Episode 84 Mixdown PROOFED

Mon, Apr 04, 2022 12:08PM • 35:12

SUMMARY KEYWORDS

honey bees, beekeepers, bees, pollen, apple cider vinegar, pollinator, small hive beetle, honey bee, pollination, trap, varroa, beetle, report, colonies, question, forage, impact, pollination services, hives, beekeeping

SPEAKERS

Amy, Stump The Chump, Jamie, Guest

Jamie 00:10

Welcome to Two Bees in a Podcast brought to you by the Honey Bee Research Extension Laboratory at the University of Florida's Institute of Food and Agricultural Sciences. It is our goal to advance the understanding of honey bees and beekeeping, grow the beekeeping community and improve the health of honey bees everywhere. In this podcast, you'll hear research updates, beekeeping management practices discussed and advice on beekeeping from our resident experts, beekeepers, scientists and other program guests. Join us for today's program. And thank you for listening to Two Bees in a Podcast. Hello, everyone, and welcome to another episode of Two Bees in a Podcast. In today's episode, we'll be interviewing Jennifer Bond who's the Deputy Director of Outlook and Staff at the USDA Economic Research Service. She'll be with us talking about a new USDA publication focused on honey bee movement around the US, the publication entitled "Honey Bees on the Move." In our Five Minute Management segment, we'll be talking about how to collect pollen from our colonies. And we'll finish today's episode with our question and answer segment.

Amy 01:41

Hi, everyone, welcome to this segment of Two Bees in a Podcast. Today, we have Dr. Jen Bond who is the Deputy Director of Outlook and Staff Analysts, Markets and Trade Economics Division, I believe she said M-Ted, the Economic Research Service for the United States Department of Agriculture. And Dr. Jen put together a really cool report talking about honey bees on the move. And that's something that we discuss fairly often is just about the commercial beekeeping industry and their migratory routes around the state. So it's really exciting to have Dr. Bond on our call today. And Dr. Bond before we actually get into the report, can you tell us just a little bit about yourself? How you started in beekeeping or just working with honeybees in general?

Guest 02:29

Absolutely. Thank you for the introduction, Amy. And thank you, Amy and Jamie, for having me here on your podcast today. We're excited to have recently released our report on honey bee movements, and worked with a great team of researchers at ERS to put that out, many of whom were members of the pollinator health research team at ERS for some time. Some have moved on to other roles, but I remained at the Economic Research Service and have been working in pollinator research topics since about 2013. In 2013, we had a request from Congress to take a look at the value of honey bees to the US economy. And so we provided that congressional report and from there, moved on to developing research plans to investigate things like the scope of pollination services, the impact of CRP on pollinator health, document pollinator, commercial honey beekeeping routes, rather, and more. So that work continues today, and there's still some active projects going on. And folks are welcome to take a look at the ERS website to see more about the research reports and data we have on honey bees, and pollinators more generally.

Jamie 03:44
So Jen, I spent a little bit of time looking at the report that you guys generated. We're going to make sure, you listeners out there, that we're going to link this report in our show notes. So please make a point to go and look at it. It's a really great report, "Honey Bees on the Move: From Pollination to Honey Production and Back." So can you give the audience an overall summary, Jen, of that report that was just released?

Guest 04:04
I'd be happy to. Absolutely. And folks can certainly go to the ERS website and find the report and a summary. And we've even got a fun infographic on the ERS website. This is a really visual report. In this report we're, in part, documenting the movement of commercial honey bees around the country. And one of the reasons we were interested in doing that is that we could observe that there was growing consumer demand for fruits, nuts, and vegetables and expanded cultivation in the US to support this growing demand and to surface the rising number of pollination contracts and seek out some quality forage for producing honey. We noticed that beekeepers are moving their bees around the country. There was, however, some limited data available to document how many hives are being moved and when they were being moved, what route, specifically, the honey bees were taking, and the distances traveled. But a couple years back, we started getting some data from NASS. They started developing two different surveys on honey bee movements and health and more. And we utilized that data to quantify those honey bee colony movements over four seasons and really try to provide a basis for aiding in our understanding of how the transport of honey bee colonies affects the provision of pollination services, but also honey production, and potentially, too, the loss of colonies through the year. What we're seeing is that the intensity of use of pollination services across a variety of pollinator-dependent crops in various regions varies. And so we summarize those differences across regions and crops in the report and also use that to explain some of the timing and volume of colony movements.

