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SPEAKERS

Jamie, Stump The Chump, Honey Bee, Bill Hesbach, Amy

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. In this episode, we'll be joined by Bill Hesbach who's a master beekeeper and President of the Connecticut Queen Breeders Co-op. He will be joining us to talk about how to overwinter honey bee colonies, specifically how much insulation they need and whether or not they need ventilation. We'll follow that with a Five Minute Management on how to be a good neighbor. If you keep bees at some point, you're going to have people on the other side of the fence interested in what you're doing and you want to make sure and keep those folks happy. We'll tell you how, and of course, at the end of today's podcast, we'll finish with our question and answer segment. Hello, everyone and welcome to this segment of Two Bees in a Podcast. I've actually really got a treat for you guys. I write a monthly question and answer column for the American Bee Journal. It's called "The Classroom," and there are plenty of times where our readers, in that case, ask me questions that I can't answer. One of those is that I live in a warm climate, so anytime I get cold climate questions, how to overwinter bees in cold climates? Well, what about insulating bee colonies? I have to find someone I can ask, and I've gotten a lot of those questions recently, which brings me all the way to our guest today, Bill Hesbach, who's got a lot of different expertise in his background. I'm gonna go through this list of things that he's done. He is a master beekeeper with the Eastern Apiculture Society. He's completed the master beekeeper program with the University of Montana. He writes regularly for the American Bee Journal and Bee Culture. So a lot of beekeepers around the US and elsewhere have heard of him. He's the President of the Connecticut Queen Breeders Cooperative, soon to be president of the Connecticut Beekeepers Association. He runs his own Apiary called Wing Dance Apiary out of Cheshire, Connecticut. All of that,

he's even hosted me in his house when I spoke to the Connecticut Beekeepers Association. Bill, I'm not sure what you can't do as a beekeeper. Thank you for joining us on Two Bees in a Podcast.

Bill Hesbach 02:55
You're welcome. It's an honor to be here.

Jamie 02:58
Well, I tell you, it's funny that we're able to interview you now. It happens to be winter. It's February 3, 2021, and winter in Florida is different from winter Connecticut for sure. But every time I ask people about winter management questions, they always say, "Oh, you gotta go ask Bill. Bill knows all of these things." So a lot of our topic today is going to be winter management. But before we get there, Bill, if you don't mind could you just tell us a little bit about yourself, your background, how you got into beekeeping? We find that our listeners love to know a little bit about our guests. So introduce yourself. How did you get into this, and ultimately, how do you experience the joys of beekeeping?

Bill Hesbach 03:36
Oh, well, my first introduction at beekeeping was way back in the '80s. I read this little book on the art and adventure of beekeeping. It was an extraordinary little book and I kept it on my bookshelf for years. It sparked my interest. It was a father and son story about how they managed to navigate the peculiarities of beekeeping, and they explained it in very plain language. It just sort of hooked me right at the beginning. And I kept that little book in view on my bookshelf for a number of years. The first opportunity I got to keep bees in a sort of a hobby way was much later. And then, my interest sort of grew from that. When I began to actually experience beekeeping, I was just totally floored by both the art and the adventure of beekeeping. From then, it's just grown into a love for the basic insect. I love the biology piece. I like the fact that it draws me into the ecosphere. I've learned so much in the meantime about how all the floral sources work in concert with the biology in the colony. And I took it to another level by extending my education to different areas from professionals that would teach me more and more about beekeeping, and I just continually grow in the fascination of it all. So, essentially, I'm hooked. Basically, I love the science. Sometimes, I spend a little too much reading the science, but I also love the observational part. And I think that if if beekeepers begin to understand how the biology and the colony is yoked to the ecosphere, they cross through some threshold that is just delightful and times that with the bees, just marvelous.

