely related, or at least in the same family as Brazilian peppertree in Hawaii that was not attacked at all. So we felt like there was some evidence of some sort of inherent specificity there. And back then, in the 50s, in Hawaii, they were only concerned about agricultural pests. They weren't concerned about native plants, or threatened and endangered plant species that could be at risk like we are today.

Jamie 29:38
So Jim, you're using the word biological control a lot. So let's back up ahead and set the stage for the reader or the listener. So you've got this threat. You got Brazilian pepper, there's multiple ways you can control it. What is biological control, we'll get there. One way is mechanical. You just physically go chop those suckers down and push them away. A second way is you can herbicidally control. You spray a lot of compounds out in the environment, we're gonna talk about biological control. Are there any other types of control for invasive plant species? Or mechanical, herbicidal, and biological?

Guest 30:08
To my knowledge, I don't think so. Those are the big three. And what we try to do is try to integrate them in such a way that you can basically combine them. So they kind of complement.

Jamie 30:18

You're kind of an integrated pest man. So I said biological control, could you define biological control for the listeners?

Guest 30:24
Okay, biological control, and again, there are a lot of different types, but I'm gonna talk about what's called classical or importation biological control. This is where you basically discover an organism in the native range where a Brazilian pepper came from, identify potential organisms that, let's say, are feeding on the plant, or in case of a disease attacking the plant and infecting the plant. You look at those and you say, Okay, we want to introduce those into this country. So basically, classical biological control is reuniting the plant pests here with its natural enemies that occur in a native range. It's as simple as that trying to find the ones that are specific to that target weed, in this case, Brazilian peppertree, testing it to make sure it's only going to attack Brazilian peppertree, and then getting approval for release, and so on.

Jamie 31:12
The way I usually teach biological control is everything that is alive has something that makes it sick, or tries to eat it, and if you can find that something that makes it sick, or try to eat it, and rear it up and release it, you can hopefully get an attempt at controlling that something.

Cameron 31:27
And biological control probably is not a very fast process most the time.

Guest 31:33
I'm glad you brought that up, Cameron, because as I recall, when you first came to Florida, you invited me to one of your beekeepers meetings.

Jamie 31:39
I did that's right. It was a big issue back then, they heard rumors that University of Florida was going to release things, and so we had you come speak.

Guest 31:45
And I was glad that you did that because what I try to tell people is that if you look at the other control technologies, mechanical, okay, that's immediate. I mean, you go in there, one day, 24 hours later, all the Brazilian pepper is gone. So now if you had bees interested in those plants, forget it. Yep, they're done. Chemical control is a little slower. And it's more of a temporary control. But even with that, depending on the herbicides, and you're gonna get some death fairly quickly, probably within the season, the same growing season.

Jamie 32:18
But if you think about too, Jim, chemical controls, not so palatable to the to the citizens of the US there are a lot of people are like, "Oh, gosh, you're broadcasting herbicides everywhere."

Guest 32:26

And then, of course, some of these herbicides, and not so much that herbicide itself, but maybe some of the carriers, some of the surfactants, maybe affect bees, etc. But what I also try to tell people is when you have something like a biological control agent, it takes years and years for them to build up populations really start to be high enough to really start to seriously affect the performance of the plant. And I think there is absolutely no case that I'm aware of where a bio control agent actually totally eliminated a plant, it can't do that. Because what happens, because the populations of the bio control agent are so closely tied to the population of the plant, eventually, the population gets so low, that would basically escape, essentially, the effects of the bio control agent. So the bio control agent dies, right, you have that lag, and then eventually the plant starts to come back. So there's always going to be a reservoir of let's say, Brazilian peppertree plants around.

Jamie 33:22
I think that's a really important point because when, we're going to talk specifically about the release in a second, but when you and your colleagues released stuff for the control of Brazilian pepper, we were always getting phone calls and emails, because they thought essentially, these things were going to obliviate Brazilian pepper instantly. But if I understand you guys correctly, you're only expecting a relatively specific biomass reduction, but over the next 15 or 20 years, right? It's not like BP is going to disappear tomorrow. There's going to be a transition time. Could you explain, what what did you release? And what is that transition time?