Amy 05:53
I want to be sure to put this report on our notes page that way our listeners can go to our website and take a look at the report because, as you said, it is a visual report. And it's really cool to see, actually,

the migratory routes of commercial beekeepers, where they're going and where they're coming from. So thank you so much for putting that together.

Guest 06:13
Oh, my pleasure. I've worked with a great team, including a geographer that used geocoded data to put together these maps that show where we were finding pollinators, rather, honey bees, commercial honey bees, specifically. We're moving throughout various quarters of the year. So it was fun to put together something visual from, basically, a whole lot of spreadsheets. So thank you.

Amy 06:37
Yeah, so can you give us a little bit of background on the migratory routes for honey bees and what this might look like for your typical commercial beekeeper that does pollination?

Guest 06:47
Absolutely. And this probably won't come as any surprise to your listeners, but the movement of honey bee colonies across the US is really dominated by one event in particular, but, more or less, two. And the first event is the influx of honey bee colonies in California for almond pollination. Typically, that takes place in February, March, whenever the trees start to bloom. And then there's sort of a second big movement and that's the exodus from California post-almond bloom up to the Pacific Northwest, but also to pollinate some orchard crops, in particular, some fruits and vegetables, but then into the Great Northern Plains too, which are known as some prime foraging grounds. And when the bees are foraging, they're gathering nectar, they're producing honey as well. So you've got this influx first into California from various parts of the country to provide pollination services, and then movements, typically, north and east in order to forage and then also do some additional pollination service work.

Jamie 07:53
So Jen, in this report, you discuss how colony health is affected by long-distance travel. Can you talk about what these effects are and how to minimize any major stressors?

Guest 08:03
Sure. Certainly, in our report, we document the distances traveled by the colonies included in NASS's surveys. We don't specifically measure the impact of transportation on honey bee health. But there is a wide literature that does do some documentation of those impacts. And we've referenced that in our report, and, specifically, some of the recent work by Melicher that was released in about 2019. And that report notes that certainly transporting commercial honey bees for pollination services and even to forage grounds often involves long-distance travel, but also that travel might take place in some variable environmental conditions that could be detrimental to colony health. Melicher and his team noted that during travel, honey bees, the colonies, rather, are typically kind of wrapped in a way. There's some ventilation there, of course, but they're, wrapped such that the honey bees aren't, hopefully, escaping. So that can potentially provide some challenges to accessing forage resources while they're on the road. And so the honey bees in transit are typically fed supplements, maybe sugar or fondant that possibly isn't as preferred to the variety that would be encountered during typical

foraging activities. You'll note from our report, we show the timing of when the colonies are on the move. For servicing the almonds in California, that's typically late winter so you're not always going to encounter heat issues. But still, the later you go in the year and through summer if you're moving colonies around to service some of the other crops that need pollination, possibly early summer, or for forage, the hives in transport can be affected by overheating. There are waves that are documented in Melicher's work and Zhu's, and many others that talk about how hives can be stacked to improve ventilation and more. So there are a fair number of things that beekeepers can do to minimize the stress of transportation. But that stress, regardless, has been documented. And some of the ways that that stress has been exhibited is an increase in the abundance and prevalence of some fungal pathogens. And then, also, some found that there's, potentially, a decrease in lifespan but that's relative to stationary bees. I'm not sure that these are well-controlled experiments. But again, there is some literature to suggest that transporting hives long-distance can create some stressful circumstances for the bees.

Amy 10:52
So you kind of answered this part, as far as some of the trends that have been examined over the years, but are there any changes or other trends that you want to talk about that have been examined over the years, as far as just the seasonal movement of commercial honey bees?

Guest 11:07
Yeah, there are some really interesting trends that are going on. And I think we had a couple of years' worth of data. And so we could see those but speaking with beekeepers, as well, and then some of the other work that we've done, the pollinator health team at ERS, what we're seeing was that the growth and demand for pollination services from the almond industry has had a big impact on the movement of honey bee colonies. So the scale of that demand, and that early timing really creates a large-scale effort by beekeepers to bring colonies out of dormancy, quickly replenish bee stocks to meet contractual obligations for numbers of frames, for example, and more. So that almond acreage has really increased rapidly over the last decade, and in accordance, pollination service fees have also generally risen. Part of the reason for that could be that beekeepers may be coming from further afield to meet the growing demand for honey bees in California. So we did find some hives coming from as far away as Texas and Florida to come service those contracts in California, because it's worthwhile for them. Those pollination service fees, despite the cost of bringing the hives out of dormancy and transport, make it worthwhile for the beekeeper.