Jamie 05:25
Bill, you and I are cut from the same cloth. When I started keeping bees at 12 years old, I was just interested in just keeping bees. But the longer I kept bees, the more I just kind of fell in love with what bees do, their biology, ecology. I remember when I was able to stay in your house in early 2020, I really got that sense from you, that wonderment, amazement, associated with just watching bees do what they do. Oh, by the way, they give us honey and pollinate our crops. It's neat, it's neat. It was a neat interaction. I'm grateful that you're able to join us today.

Amy 05:56

So Bill, it's funny that you had mentioned that you were reaching out to the specialists and the researchers, because, now, you're our go-to person. So we, actually...

Jamie 06:07
No pressure, Bill, no pressure.

Amy 06:11
So we actually received an email, we had put out a survey last year asking people about what questions they had for our podcast, just different topics that they wanted to hear about. And one of our listeners had emailed us and said that, up north, they usually do some kind of extra ventilation or use a quilt to help with overwintering. This listener had recently heard Dr. Meghan Milbrath, who we've had on our podcast in previous segments, so they had heard that she actually, specifically, does not use any kind of extra ventilation. And so this was something that she had recommended that we speak to you about. So I guess you are our expert, now, on ventilation and overwintering, etc, etc, etc. So, with that said, I guess we'll just kind of start from the beginning. Can you talk to us about what honey bees do to survive during a cold climate?

Bill Hesbach 07:02
Yes. So in the northeast, especially in just about anywhere in the world where temperatures are consistently below 50 degrees, ambient temperatures, bees form a cluster somewhere in the colony, and they thermo-regulate from there, they generate heat from their flight muscles. They maintain a central core, a cluster of bees that are fairly warm, and then a mantle in what I would consider an outside shell. All three of those different areas are different temperatures, there's what they refer to as isotherms. They get warmer in the middle clusters -- well, it's actually quite warm in the middle, the mantle is a little bit different temperature, and then the outside shell is just a single layer of bees facing inward. Now, if you think about -- if your viewers want to visualize this in some way, they can actually use a chicken egg to think more about it. The yolk being the sort of cluster, and the white being the mantle, and then the outside shell is the same as the outside shell of a cluster. So those parts are where the bees regulate temperature. It gets very complicated when you start thinking about everything that occurs inside of a cluster during the winter, all the moisture that's developed from just a regular metabolization of honey, and all of the the oxygen levels and carbon dioxide levels that change. There's a bunch of folklore or oral tradition around what people try to do to either mediate -- what beekeepers do to try to mitigate the effects of excess moisture in the cluster, and also, the gases that come off of the regular bees eating honey, metabolizing, honey. Yeah, so there's a lot of areas to talk about in the actual cluster piece. So I usually leave it there, but we should really flesh out some of the peculiarities, especially around ventilation, because beekeepers just, in my opinion, don't really understand much about that part. In the northern climates where it gets really cold, if you follow some of the folklore, oral tradition around ventilation, and all the rest of the ideas that take moisture away from the colony, you can do some damage.

Jamie 09:19

Bill, you've said a few things now that make me want to ask about a million questions. So, I'm trying to make sure and get all of my questions in because I think this is very important to listeners, because, I guess, the questions I received for the American Bee Journal as well as questions I just get randomly emailed here at University of Florida or get left on our social media, those questions end up being season-specific. So when it's winter, I tend to get a lot of winter-type questions. So recently, I've really been getting a lot of questions about insulation. One that I can remember is a gentleman emailed me and said, "I'm a builder. I understand R-factors and this and that the other and I live in a northern climate and I'm just curious what research has been done on insulating colonies, making insure that ventilation," and I was looking up and I was really struggling to find information, true scientific information on insulating colony, which is when I reached out to a couple of colleagues and they pushed us to you, and here we have this podcast episode. So, there are so many things I want to ask you. I guess I'll just start with a basic question. How important is ventilation in a colony? And then after that, I'm going to ask you, well, how important is insulating a colony during winter? So first things first, how important is ventilating a colony while they are clustering, and is it important at all?