Guest 33:58
Well, we released one of two insects, the thrips, which surprisingly, and this is kind of interesting story as well, was released first in July of this past year down in South Florida, Broward County, and then later in October in St. Lucie County. Now, as I said, I started working with this thrips, a thrips, in 1998, when I first got here, but as we discovered over time, is that because of the genetics of the plant, we didn't understand it at the time. We also found out as we started to really get into the genetics of the plant, that there's also very cryptic species of the thrips that are associated with these plants, and the one I was working with at the time, it was specific to Brazilian peppertree. But it didn't perform very well on the Brazilian pepper trees we had here. It wasn't until I said we discovered the genetics of plant that we can go back and really match a thrips that was very specific to the Type A or type B that we have now here. And now not only is this specific but it's gonna really reproduce well on these current Brazilian pepper trees. So, and again, once it was happened to release them, takes time for them to build up and eventually the plants will be impacted. And you can see this now with things like Melaleuca, air potato, that was a very quick one air potato. Everybody had air potato problems in fact, they do still do in some areas. But once the beetles were released, in a matter of about five years, we don't have air potato anymore.

Jamie 35:30
But that's kind of an extreme example. That's a bigger success. So for you listeners out there again, this is a Florida story Brazilian pepper, but this is not a Florida issue. Cameron, it's again, this issue. There are other invasives that honey bees visit that beekeepers use for honey production purposes. There are other species out there that are subject to biological control and beekeepers, in those respective areas are essentially having the same issues that we're having here in Florida with Brazilian pepper.

Cameron 35:57
Really, everywhere that I've lived, I've seen this issue. I grew up in the South, well really Southern Nevada, where tamarisk is everywhere. So tamarisk is also called salt cedar, it grows in river areas all around Rio Grande. So it's a big issue through Texas, all the way through California, New Mexico. And so, this plant is a great nectar producer, and actually makes a really good honey. I like dark desert honeys. But everybody else is trying to get rid of it because it's a terrible invasive, and it can cause a lot of problems. And so I've seen there's chrysomelid that's been released and there's raptor beetles. And that's one instance that I'm familiar with. I also did my Master's at Oregon State University. So I was living in Pacific Northwest where Himalayan blackberries just everywhere. It's just big, thick, bushy. I liked it personally, because I want it because I'm a beekeeper and it makes a ton of nectar. And also because it made blackberries that you can just go off the street and pick up some blackberries. But it just again, it just crowds everything out. And it just makes a big mess. And it was really hard to clean Himalayan blackberry up. It was big thorny and would just grow everywhere.

Jamie 37:18
Were there efforts to control Himalayan blackberry there?

Cameron 37:19
Yeah there are. I'm not aware of any bio controls that are used for that. But a lot of mechanical controls of them kind of cutting it down, burning, a lot of herbicidal controls, and as Jim said, kind of the integrated approach of trying to use kind of all three.

Jamie 37:34
So Jim and Cameron, these problems aren't even unique to where you guys are. I'm actually from Central Georgia and the principal honey plant for me when I was growing up, was actually Chinese privet and if you go anywhere in central Georgia, that is the plant that's growing on the roadside, it's considered invasive. When I was in Europe, every time I'd go to the UK, I'd see talks on Himalayan Balsam which is a plant that grows in riverbeds and stream beds that's incredibly invasive there, that there are efforts to control that, but of course, is an incredibly important honey plant. And back to Florida, in the Panhandle in Florida. There's Chinese tallow, which some people call popcorn tree, it's an incredibly invasive plant. And I think someone from LSU, Jim, is releasing a flea beetle to control Chinese tallow.

Guest 38:17
Actually, the USDA here in Florida was involved in the actual screening. Let's see, Acacia is the genus for the beetle. But I think LSU is involved in some of that research as well. But I know there's been a lot of resistance to it. But let me go back to some, I thought it was worth thinking about this. And maybe you guys can educate me. Now, Brazilian peppertree is a dioecious plant. What that simply means is that there are two separate sexes. There are male plants and female plants. Now, they both produce flowers. My question to you is, does anybody know if bees use the male plant flowers differently than a female flower?

Jamie 38:59

Well daggum you, Jim, I was not prepared for such a good question. The short answer is I don't know. I'd have to ask my colleagues. Maybe you can find a thrip that only eats females?

