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SPEAKERS

Amy, Jamie, Serra Sowers, Stump The Chump, 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.

Amy 00:47

Hi, everyone, welcome to today's episode of Two Bees in a Podcast. Today, we actually have a very special episode because we are interviewing one of our own Dr. Jose Marcelino, a postdoctoral scientist here at the University of Florida Honey Bee Research and Extension Laboratory. He and Dr. Ellis have published a paper called, "The Movement of Western Honey Bees Among U.S. States and Territories: Some of the Histories, Benefits, Risks and Mitigation Strategies. And so what we're going to do is a little bit different than what we'd normally do in a podcast. But Jamie will also kind of pitch in with some of his feedback. So, Jamie, the first question I have is for you. Can you tell us a little bit of background that led to the formation of this effort?

Jamie 01:35

Yeah, so Amy, I can. It's going to be a couple-minute spiel. So, hopefully, you listeners out there can bear with me. Okay. All right. First, I'm going to talk about the title, "The Movement of Western Honey Bees Among U.S. States and Territories." When people think about honey bees moving around, they almost always use the term import or export. But those terms are specifically about bringing honey bees into a country from another country or moving them to another country from your country. We're not talking about imports and exports with this effort. We're talking about movement, and we define

movement of honey bee colonies as moving colonies within a country. So this is important. Why would this even come up in the first place? Well, to make a long story short, a few years ago, I was contacted by a colleague at USDA APHIS right about the time when there was discussion of potentially moving some colonies or queens of honey bees from Puerto Rico to the US mainland. And so it is the federal government's policy that movement within the United States is not restricted. Their policy is, essentially, once honey bees are in the US, they can be moved anywhere within the US. But of course, we're the United States of America, which means all the states get to set their own policies related to a lot of different things, but also including movement. So while the federal government may be okay with bees moving, say, from Puerto Rico, just to use a specific example, here to Florida, the state government of Florida may not be okay with that, depending on the bee that's being proposed to be moved, etc. And so Puerto Rico, Hawaii, Guam, the US Virgin Islands, all of these places are the United States. They're all part of the United States, even if they don't have official statehood. So the idea is while the federal government says we can move or there are no regulations against moving bees between these areas, the question arose from my APHIS colleague, should this be something that we do? I think most of our listeners out there wouldn't struggle with the idea of moving honey bees from Florida to Georgia, or from Georgia to California, from California to New York. None of these are things that kind of raise concern for beekeepers. We do it all the time. There's a pretty homogenized disease and pest population across North America, the continental -- the 48 contiguous states, as it were, but it does raise an important question. If say, a particular virus, isn't present in the honey bee population in Guam, should we be moving bees from California with this virus to Guam, or vice versa? So this kind of produced an effort where a lot of scientists came together with federal and state officials to form a technical working group to look at this issue. What's the history, the benefits, risk, and mitigation strategies associated with moving honey bees between the continental 48 states and the outlying states and territories? This is kind of where our lab was tasked with leading this technical working group. We were funded to do that. We published this paper specifically where we review this issue. What's the history of moving bees within the US? What are the benefits of moving bees within the US? There are risks of moving bees within the US, what are those? And how can those risks be mitigated? So, enter into this discussion, Dr. Marcelino, who is a postdoctoral scientist who joined the lab a couple of years ago, and he was the one in our lab tasked with doing the everyday work associated with this idea, the movement of honey bees within the US. So, our first phase, we produced this manuscript that we've published as open-access. We'll link it. I know there are a lot of folks who listen to our podcasts from around the world but you're going to have this same issue as well. If you've got outlying states or provinces or territories that have honey bees, the question is going to arise, should we move them? And under what framework should we share honey bees? Amy, I'll let you take it away from here, take it from here with Jose, who's really become an expert on this topic, since he led the literature review associated with publishing this manuscript.

Amy 02:31

Right. So, Jose, we've had you with the lab here now for a couple of years. And I know a lot about you. I think the one thing I do know about you is that you love banana bread. That is very true. Other than that, can you tell us a little bit, introduce yourself, and tell our listeners a little bit more about yourself?

Guest 06:29

Thank you, Amy. Thank you, everybody, those listening, thank you for having me here. So my background is a little diverse. I am from Europe, from Portugal. I first started to do forest engineering, and then I discovered insects and I loved insects. I started to work on their biological behavior. And then I funneled in from other organisms to honey bees because of their importance and of their intriguing behavior and biology. And so after multiple steps, I reached the US and I did my PhD in Vermont. Then, I went to Illinois, and then to Puerto Rico, and then, ultimately, to the University of Florida where I am today.