Jamie 12:29
So what kind of factors have not been considered in this report that could be examined in the future?

Guest 12:34
I think there are just a lot of different areas for exploration for the movement of honey bees, the impacts on honey bee health, looking at the pollination service sector, and more. But speaking specifically about our report, I'm an economist. I love data. So always more data would be better. I would say that what we can take away is that beekeepers do make some complex determinations about where, whether,

and when to move honey bees to produce honey service pollination contracts, and provide their bees with access to nutritious forage. So using data from NASS, ours is the first to quantify the seasonal flow of honey bees as hives were moved into and out of regions in the US. But what we did find was that despite this rich data, which was much better than what we had before, we still had some unanswered questions about some of the decisions that beekeepers made. We didn't have good information on beekeepers' maintenance costs, and how that might impact transportation decisions, for example. And we didn't also have good information about the prevalence of local pollination. So that could potentially supplement the demand for commercial pollination and might help to explain why we were seeing variable rates of intensity of use of commercial pollinators for the same crops but in different regions. So there might be much greater use of commercial pollination for apples, in, let's say, Washington than apples on the East Coast. And we could observe that that was the case and start to describe the situation but we didn't have all the data we wanted to explain why. So I'd love to do a deeper dive into what local pollinators are available, think, too, about the varieties of crops that are being pollinated, and then also do some investigation into the costs and benefits to the beekeepers themselves to kind of knit together the story and really help us to explain the nuances of the market, and then link that to pollinator health as well. So lots of fertile ground for additional research, and I sure hope that there are folks that are listening that are interested in taking that up, and if they are, I would encourage them to seek out resources on the USDA website, ours or reach out to myself. I'm happy to put people in contact with those that are like-minded.

Amy 15:07
That sounds really great. And I feel like there's a lot of potential even for us to collaborate, and to discuss how we can help move this project forward.

Guest 15:16
Absolutely. I hope that's the case. And just a couple of weeks ago, we had the Pollinator State of the Science workshop, which I found inspiring. As much as we learn about pollinators, and pollinator health, and beekeepers, it's just peeling away bits of the onion, and there's just so much more to learn and some great researchers doing interesting work on beekeeping. So lots to work on, and I'm excited to see what comes next.

Jamie 15:41
So Jen, that's all great information. On the website that we're going to make sure and link to in our show notes, you have the entire report and the report summary. And the report summary is a must-read for beekeepers, at least beekeepers here in the US, because it really does a great job summarizing the key findings that you guys have made through this effort. So I recommend all of our listeners, make sure and check out, at least, the report summary. There's a great bulleted list on page three. There's a really neat map showing the movement of honey bees around the US, particularly in California, so please have a look at that in our show notes. You'll find it very useful.

Amy 16:17
All right. Was there anything else that you wanted to add, Dr. Bond?

Guest 16:21
Thank you, Amy and Jamie, for having me today. No additional details to add, just an appreciation for your interest in the report and your promotion of the work that we've done. Thank you, listeners, for your attention. And I just encourage folks, if they've got questions to please reach out to me. I'm always happy to talk about pollinators. There's a great group of individuals working in USDA, EPA, across the federal government, and at universities too, lots of collaboration is taking place. So it's a great community of science working on these questions. And I hope that folks are inspired to do their own research. And I appreciate your time today. Thank you.

Amy 17:02
All right, everybody. That was Dr. Jen Bond, Deputy Director of Outlook and Staff Analysts, Markets and Trade Economics Division, the Economic Research Service with the United States Department of Agriculture. Thank you so much for listening to this episode of Two Bees in a Podcast.

17:42
Have questions or comments? Don't forget to like and follow us on Facebook, Instagram, and Twitter @UFhoneybeelab.

Amy 18:06
Welcome back to the Five Minute Management. Today, we are going to talk about collecting pollen. Jamie, actually, our lab manager right now, he wants to collect pollen because he wants to look at the different colors of pollen throughout the year. So that's his new project that he's focusing on. I'm kind of excited for it. I'm excited to see what the bees pull.