Guest 39:09
Well, no, it's gonna eat -- here's the thing. We were trying to develop what's called - and I've seen this where some of the chemical control people do this.

Jamie 39:17
The plant version of the sterile insect technique?

Guest 39:19
Not sterilizing. But what we're seeing though, like you say in some places, where it's like Brazilian peppertree, obviously, occurs along the coast near mangrove forest and some of these other areas that are really sensitive that you cannot use herbicides, or if you do, you have to do it very carefully. So one of the things they've been talking about, and I think they've been doing this for a lot of years is something called matricide, where they go out and selectively only killed the female plants because obviously, think about it, if you kill the female plants, those are the ones are actually producing seeds that are possibly responsible for the spread and dispersal.

Jamie 39:50
So the female plants are the troublemakers, right? All right, just the female plants.

Guest 39:54
I'm not going there.

Jamie 39:56
Jim, I didn't go there. I said the female plants. All right.

Guest 39:59
Yeah. Okay. So anyway, we were thinking about this in terms of trying to develop an IPM. Now, if we have the insect, the thrips, and even the silver that we're gonna release later is they're not going to distinguish between the male and female. However, if you could direct your control efforts to the female plant, and, of course, if you kill some of the bio control agents that are on the female plants, so what? They still have the male plants as a refuge to maintain themselves on. So this is something we're trying to figure out, but it's going to take a little extra effort, because you'd have to go out in the fall, and you can separate male and female plants fairly quickly, fairly easily. Maybe just go out maybe mark to trees or something, or just go out there and just selectively control either how they want to control those plants or not. And I think everybody will be happy.

Cameron 40:49
Sounds like a great project.

Jamie 40:51
Maybe you need a PhD student for that, Jim?

Guest 40:53
I don't know. Something we've been thinking.

Jamie 40:57
This concept of biological control, or control of invasive species, for that matter, never really entered my mind until I was a graduate student. I did my PhD work in South Africa, Jim, you might appreciate this story. When I was there, the South African government and scientists that figure that invasive plant species were sucking up 20% of the nation's water. And so what they did is they - South Africa is a water limited country. And so what they did is they developed this program called working for water. The idea is that they would mechanically control invasive plants. In South Africa, one of the invasive plants was eucalyptus, the tree from Australia that Australians called gums, we call eucalyptus and that's, of course, an important honey plant. So they were pushing them over with bulldozers, those and other invasive plants. But the seedbed was so intense that seeds would prop up and propagate. Plants would come up for the next 20 years. So they pushed down these plants, and then they'd herbicide every year for the next 20 years. So my point is, there's biological control. There's mechanical control, there's chemical control, and beekeepers, what I'm trying to tell you, and this is not a popular message, but government scientists, regulatory agencies, they are going to control invasive species, at least they're going to try to control invasive.

Guest 42:10
And yeah, if you think from a federal perspective, in December 2016, I think President Obama issued an executive order safeguarding a nation's biota, and agricultural products, and what this did is amended the 1999 executive order issued by President Clinton that basically coordinated or mandated that federal agencies coordinate their efforts to control and manage invasive pests. So again, this is from the top.

Jamie 42:41
Full stop, period. So with that background, I think that's incredibly important. So the point is beekeepers, federal agencies are going to try to address invasive species. Sometimes those invasive species are going to be plants that are important to honey bees, not just honey bees, native bees use them as well. So I'll put that out there. However, there's got to be a beekeepers response, right. So what is that response? Well, number one, we need to tell you we are optimistic that these things are going to take a little bit of time You'll see so there'll be a period of adjustment. Number two, it's going to change strategies for feeding bees, especially in the case of Brazilian pepper, because Brazilian pepper is a plant that blooms at a time of year that otherwise feeding would be necessary. There are a lot of invasive plants that bloom in spring and maybe losing those might allow other things, we'll talk about that, but feeding bees or strategies for feeding bees or nutritional management's going to be very important when a honey plant is taken out. Secondly, one of the sales pitches is that removing an invasive plant like Brazilian pepper or Chinese tallow, or Himalayan Balsam or Himalayan Blackberry, or Tamarisk, etc, is that it opens up the ecological niche to allow native plants that are hopefully nectiferous, produce nectar, or produce lots of pollen, it opens up the environment for those to come back. So the idea is that, that maybe native plants that bees can use would rebound. The third thing that's important to remember, Jim, you mentioned this to me before we even came on the air, is

restoration having a plan in place before the control of that plant to restore the land with pollinator friendly plants. So don't just kill Brazilian pepper have a plan to replace Brazilian peppers. So talk a little bit about restoration strategies?