Bill Hesbach 10:38
This is an issue that I constantly get questioned about also. So to actually get your head around the need for ventilation or not in a colony, you have to run back to how bees survive in trees. Bees in trees are adding no additional ventilation to that colony at all. The way they deal with moisture is completely different than when we have taken them out of that tree and put them in a thin-walled box. So when we did that, when we took bees out of trees and began to keep them in boxes, then, we assumed the responsibilities for the vapor cycle and ventilation and all of that, that the bees control quite naturally, inside of a tree. So there's a dichotomy in understanding. Either you understand the notion of how a bee colony condenses moisture and deals with CO2 inside a tree and how that same process takes place inside of a box, and if you ventilate, without knowledge of the needs for that cluster inside that box, you can put them in a survival mode that will require them to use a tremendous amount of honey to keep warm all winter. It can be dangerous to the bees. Now, what I like to tell people when they ask me this question is you can actually survive in your own home, if you go up to the top floor and open up all the windows. Your furnace will come on, and you'll use a lot of fuel, and you can get through the winter, you might even survive, but the cost of that is a lot of energy that goes out of the colony in different ways. And so in my thinking of it in my own research with it, and I include some of the work by guys like Derek Mitchell who know the fluid mechanics of this much better than I do, and also my own observations about actually replicating that whole idea about how bees in trees use their moisture and condense it in forms that give them back latent heat and all of that. I try to reproduce that in my own colonies and I make them into condensing boxes. So what I'm known for in the beekeeping community is somebody who knows about condensing colonies and how they work. By condensing colonies, I mean that one colony that conserves moisture and uses it in a way that's beneficial to the bees. The whole water cycle inside the tree has been perfected over millions of years by bees, or, at least hundreds of thousands.

Jamie 13:22

So, then, just quickly, as an interjection, I'm reading into your statements, and hearing you say that moisture in a colony is not necessarily bad during winter, which is what a lot of people's kind of robot recommendation, "Well, you got to get that moisture out, you got to get that moisture out." So you're saying bees can actually use it to their advantage?

Bill Hesbach 13:39
Well, actually, bees have evolved to be conservationists of moisture in the winter cluster. What we've done is, and there's a good reason for this, Jamie. The reason for it is that beekeepers observed right away that what happens in a cluster where you have no insulation on that box whatsoever, I'm talking about a Langstroth box, now, with a cluster in it, the bees give off a certain amount of moist air, and natural convection is that that moisture will go upward because it's lighter because it's been heated, and it meets a cold surface. The first thing that happens is it will condense into moisture at that point. Beekeepers' early on adoption of thin-walled boxes noticed this. Some of that might even freeze up there right over the top of the cluster. Then, when a little bit of warm weather comes, it might defrost and then drip down cold water on bees. So that observation led to the practice of adding ventilation, except there's absolutely no knowledge base that could guide beekeepers in that respect. So how much ventilation do you add? When the folklore around that is incredible. It's a continuum from power ventilation where people have put solar devices on to blow into the cluster in a winter, clothes pins under the telescoping cover to all kinds of different quilt boxes. All of that is all because folks notice that they can kill their colony if there's no insulation over a cluster that's producing moisture in the middle of winter. Now, if you can reverse all of that by doing a simple thing, and the most simplest way to deal with the way bees develop their moisture in the cluster in a winter is to insulate over the top of that cluster. Heavily insulate over the top of that cluster. What you do when you do that is you let the normal convection flow come up, but it meets up a barrier of insulation, higher value insulation. In that case, the moist air spreads out over that top once it's warmed and finds its way down to the peripheral of the bee box and down along the sides of the comb. Maybe even out the bottom border, if you have a screen board, it goes out there. And in that way, you've recreated what occurs inside of a tree, the exact same thing happens, bees have been happy to propolise the entire inside of their natural cavity. When moisture goes up to that top surface, there's almost an infinite amount of insulation over top of a beehive inside of a tree, and there's also a thick layer of insulation around the sides of the beam. Literally, the same thing below. But, that's not even a consideration. So once you've recreated that inside a Langstroth box, the bees begin to function in the way that they are accustomed to function and have been, and they go back to being able to control the moisture and the vapor exactly the way that they have evolved to do it inside of a tree. Very spectacular things happen under those conditions. One is that the carbon dioxide in the center of that cluster increases, and also, the oxygen level goes down. It puts bees, in that case, into hypoxia, which would normally kill human beings. But bees have a way to go into an ultra-low metabolic rate at that point. They conserve energy and benefit the whole cluster. So bees have a way to not only deal with the moisture that comes off of their cluster, they have another way to actually shift their biology in the center of that cluster that makes them more efficient at using fuel. Then the rest of it, the moisture that does escape from the colony finds its way up to that top layer. When it does condense on the outside walls, when it spreads out along the top and finally does condense on the outside walls, it gives off latent heat in the form of droplets. There's a lot of energy