Jamie 07:23

So, Jose, we've been fortunate to have you here. One of the projects that you've managed for us here in the laboratory is the day-to-day work associated with this technical working group looking at what you and I consider this very important topic. Just because we can move bees between the contiguous 48 states and the outlying territories, should we? So you really did the initial literature review for that manuscript that we're talking about that many scientists from across the country, as well as colleagues of ours from USDA, helped put together. So just to focus on that effort, can you tell us a little bit about the history of honey bee movement within the US? And we're going to start from when it wasn't movement, from when it was actually an importation. When were honey bees imported into the US? And after that, can you talk a little bit about current regulations associated with movement within the US?

Guest 08:13

Yes. So that's a very interesting question. It is very interesting to try to navigate all the information that is available. So what we know, and we can accurately assess what's documented, we have documentation from mostly the advent of steamship in the US. So there was a lot of activity from the initial of the 17th century to the early 20th century. There was a lot of import activity to the US. But prior to that, during the exploration of America, most certainly, beehives were brought, but we don't have documentation regarding that. So the one we have is from the 17th century onwards. So what we know is that there were a lot of imports from Europe, and some subspecies that were of interest because it was known in, let's say, Italy or other northern Europe, that they were highly productive. Mainly, that was the criteria to try to bring them was that they would produce a lot of honey. And so multiple subspecies were introduced at that time, namely, the Italian bee, *linguistica*, which is still preferred to this day. *Carnica*, *mellifera* from Europe, *caucasica* from Middle East, and *iberiensis* from the Iberian Peninsula at the western point of Europe. But there were other origins, for instance, from Egypt, Syria, Cyprus, and Northern Africa. There's also documentation about this. So there's already the ones I said, it's a panel of seven to eight that are very well documented. However, all of this stopped when the Federal Honey Bee Act banned importation of the honey bee, because they were starting to have concerns about, you know, we don't know what is being brought and in my brain pathogens or other sources of negative traits. So the 1920s, with the Federal Honey Bee Act, this stopped. However, after this entry time, there were amendments to the act that would allow importation with some premises that the bees were monitored for their health. And if they were healthy, and healthy is a broad statement, but if they were considered healthy, they could be brought in. So currently, there is a lot of variability in

what can be done. So like Jamie was saying, and now, I'm going to speak well, for imports, there's a lot of considerations, and basically, you have to screen them and have certificates, etc, that they are healthy. However, if they are a subspecies of concern, and these are what is called African bees, and in the US, they are called Africanized, but African bees that are *Apis scutellata*, or *Apis capensis*, or *Apis cerana*, these, in particular, are regulated at federal state. So they cannot be imported, and they cannot be moved within the US. However, like I was saying, this is at the federal level, but like Jamie said, that state level, the states can also regulate what happens. And this is what's happening. That's what we documented in this paper. So we went over and we contacted a lot of apiary inspectors of all the states and territories to know what was the regulation because, sometimes, it's very difficult to navigate the printed or online regulations and legislations per state. It's kind of a rabbit hole to find and pinpoint information. So we've compiled everything in a table and in an interactive map so people could access it easily. And what we found is that there's a big discrepancy. So some states do not regulate at all so you can freely move things in and out, and some other states have a lot of regulations. However, I would like to point out that when I say no regulations, it's a very strict number of states, like three or four, because most of them, even if they say, we do not regulate, they still have to pass through a process of certifying that the bees are healthy. So the concern that they are healthy, it's also broad, but it might mean that they don't have pests and pathogens, and that the subspecies or the race that is moved is not relevant. Whereas, for other states, what is being moved, apart from the health status, is critical, meaning these criteria that the federal regulation stated, the African or Africanized bee or the Asian bee, *Apis cerana*, which is not in the US, *Apis capensis* cannot be introduced or moved, etc. And this translates into a grade that is not standardized, and ultimately, things can be moved quite freely.

Amy 14:49

So, Jose, can you tell us why the movement within the US started? And then also, can you describe some of the benefits of moving honey bees amongst states and territories?