Guest 44:22
I think this was actually something that was brought up in one of the International symposiums on bio control years ago where its trying to be proactive and say, Okay, we don't know what's going to come back once you control invasive plant. Now, here's a good example. We've had a very effective bio control program for Melaleuca, or Punk Tree here in Florida,

Jamie 44:42
Which, by the way, is important for honey bees.

Guest 44:45
And they've had three bio control agents. In fact, of this I guess the first biocontrol agent was released I think in about 1980 something, 88/89 that was the weevil, but bottom line is, if you look around, you see Melaleuca. Now it's not doing well, if there are three agents taking it out. But you know what's coming back if you look very closely to what's moving into the areas where you're starting to have the decline? Brazilian peppertree. So again, sometimes you just can't let nature just take its course because you open up a niche, something else is gonna come at you just as bad. But you can be proactive, find like you said, identify the certain plants that are fall nectar producers, and have a plan to put those in there, start growing them.

Jamie 45:31
Admittedly, Brazilian pepper is unique because of the time of year it bloomed. It's a little bit of a struggle to figure out how to restore land and in a way that that makes up for the Brazilian pepper loss. So really, it's just feeding strategies, I'm afraid at this point, but however, some of these others that are spring bloomers. There can be plans for restoration, especially with natives, like in the Panhandle where Chinese tallow grows, perhaps things like gall berry or palmetto, things like that. Tupelo, for example, all of these are things that are native plants that are important to honey bees, and the same is probably true around the US. Well, wow, you have been an incredibly insightful guest, Jim.

Guest 46:05
Well, let me have another.

Jamie 46:06
Please do. Take another.

Guest 46:07
Okay. As I said Brazilian peppertree didn't become a problem till about the 1950s. What were the bees using here in Florida before the 1950s or weren't there beekeepers here in Florida, I suspect they were.

Jamie 46:19

So, they were, but they didn't have populations of bees as big as they do now. In fact, what's interesting is there has been a significant growth in the number of colonies moved to Florida over the past say 10 or 15 years and probably a lot of that in response to Brazilian pepper. Let me explain the system for you. One of the most important pollinator dependent plants, honey bee dependent pollinator plants, in the United States is almond. So every year about 60% of the managed honey bee colonies in the US move to California to pollinate Almonds. Almonds bloom in late January February. So Florida, specifically South Florida, provides the ideal place to move your bees to overwinter. You get a massive Brazilian pepper flow, you've got a warm climate, you can get your colony strong before you head out to California. You can't keep bees in the north and do this, because the colonies won't be ready otherwise in winter because it's just too cold. But in Florida, there's just been increasing number of commercial beekeepers who moved to South Florida to take advantage of Brazilian pepper, take advantage of the climate, and be ready to head west to pollinate almonds, and that's kind of the issue. And so you know, they feel with the loss of Brazilian pepper the rug is going to be pulled out from under them. This whole infrastructure that supports that will be gone and it's a big deal. So that's why you've been such a wonderful guest today. Listeners, this has been Dr. Jim Cuda. He is a professor and Fulbright Scholar here at the University of Florida Entomology and Nematology Department. His specialty is biological control and insects. Jim, thank you for joining us.

Guest 47:46
Thank you very much. I'll send you guys an invoice.

Jamie 47:50
We loved having you, can we have you again?

Guest 47:51
Certainly. Anytime.

Jamie 47:52
What a great insightful guest. I hope you guys enjoyed that, listening this segment, I look forward to talking to you more on Two Bees in a Pod.

Amy 48:04
Welcome back to Two Bees in a Pod, the question and answer time. We're gonna stump Jamie. We'll try to.

Jamie 48:09
I'm sure you can. I'm not sure you will. But I'm sure you can.

Amy 48:13
Alright, so we have a couple of questions today from the audience and someone's wondering, we're trying to save the bees, but what about the wasps and the yellow jackets?