Jamie 18:28
Yeah, Amy, our lab manager has been doing that. We happen to be recording this podcast in October 2021, and he had a pollen trap on colonies a few weeks ago and some really beautiful color pollens came out. And so we were thinking about making a pollen calendar, collecting once a month, every month of the year just to kind of have this vision of what bees bring in here at the UF honey bee lab throughout the year.

Amy 18:50
Alright, so for our listeners, if they want to collect pollen, you've got five minutes to tell them how to do this. And I'm starting the timer now.

Jamie 19:00
So folks might wonder in the first place, Amy, why would people want to collect pollen? Well, it's just another one of those ways that you can generate income using your bees. There is actually human consumption use, there are some folks who consume pollen, some folks who will purchase pollen for the purpose of consuming it. There's, also, you can use it to feed back to your bees at a later time, maybe mix it into some pollen patties, nutritional supplements that may benefit bees later. You just

have to remember if you do the latter, that you could spread diseases around. I still think it's a minimal risk but, nevertheless, there are a couple of different reasons people would want to collect pollen. So how do you do it? Well, it all boils down to using a pollen trap. There are lots and lots and lots of different types of pollen traps. So if you look at any of the equipment producers, they're going to have a pollen trap or two or maybe even three for sale. They all work on the basic principle that they go below the bottom most of your boxes have your hive, usually the brood chamber, but above your bottom board. So you would place this between the bottom board and your brood chamber. And essentially, as bees fly into the entrance of the hive or the pollen trap, they have to navigate a certain part of that pollen trap that is just big enough for the bees to fit through, but not big enough for them to carry their pollen through on their hind legs. These traps will knock the pollen off of the bees' legs while the bees are going through it. And it will knock those pollen balls into a tray beneath that trap. And so essentially, when you put this trap on and bees walk through it, you're collecting the bees' pollen into this tray while that trap is on. Now, there are some pollen traps that are really nice that you can kind of open and close the pollen trap from outside the hive so that way you can make it where the bees are able to go through the trap without having the pollen knocked off their hind legs or go through the trap with the pollen knocked off their hind legs, but a lot of traps, simply are on when they're on the hive and off when they're out of the hive. And those are the traps that require you to physically go down to the bottom board to either put them on or take them off when you want them in use. I'm not going to talk about the pros and cons of the 3000 different pollen traps. They just all work on the principle that when a bee walks through it, it knocks the pollen off their legs into a tray. And so that's it. You simply put these things on hives during times of the year that lots of pollen would be available, and then your bees are going to collect pollen, and it's going to be knocked off their legs into these trays. Most beekeepers who use these traps to collect it from the bees don't leave them always on, because bees need pollen. That's why they're going to collect it in the first place. If you're leaving these things on year-round, then those colonies are never going to get pollen or are going to get very little of it. And that can compromise them significantly. So beekeepers might leave it on for three days, and then off for three days, and then on for three days, and then off for three days. Nevertheless, even though they might do this on/off alternating period, you still want to collect the pollen from the trays daily. And that's because small hive beetles can get into those trays and other critters looking for pollen can get into those trays and really mess it up really quickly. So at the end of the day, you'll collect the pollen from those trays. The next thing you're going to have to do is sort out the debris. You have to be able to clean it. You can do this by hand by spreading the pollen out over a surface and taking out the debris, which might be wax bits or bee parts or small hive beetles, or something else. You want to take that out. You might also use a mesh seed or a seed cleaner the same way you would clean seeds, or with a fan. All of this stuff helps you remove the debris from the pollen. And once you have the debris removed, you will either dry it, dehydrate it, or freeze it to improve its shelf life. Most folks I know simply throw it in the freezer anyway because there might be beetle eggs or something in it that you don't want to pop up later on in the pollen while it's in storage. So you either dry or dehydrate it or freeze it and then that will improve its shelf life until use.

Amy 23:35

That sounds easy enough. I'm excited to see if other people start collecting pollen. Feel free to share your photos with us. I love seeing the different colors of pollen out there. And that is our Five Minute Management.

Stump The Chump 23:55
It's everybody's favorite game show, Stump the Chump.