Guest 14:59

Yeah, so, honey bees are very intricately with humans for many, many centuries. So, with the advent of the large-scale agricultural industry, the need for pollinators and the need to have pollination services from honey bees was very evident. This triggered migratory beekeeping, which is very well established, as we all know in the US, starting with migration to human-mediated migration of hives to the West Coast for California beekeeping and then to other states to provide pollination services. You have to remember that this is very intricate, not only in the US, but in Europe, and in other states -- in other countries, sorry. So in the United States, beekeeping has several levels of importance for the US economy. For instance, the pollination services to the crop industry in the US is estimated \$12 to 50 billion a year, billions with a B. So, this is the whole economy. Then, at the beekeeper level, there are 1.8 million colonies being moved across the US. So this is 60 to 75% of all commercial colonies. This translates into commercial beekeepers' level into revenues for rental fees. The crops are strongly dependent on the bees. Most, 70%, of all the crops that are produced in the US, and across the world, rely exclusively on pollination services and mostly honey bees. So the benefits are very intricate with the society and provide food security, which is a term used across the world to relate honey bees with human society. So they are very intricate in the food security for human societies. There is also

ecological value, non-marketable ecosystem services. Bees are also responsible, in part, for ecosystem function and stability. So, the network of pollination between pollinators and plants is highly dependent on honey bees. So there's also, like I said, ecological value. There are also other benefits for movement. For instance, stock improvement, which is one of the main reasons apart from the pollination services. So stock improvement is really important to increase productivity and increased resistance to pathogens or pests. So that is also very critical. Lastly, to replace colony loss, as you know, winter colony losses are quite high, in the 40s percentage, so beekeepers mitigate these losses by purchasing colonies or moving hives of their preferred stocks. So all of this translates into a lot of dependence from beekeeping at national and international levels towards human societies.

Jamie 19:16

Jose, that's a really good summary of the benefits of moving honey bees among states and territories. But as you know, it's a very tricky issue. So, again, rephrasing this idea that, within the US, there's no really federal regulation against moving the honey bees once they're in the US, but it's super state-dependent, depending on what state policies are. Of course, beekeepers want to be able to do it, certainly, within the contiguous 48 states. They're moving bees all over the place for honey production, pollination purposes, stock improvement and all the benefits that you just noted. But, Jose, there are some risks associated with moving honey bees, and again, I'm not -- this paper isn't really aimed at addressing those risks within the contiguous 48. It's more about moving bees from the 48 to outlying states and territories and vice versa. So could you give us a brief overview of some of the risks associated with moving honey bees?

Guest 20:13

Yes. Well, the most known and the most talked about risk of moving bees between states and territories is the elimination of pests and pathogens. Some of them are quite evident, like Varroa. But there are other things that you don't see and you might be moving. So, that's one of the main concerns and, in fact, in the paper, we have a case study about Varroa and why the spread of Varroa was so quick in the late 80s because there was a lack of a central or common authority governing movement. So, these concerns about movement can be traced back to the 80s. We document some of these issues of dissemination of pathogens because of a lack of standardized or centralized or a common authority governing movement. So, yeah, the most critical and the most spoken about is the dissemination of honey bees pests and pathogens. However, the spread of resistant genes, for instance, you can move a certain stock that can spread resistance or spread pathogens that have resistance to, let's say, a pesticide, and also, that can be the spread of deleterious genes in honey bees, meaning an introduction of a bee that is susceptible to a particular organism, whereas the resident bees were not. So this is also a documented problem. And also, the dissemination or the loss of traits when you move honey bees, for instance, you can move honey bees that are of interest because they have a particular trait. But if that trait is not genetically -- how can I say it -- genetically established in the population, you might lose that trait when you move the bees over a couple of generations. Also, conversely, you can disseminate a trait to other bees by a mixture. A mixture in honey bees is central, crossing races or even subspecies. So, you can be disseminating something you do not wish to be disseminated, and that can have an impact in productivity or health of your honey

bees. And also, a very important one is the impact on other flora or fauna. And this is a major concern for some groups in the US, which is you might want to move bees for an area that is pristine or it's conserved or is known to have a high biodiversity of other pollinators. So there might be concerns that moving bees could have impacts on the established population of other pollinators or other bees. So all of these concerns are in-state but the most relevant one is the dissemination of pests and pathogens. However, the US covers this, or is aware of this, and tries to mitigate this problem by doing national health surveys that are done across all the states and territories to know what is the status of the population of pests and pathogens. So all of this can be taken into consideration when something is being moved.