Jamie 48:24

What about the wasps and the yellow jackets? So the only reason I'm familiar with wasps is because we get a lot of calls about nests that people have on their property they think are honey bees that are wasps. I also know a bit about wasps because I had a former graduate student, Jason Graham, who looked at solitary nesting bees and wasps and we had a lot of wasps show up in the solitary nest sites we made. So the funny thing is despite the fact that we are the largest Entomology Department in the country, faculty-wise, we have no wasp specialists. So I would argue that wasps are understudied and we likely don't know the answer to that question. I have seen reports that suggest that there are wasp populations that are suffering, but I just don't think there are enough wasp scientists. We need more. So, hopefully, if you listeners are out there wanting to come into grad school, there's some potential for you there.

Amy 49:17
I was just about to say it's probably because wasps sting over and over again.

Jamie 49:22
One of the things I think it's important to this question is should we even save wasps? I would say wasps are incredibly important. They are predators, very fierce predators, of a lot of insect prey, so they can help control a lot of the things that we don't like: caterpillars in our gardens, certain flies, for example, some eat spiders, which themselves are good, but for the purposes of this discussion, wasps might eat them, grasshoppers, other things. So wasps are really good and if their populations are suffering, and I'm sure there are some species whose populations are suffering, then we should do something to address it.

Amy 49:57
Absolutely. So with that, we always see wasp nests we always see bee swarms. People are always catching swarms. And so my next question is, you know about bait hives for swarms. So when you're setting up a bait hive for swarms, do you usually install frames with foundation? Do you leave it empty? What do you actually suggest? As far as that goes?

Jamie 50:18
Well, first I'll briefly explain to the listeners who don't know what a bait hive is. A bait hive is basically a dummy hive that you hang up in an area hoping to attract a swarm of honey bees looking for a cavity, or a place in which to nest. And so bait hives are best hung usually between 20 and 30 feet in the air. And the questioner of course, is asking, is it appropriate to put combs in the bait hives, and I've heard arguments both ways. And the problem with putting wax into a bait hive is there are no bees there to protect it. So it is going to be very susceptible to wax moths and likely to be destroyed anyway, the only type of comb that you would benefit maybe by putting in there is white comb, newer comb, but I just don't know that the benefit's worth it. Bees are used to moving into cavities that have no combs, but it would be one of those things that listeners can experiment with. If you're someone who uses bait hives, and you put out 10, put combs in half of them and not the other half and see if you get a higher capture rate with combs in or with combs not in.

Amy 51:27
Are there any studies as far as the percentage of bees moving in?

Jamie 51:31
So I'm not aware of any, but the beauty, Amy, is that we are going to have Dr. Tom Seeley from Cornell University on a future podcast, and he is the world expert in home finding for bees and he will be able to answer that question. So make sure you put that one in your pocket and bring it back out when he gets here.

Amy 51:49
Awesome. All right. Now speaking about homes and bees. We want to talk a little bit about queen cells. So the last question we have for you today, people are seeing queen cells in a thriving colony and they're wondering, should they destroy it? Or should they leave them?

Jamie 52:04
I destroy queen cells in thriving colonies unless I need queens in queenless colonies. So for example, if this particular colony is in fact thriving, that suggests that it's doing well compared to its neighbors. And so if you've got a neighbor who has an underperforming queen, or no queen at all, you can use cells from the thriving colony to requeen those other colonies. If everyone is otherwise fine, then I remove queen cells. I don't want that swarming tendency or stimulus to be in the nest. So I cut them out, unapologetically.

Amy 52:38
That's where you take all your anger.

Jamie 52:41
Queens are good some of the time, but not all the time.

Amy 52:44
All right. Well, thank you very much. Those are all the questions for today.

Jamie 52:47
Great questions. Thanks, listeners. And anytime you have a question for us, make sure you post it on one of our social media accounts. We are more than happy to try to answer you online. That's @UFhoneybeelab. Thank you for joining us for Two Bees in a Podcast. I'm Jamie Ellis.

Amy 53:00
And I'm Amy Vu.

Jamie 53:01
Thanks again, looking forward to you listening next time.

Amy 53:09
We'd like to give an extra special thank you to the following: to our editors Shelby Howell 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 53:22
For more information and additional resources for today's episode, don't forget to visit the UF IFAS Honey Bee Research and 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.