Amy 24:11
Welcome back to the question and answer time. Today, we are going to talk about -- Well, I'm just going to go ahead and read the questions to you, Jamie. The first question, I've actually received this a couple times this week, and apparently, on Facebook, rumor has it that if you mash up apples with water and leave it out for the bees, they are able to get sugar out of this. Is this true?

Jamie 24:36
Well, if it's on Facebook, it must be. Sorry, I didn't mean to be facetious.

Amy 24:43
You're right. I believe it now.

Jamie 24:46
So, Amy, actually, honey bees will collect sugar from a lot of fruits, from a lot of rotten fruits, and this is usually done during times of the year when there aren't lots of nectar-producing flowers available. My wife and I, we grow a lot of fruit-producing trees in our backyard. And any time, they're damaged by a beetle or something, maybe they're overripe, and there's an opening in the flesh of the fruit, some of our honey bees will go and presumably be feeding there on the sugar liquid that's coming out of those fruits. So it's certainly possible. However, the question about mashing up apples with water, and then leaving them for bees to get sugar, if this is a useful thing, I don't think it's useful at all. From a beekeeper's perspective, there are much better ways to feed bees sugar than doing something like that. And even from a concerned homeowner's perspective, maybe they're just saying, "This is a way that I want to help bees." I don't think open feeding on a sub-optimum sugar choice is really good for honey bees. So even if it were true, even if honey bees do end up visiting mashed apples and water, I don't think it's good from a management standpoint, from a beekeeper's perspective, or even overly useful if you're just trying to do a nice thing for bees from a general homeowner's perspective. I just think there are better ways maybe to do it. But for sure, in periods of nectar dearth, bees will visit things that, otherwise, we wouldn't necessarily see them visiting just because they have sugar with them.

Amy 26:15
Yeah, definitely. I mean, I get calls from rooftop bars all the time saying that there are honey bees just because they've got their liquid syrup, that sugary substance. So, I guess if they had rotten apples around, they would probably take that, but probably not something that we want to just add to our management. Alright, so the second question we have, so this was actually a question that I received from this past weekend. I was at the Oklahoma State Beekeepers Association. And there were two

guys that were there talking about small hive beetle and the larva development, and one of the guys said he lived on the east side of the state and the other guy lived on the west side of the state. And the guy on the west side of the state said, "My soil pH is different. I don't really deal with small hive beetles." So the question was does soil pH influence small hive beetle larva development?

Jamie 27:06
Amy, I had to look this up. You probably know that I actually worked with small hive beetles for my PhD. That's what I did while I was over in South Africa.

Amy 27:14
I do. That's exactly what I told them after they asked me the question. I said, "It's a great question for Jamie."

Jamie 27:20
It's kind of right up my alley, right? So when I was over in South Africa, when I was a PhD student, I did look at different soil types, as well as characteristics like sand loam, things like that, clay, etc. and different soil moistures being either moist or dry and looking at their impact on small hive beetle pupation success. And the only thing that I saw, ever, that impacted beetle pupation in the soil was how moist it was. And it wasn't necessarily that the soil was moist after they started pupating, it's just that we would see that larvae would not go down into soil that was dry. So they would kind of spin around the top of our chambers, waiting to go into the soil once we finally moistened it. Now, when I look at small hive beetle success in pupating, I consider, usually, soil moisture as the most important factor, because, in a lot of these other soil types, we were able to get them to pupate very well in moist sand, in moist loam, in moist clay. And so moisture was the key. And of course, between sand, loam and clay, you get vastly different soil pH and characteristics, etc. So I looked up online, in order to answer this question appropriately, I looked online to see if anybody had looked at soil pH impacts on small hive beetle pupation. And I didn't see any refereed manuscripts on this. I didn't see any evidence that this was investigated. So I can't say conclusively that pH doesn't play a role. But my sneaky suspicion is that it doesn't and that there are probably other factors that contributed to these two individuals' different experiences with small hive beetle populations, depending on where they were in the state. Climatically, it might have been different. Maybe it was colder on one side than the other, so beetle populations are slower to build on one side than the other. Maybe the density of beekeepers is low on one side or the other. So there could be a lot of other factors at play. Now, as a scientist, I can't say with certainty that pH doesn't play a role. Maybe someday, someone will find that it does. It's just that at the moment, I think that other factors are more important for limiting the spread throughout small hive beetles.