Amy 24:58

Okay, so Jose, you just described some of the risks associated with moving honey bees. Jamie, I know that you and I have discussed some of the strategies for movement, mitigation strategies for risks. So do you want to kind of go into what these are?

Jamie 25:14

So that's a very important question, Amy. One of the things that I want to make sure our listeners hear clearly is that this group of individuals, this technical working group who are coming together, they're not proposing at all to stop movement the way it is currently happening. The movement of honey bees to pollinate almonds in California, the movement of honey bees to pollinate blueberries in Maine, things like that. But we do recognize that the movement of honey bees between the 48 contiguous states and the outlying states and territories share a lot of similarities with import/exports, maybe even more so than standard movement where you're moving around within a country. So as a result, there are risks associated with moving bees from the contiguous 48 to Guam, and vice versa, or to Puerto Rico and vice versa, or the US Virgin Islands and vice versa. So, as a technical working group, we're not here trying to set policy or shape policy or say that this shouldn't be done. We're just saying, hey, when you move bees in this way, there are these risks. Obviously, we might need to be able to do it because there are all these benefits associated with moving bees. But there are also these risks. And anytime, Amy, you do a risk assessment, when you're considering whether or not to do something, and in this case, move bees between the contiguous 48 and an outlying state territory or vice versa, you don't want to just say, it shouldn't be done. You want to categorize that level of risk. You want to say, here's the risk that this threat this movement poses. Now, should we mitigate that? Are there ways that that risk can be mitigated, and therefore permit the move? So for example, you might say, moving bees between Florida and the US Virgin Islands, under this specific scenario, is simply too risky, you shouldn't do it. Or you might say, You know what? There are some risks associated with moving bees between Florida and the US Virgin Islands, but we know what they are and here are the mitigation strategies that, if followed, then would endorse the proposed move. So we didn't, as a group, want to just say, movement shouldn't happen. We wanted to say, clearly, here are some of the risks associated with movement but here are mitigation strategies that, when followed for moderate or low-risk movements, can really reduce the risk to a much more tolerable level. Jose spent a lot of time looking at those mitigation strategies, of course, along with the team of individuals, who are members of this

technical working group. So Jose, what were some of the risk mitigation strategies that we were able to share in the manuscript?

Guest 27:53

Yes, yeah. So like you were saying, most of the mitigation strategies we analyzed are based on importation and what was done in the past for imports, namely, for the Russian honey bees. But there are also protocols in place in the US, and we also analyze them, namely, the movement of the *Hylaeus* bee from Hawaii and to Hawaii. So, I think this is relevant because when we say and we analyze all this, we are not saying that the movement has to completely be changed, or the strategies that are in place have to be changed. Now, even if movement sometimes is not regulated, in the legislation, there is also some kind of screening before things are moved with very few exceptions -- three or four exceptions. So, the government and the states are aware of some of these risks that we just described and some of the benefits. They do have, to a minor or a bigger extent, some kind of monitoring before a movement happens. However, it's not standardized. What we are advocating for is to provide suggestions as to how to standardize and how to mitigate movement. In this case, for mitigation, we thought some of the protocols that were done for importation could also be used for movement. A movement here is a movement of specific races or subspecies that are in the US already and have been documented, and this is important, have been substantially studied for traits of interest and health stability and strong health characteristics. So, as you know, the Russian bee was introduced and it was quarantined. An important thing is that germplasm was introduced. It was not that the actual bees are introduced. So this is a good way to prevent some of the most known pathogens to be introduced or pests if you just are moving germplasm and then artificially inseminating bees, locally. So this is something that we think is a good strategy, the instrumental insemination of germplasm into existing honey bee populations instead of moving the actual bees because there's always a level of uncertainty with a live organism, how it will behave. Even if you studied for years, you don't know 100% what will happen when you move them from point A or from region A to region B. Also, this is done for the *Hylaeus* bee, so, although federal movement of the bees to Hawaii is not permitted, there are USDA-established programs that allow for germplasm to go there, and germplasm are Varroa-resistant, reared in quarantine facilities at USDA facilities, so, in a closed environment. So, they are not open-air apiaries. They are moved to Hawaii. So, in controlled conditions, the germplasm is moved there to enhance the resistance to Varroa of the Hawaiian bees. So, this is an example of what is done within the US for movement and what are the mitigation strategies they do when this movement occurs. And actually, at this point, the movement back to the US from this *Hylaeus* has been progressively been expanded. It initially was just a few queens, and in 2020, was expanded to thousands of queens, but again, all of this is continuously monitored. So, this is another thing that introductions have to be monitored after they happen. So after quarantine and distribution commercially, they have to be monitored. So, these are some aspects that are critical for a cohesive mitigation strategy when movement occurs. Also, a stock certification program that can include multiple risk strategies should be implemented. There are attempts to have a standardized certification program across the US, but the criteria to establish this are still not well-defined or implemented across all the states and territories. Namely, what are the attributes of stocks that are relevant commercially? So, this needs to be defined and what are the screening that has to be done? I mean, you can do superficial screening, just visual

screening, and then you can do in-depth genomics, screening for pests and pathogens, namely, for viruses. There are things you cannot do by visual observation. But, a composition of all these criteria could lead to the implementation of a stock certification program that would support robust movement, meaning that you can actually accurately know what you are moving by reducing substantially, or almost completely, the chance of risk of dissemination of pathogens or pests or other risks that we defined previously. Also, not to move bees for regions where they are not present, for instance, these pristine areas that I was defining before or forests that are kept pristine for whatever ecological reason, and they do not have honey bees. They should not go there unless, again, totally, the impacts are studied. I think that's a key that a lot of research has to be done prior to suggesting or accepting moving from point A to point B.

Jamie 35:52

So Jose, I think you really provided a good summary of highlights in the manuscript and the efforts of the technical working group. So, what's next? What's the future of this issue? What's the technical working group going to do now that they've got this first manuscript out?

Guest 36:09

Yes, that's a good question. So after, I'm not sure if we defined this group, but the technical working group is composed of many academics, but also the USDA agencies. So, we tried to compile or to group the best knowledge that is available within the US and abroad to help us to provide an overview of what is the current status of the industry and regulations, which is what we are discussing now. And now, in the second phase, what we are going to do with this technical working group is to provide potential methods to decide on a movement or decide or not to move a particular stock or a particular race or a particular honey bee with interest. So, what we are doing as a group now is to generate a support decision tool that can help decision-making agencies or other decision-making stockholders or others that are in the process of deciding these movements. So, what should be a stepwise decision process based on the risks, on the benefits, and on what is moved? What should be the strategy to be sure that all the parameters that are necessary to be covered that we just discussed, the benefits risks etc, if they are all contemplated, and basically decide to progress in a decision tool, dichotomous decision tool, so a yes or no. For instance, we aim to define what is being moved and then provide a risk assessment based on all the criteria that we just defined. And then, based on proficient knowledge of the people that are part of this technical working group, suggest decisions that can be made based on this analysis of risks and benefits and advantages issues that might occur with moving a particular bee from point A to point B. But again, like for this first paper, we are not advocating that every single time you move a single bee you have to go through a procedure. It's mostly for bees that have traits of interest or traits of concern. So, how to balance this and make an informed decision on movement or not. I mean, of course, we are not intending to regulate movement established for pollination services that are critical and imperative to happen and are well-established in the US. So yeah, we are trying to define a supportive tool that can inform decision-making agencies or stockholders on whether to move or not move a particular bee to their territories.

Amy 40:09

Alright, Jose, thank you so much for coming on to our podcast today. I'm excited to share this publication with our listeners. Hopefully, they'll be able to take a chance to read through the article and see what you've compiled, you and this great group compiling this information together. So thank you so much, again, for joining us today.

Guest 40:10

Thank you, Amy, and everybody that is listening. Again, we do provide a tool for a quick visualization of what are the regulations in an interactive map. And I would encourage people to try to use that link if they want to know or to further explore what are the limitations or what are non-restricted movements that can be not in the US states and territories. I think this is a valuable tool that many apiary inspectors were grateful when we were compiling it. So I think people might want to see that, in particular.

Amy 41:11

Absolutely. Thank you. All right. Thank you. So everyone, that was Dr. Jose Marcelino, a postdoctoral scientist here at the University of Florida Honey Bee Research and Extension Laboratory. Thank you so much for listening to today's episode of Two Bees in a Podcast. Jamie, I thought that was really cool. I've taken a look at the publication, "The Movement of Western Honey Bees Among US States and Territories," and I think it's just really great that Jose was able to take everything and bring it together into one publication to discuss the history, the benefits, the risk, and some mitigation strategies because I'm not even sure -- has this been done before?