Amy 29:26
Alright, that's totally fair. Okay, so for the third question, it has to do with apples, but not the first question we asked. This person's asking about apple cider vinegar and honey bees. And they're wondering if, again, if they're, I guess, the question is, if there's an effect on honey bees or mites or is anyone looking at apple cider vinegar and pest control?

Jamie 29:53
Yes. That's the short answer. And, Amy, apple cider vinegar is one of those things that people have considered mixing in as, quote, a nutritional supplement into their bee feed, their sugar water, etc. My experience with apple cider vinegar, it's funny, all this feels like all three of these questions are related because we go from apples to beetles to apple cider vinegar, which is used for beetles. It sounds like the specific questioner was actually asking about evidence of apple cider vinegar being used against Varroa, and I am not aware of anybody using apple cider vinegar, effectively, to control Varroa. Now, I did look up again some manuscripts, and I did see one group where they were testing apple cider vinegar, but they were also looking at some of the some essential oils as well, and I didn't feel like the results are very conclusive one way or the other. But I do know that apple cider vinegar is used regularly in the small hive beetle realm, not necessarily the Varroa realm, but the small hive beetle realm. What do they do with it in that regard? Well, through a lot of research, a colleague of mine who's retired now, Dr. Mike Hood, he was at Clemson for years and years and years, Clemson University in South Carolina, and he did a lot of work with small hive beetles. And he, very early on in small hive beetles' presence in the US, found that small hive beetles are attracted to apple cider vinegar. So in his beetle traps, he would put apple cider vinegar. The problem is, yes, the beetles are attracted to it, but they could crawl into the vinegar and crawl right back out and not seem to be any worse for that. So what he found is that you needed to use apple cider vinegar as an attractant, but that you had to have something else in that trap to kill the beetles. And so he developed a trap that had three compartments. In the middle compartment, he put apple cider vinegar, kind of as the attractant. In the outer two compartments, he put mineral oil or vegetable oil, and so when the beetles went to that trap and got in one of those two oils, they would die. So I know apple cider vinegar has been used successfully to attract small hive beetles to traps, but I don't know of any successful uses of it from a Varroa control perspective. Now, again, just like what I answered previously for one of the other questions, I can't say conclusively that it doesn't impact Varroa or that it won't someday be shown to impact Varroa. It's just that right now, it doesn't seem to be any good support for that.

Amy 32:20
Sure. And okay, so I guess I just wanted to clarify. So is the idea that the honey bees are drinking the apple cider vinegar, and then the mites that are feeding on the honey bees don't like it and either aren't feeding on them, or die in some way? I mean, what's the idea behind actually using it for mites?

Jamie 32:39
Yeah, so maybe so. I was not even really able to find papers about trying this. So, a lot of people kind of concoct a lot of different things that in their mind will work. So I know that in the past it's been mixed into, like I said, sugar water, kind of like as a food supplement. But it's just one of those things that people do because they think it makes sense, not necessarily one that's been done because of studied research. My guess is, too, if I dug a little deeper, people might have used apple cider vinegar from "a sprinkle it on bees" perspective, or from "fogging it" perspective. But to me, there's really just no wide-scale support for its use. And one of the things that I always say about stuff like this, Amy, is when we have other things that we know work better, it seems safest and best to do those things, rather than

these things that we see on the Internet that some folks might be trying and they make these proclamations about. So if someone out there has used this and believes it really to be working, I would recommend that you contact your nearest honey bee researcher and see if you can talk him or her into testing this and seeing if there's some truth and merit to it. But in the meantime, I would recommend the more traditional ways that we have of controlling Varroa because there's just other products, even essential oil products, and formic acid, and oxalic acid, Apivar, Apiguard, all these things that are out there available to control Varroa that we know have some efficacy against them.

Amy 34:09
All right. Well, thank you so much. And that is our question and answer segment. If you all have any other questions, feel free to send us an email. Our email is honeybee@IFAS.ufl.edu (stands for the Institute of Food and Agricultural Sciences and UFL stands for the University of Florida) or you can follow us on our social media pages. We're on Facebook, Instagram, and Twitter at UF honey bee lab. Hi, everyone, thanks for listening today. We'd like to give an extra special thank you to our podcast coordinator, Chelsea Baca, and to our audio engineer, James Weaver. Without their hard work, Two Bees in a Podcast would not be possible.