Jamie 42:12

So, Amy, it's not been done from a movement perspective, it's almost always done from an import-export perspective. So for example, the federal government here in the US has rules and regulations about importing or exporting bees into or out of the United States, and many countries around the world have that issue. But, a lot of countries are more than just a single landmass. Of course, the United States is one of those, we have the 48 contiguous states, but we also have Alaska and Hawaii, and then various territories, like we've been talking about, Puerto Rico, Guam, all those things. So most folks think about honey bees being transported strictly from that import-export. But this is more of that movement perspective. When you're taking bees from some of these outlying states and territories to the contiguous 48 and vice versa, and you could say the same thing, like British colonies or French colonies, etc., it's a lot more like an import-export scenario than it is just simply a movement scenario. And so, while a lot of governments have looked at it from that import-export perspective, we're just not aware of a lot that have looked at it from within our own country, what about these unique scenarios that pop up? Should we be moving bees under these scenarios? So, Amy, this is a really good place to pause and just kind of insert something because this can really freak out a lot of people. "Well, you're proposing that we stop moving bees? We need to move bees to California, or we need to move bees wherever." It's like, that's not at all what we're trying to do. We're just trying to look at it from a scientific, a research perspective, specifically in the scenarios where we're talking about moving bees between a landmass and its outlying states/territories. So, the first manuscript we produced is exactly that: a resource for folks who are considering what to do under these scenarios. There is a phase two of this effort, and I want to stress in this phase two of this effort that we're actually trying to develop a risk

assessment protocol so that if policymakers or rule or regulation makers someday want to say, "Hey, we need to consider movement under these unique scenarios more like import-exports than we do just moving bees. What are some guidelines we could use?" We want to provide that resource in the form of a risk assessment. In other words, it's just like Jose was talking about. You walk down this yes-no tree. Is the bee this or that? Yes, no. Is the bee this? Yes, no. Is the bee that? Yes, no, and it be assigned a risk score. And that score essentially will dictate, well, if it's assigned a score of this, these mitigation strategies will help you overcome this, or, hey, this is simply too risky. The risk outweighs the benefit of moving bees between this spot and this spot, and we shouldn't do it. And we just want that to be a resource for those folks who are having to consider these policies now as this world is increasingly globalized, and it's so much easier to move bees than it ever has been before. So yeah, we feel it's an important issue. We're trying to provide that resource to these policymakers before they have to face a scenario where a movement is imminent and something needs to be done.

Amy 43:29

Yeah, and I think it's really cool that Jose, and the whole group, actually, was able to compile this and make it a resource for policymakers. This could make change, this could create change and change behavior in what is allowed and not allowed among our states, but also, as you mentioned, some of the territories that are outside.

Stump The Chump 45:14

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

Amy 46:06

Hello, everybody. Welcome back to the question and answer segment. So, Jamie, we are recording in October of 2022. We just had a pretty bad hurricane come through, Hurricane Ian came through. It basically came through, well, besides the devastating impacts it had on honey bee colonies, and the flooding that it caused, it also affected the pollen and nectar sources, all the forage that we have for the honey bees. And so we had a questioner email us asking about flowers and sugar water and what we need to do with the bees. So really, generally speaking, what do beekeepers need to do when they don't have forage post-hurricane because they don't want their colonies to starve, but they also don't want to really grow their colonies at this time, either? So what are your thoughts on this?

Jamie 46:56

Yeah, so, there are a lot of what-ifs that I'm going to provide in my answer to this question. It's very important, I mean, that you did what you did, which is set the stage. Here in Florida, the hurricane came through around early October, and we were feeling the effects, the aftermath of this hurricane. And for us, we're discussing this at a time of the year where we're a few weeks in into fall, formally fall. But in Florida, there are still a lot of floral resources, especially in southern Florida, where the hurricane went through. So there are a lot of beekeepers who were allowing their colonies to grow, or at least to store food based on the amount of nectar and pollen that was coming in from the environment. So when that tap is shut off, when there's no more of the floral resources available, what do you need to do to ensure colonies have enough feed, but you're not overfeeding to cause them to grow? Well, the short answer

to that question is you would do what most of the people, most of the beekeepers in the rest of the country have to do. Florida, we're fortunate in that we have a really strong significant fall flow, especially in southern Florida. A lot of other beekeepers do as well. But there are a lot of beekeepers who don't have that fall flow. And what they'll do is they usually feed their colonies just to ensure that there's something around a medium super's worth of honey on because that's about the amount of honey that it's going to take to help the colony through winter. So it's not like you're saying, "Well, if I feed too much they're going to grow." You don't have to worry so much about that. You're kind of feeding them to a target fullness, and then you're stopping. My usual target fullness is about a medium super's worth of honey. That's about half to two-thirds of a deep box worth of honey. And if you use shallows, that's about a shallow and a half worth of honey. So you're feeding until you get to that point. Now, it is important to note that the hurricane floral damage is not permanent. Now, I'm going to discuss something from a sample size of water. We actually had a hurricane go through the Florida Panhandle a few years ago, and it came through roughly the same time of year and really took out a lot of the fall forage. There was that immediate need for bees to be fed if they didn't have enough resources. But some beekeeper colleagues of mine from the Panhandle said about three weeks later is when a lot of the wildflowers restarted blooming and forage became available. So the reason I'm bringing that up in this particular case, it's entirely possible that in three to four weeks, some of these flowers that you would have been relying on ordinarily will come back. It depends on how late in the season the hurricane comes. If it turns cool as well, none of those things may come back at the end anyway. So I don't really base it based on what's coming in from the environment but more what I know bees need to survive winter. It's that time of year to get bees ready for that purpose anyway, so I would feed to the point that I have roughly that medium super's worth of honey, and then I'll stop feeding.

Amy 49:50

Okay. Yeah, I think that's fair. So on that same note with hurricanes or storms in general, it leads me to the second question that I have for this Q&A segment. And that is, how do you get colonies ready for hurricanes?

Jamie 50:07

So this is a difficult question to answer because, for those of you listening around the world, here in the US, I'm sure it's true elsewhere, we score hurricanes at five categories. What you would have to do for your colonies to survive the different categories is quite different. And frankly, once you're getting the category four and five storms, there's just really very little that you can do for colonies. If the storm is coming through at that strength, there's just little preparation work you can do so. So let me just kind of back up and talk about general things that could be done to help avoid problems knowing that, sometimes, just even in the best-case scenarios, it's completely out of our hands. So, the big threats in a hurricane are wind damage, so blowing colonies over, blowing hives apart, water damage, usually in the form of flooding of some sort, or the damage associated with the two of those on something else. For example, strong winds and lots of rains can push trees over and trees may fall onto your hives, and so, really, wind and water can contribute to lots of problems. So I will tell you folks out there how we prepare colonies or hives when significant storms, in our case, hurricanes, but, for that matter, any other significant wind or rain event coming our way. So what we try to do is we try to stabilize the hives.

In our case, we keep two hives on a single stand, and so what we will normally do is slide those two hives together immediately side-by-side, their walls are touching. And we will run a ratchet strap around the top, down the sides, around the bottom, and up the other side of the hives. Basically, we're ratcheting them from top to bottom to make it less likely that they will just fall apart or that a lid will fly off. I personally like to stabilize the hives. If they're sitting on a stand, they could blow off of the stand or things like that. A lot of folks will move their hives to the ground to stabilize them a bit. But that can be a problem if you get 2, 3, 4, 12, 15 inches of rain. So what I have done in the past is I will drive a metal post down beside either side of hive. So, not only do I have a ratchet strap that kind of goes around the top and the bottom of the hive, but I will go with a ratchet strap around the front and back of the hive, around those metal posts that I have driven in the ground around it so that way the hive is kind of anchored front and back, top and bottom so that it's less likely to tilt forward or fall off its stand or be blown apart or things like that. Now, a lot of commercial beekeepers keep their hives on pallets. You'll have four to six colonies on the pallet. It's just really difficult to go and strap 100 or 200 or 1,000 or 5,000 or 10,000 hives, but for hobbyists, strapping them and anchoring them to the ground or a stand, in some way, is a really good idea. So that's number one. Number two, never keep bees in low-lying areas. It's really hard to know when a big storm is coming and you've got a lot of hives that you have to go move them all to higher ground. So, the better angle, Amy, is rather than responding to a storm coming, is just to keep a habit of always staying high and dry. Just never put bees in a place that can flood. And I'm talking, even the 100-year flood where an unusual amount of rain will cause that to happen. You just really want to be high and dry with bees so they can be up and out of water. And I know that's easier said than done. It's very tricky to do, especially in some areas like in southern Florida where it just floods a lot all over the place. But to the best of one's ability, you want to keep them out of any area that has any remote possibility of flooding. And then, third, I like to keep hives away from trees. I don't like to put them under trees, under tree limbs, or tree branches just in case things fall down on them. A lot of people, especially hobbyists, might put their hives beside a structure, beside a shed, or a house, or some building in the back. That can be a good idea. But if four or five category storms are coming through then there's just, again, little you can do. Another thing that we do is take off any feeder jars or anything that's on the outside of the hive that might blow away. So we want to make sure that they are strapped, that they're tight, they're anchored to the ground, they're out of low-lying areas, and they're away from places where things can fall on them. Apart from that, there's not a whole lot else that you can do. It's really painful to see when these big storms go through and to know what the beekeepers are going through but, at least, in some of those lower-category storms, following those basic tips can help more often than not.

Amy 55:06

So there was one other thing that I wanted to mention, and I wanted to kind of hear your thoughts on it. Sometimes, when the lids are propolized shut, and there's flooding at that point, the bees really only have one entrance and exit, right? So, is it recommended to have a little opening so that the bees can come in and out? Because, I mean, you've kind of gotten to the point where it's raining. You don't want them to flood that way. But also, if the water is coming through the entrance, what are your thoughts on just having a little hole or leaving a tiny hole as far as if you have like a top feeder on top?

Jamie 55:41

Yeah, it's such a hard, hard thing to talk about. We talked a lot in our insulation interviews with experts who talk about hive configuration insulation. They talk about no upper entrances, you don't want that airflow through a hive because colonies aren't choosing those types of cavities in the wild, they're usually choosing cavities with single entrances at the bottom, things like that. But I would argue and, certainly, based on what we saw with Hurricane Ian, it's really good when hurricanes or big storms are coming and floods that are anticipated to have some sort of upper entrance. It's kind of like what you're hinting at, a lot of beekeepers who had their colonies in southern Florida during this particular storm, when the floodwaters came through, they were high enough to fill the lower brood box, and maybe even the second box, with water. But there might have been a third or fourth box that the bees were able to move into. But because there were no other openings or gaps in the hive, they suffocated, or when the water rose too high, they were unable to get away and they drowned. So, that certainly leaves open the need or the benefit of that case of an upper entrance of any type that the bees could have gotten through. So I would say, if you're in a low-lying area, and you can't get out, providing that upper entrance in advance of the storm is a really useful thing to consider.

Amy 57:03

Alright, so for our third question today, this person was asking about, well, this person was asking about another person and what they did in their colony. But this individual regularly checks the solar activity forecast before opening her hives. So she says that the bees are more agitated on days with higher solar activity. So are there any studies to confirm this? Is this something that beekeepers should be looking at before they go into their colonies?

Jamie 57:38

Amy, I had to do a little bit of background research in anticipation of this question. I saw this question coming in. I didn't really see any research related to this. The only project that I saw was someone in the 1980s that actually looked at how solar radiation affects flight activity. And even that was not overwhelmingly significant. It was like what you would expect, at higher levels of solar radiation, you get a little bit more bee flight. So I would argue that this person is probably just doing something that they've found based on anecdotal observation. I would say I've worked bees under inclement weather and weather conditions of all types, and I've really not noticed a pattern with sun intensity or solar radiation intensity and bee behavior. That doesn't mean it's not there. It just means that I've never really worked bees around in one way or another and haven't noticed that there's something happening. So I would say it's one of those things that remains up in the air, but I wouldn't plan my beekeeping activities around it, honestly.

Amy 58:35

Right. Sounds good. All right. Well, beekeepers, if you have questions -- I've been loving the fact that beekeepers have just been emailing us with questions, with comments. Some beekeepers, Jamie, have been recommending certain guests, and I love that. So, beekeepers, if you have a guest scientist, an educator, a beekeeper who is doing something interesting, send their information our way, and we can take a look at having them as a guest on our podcast.



Serra Sowers 59:08

Thank you for listening to Two Bees in a Podcast. For more information and resources on today's episode, check out the Honey Bee Research Lab website at Ufhoneybee.com. If you have questions you want answered on air, email them to us at honeybee@ifas.ufl.edu or message us on social media at UF honey bee lab on Instagram, Facebook and Twitter. This episode was hosted by Jamie Ellis and Amy Vu. This podcast is produced and edited by Amy Vu and Serra Sowers. Thanks for listening and see you next week.