stored in vapor because it needed a lot of energy to vaporize. Then, when it condenses, it gives that latent heat off. In that way, the bees have learned, through evolution, that they can actually recover a percentage of the heat that they invest in making vapor. That's not something that can happen when you ventilate a colony. All of that stuff goes out to the atmosphere.

Jamie 13:40
I was gonna say, let me just ask, then, for a summary statement on ventilation. You would argue don't ventilate, insulate.

Bill Hesbach 18:08
I would argue don't ventilate, insulate. Yes.

Jamie 18:25
Okay. Alright.

Bill Hesbach 18:26
Absolutely. And over the top of the cluster.

Amy 18:30
Over the top. Kind of like what you would make as a tree. I mean, it would basically be like the honey bees sitting in a trunk of a tree.

Bill Hesbach 18:37
Yes.

Amy 18:38
Okay. So, then, what are some arguments that people would have against insulation? Because I know that you did write an article that we will link to our additional resources, but there was a section on the arguments against insulation.

Bill Hesbach 18:53
Yes.

Amy 18:54
So what are some of those arguments?

Bill Hesbach 18:56
Those have been slavishly repeated fallaciously over the top over the years. One of them is that if you insulate your colonies, they won't feel the temperature change, and they can't take advantage of cleansing flights. The inconvenient truth about that is that that's absolutely not true. I mean, I run colonies all the time in my yards, and I insulate heavily on my production colonies. And there are other colonies that, for different reasons, I don't insulate during the year, and I observe their cleansing flights

and they occur almost identically in both insulated colonies and uninsulated colonies. So, the first myth I would try to destroy is that bees can't feel the outside temperature in an insulated box, and they don't take advantage of cleansings. That's absolutely not true in my experience, and I know of many other beekeepers that have built my insulation sleeve and have reported the same thing to me over the years. So that's one. The other one is that if you provide insulation, then you prevent the sun from warming the box. Well, we know nothing about the solar gain from, say, wrapping tar paper around your colony. Folks suspect that some of the winter sun heats that tar paper up to some temperature and then, somehow or another, that warm air rising off that tar paper mysteriously heats the inside of the box. But that's not what happens. So if anybody really is interested in looking at how all that works, I refer them to Owen's study. In 1971, he did a study up in Madison, Wisconsin, and he did it for five years. So he took 1,200,000 data points using 16 to 2200 different thermal couples that he placed strategically inside all those colonies. And you can go look at the actual way that those isotherms change with the changes in heat and environment. Now, he used control colonies, heated colonies, and what they referred to back then as PAT colonies, which would be insulated. If anybody wants to see how that changes, they can just look at all of that data. A lot of its graphical. So it's not a whole lot of technical reading. You can get through that, and when you come out of that study, just looking at the graphics, you'll understand that the ambient temperature has very little to do with the way the isotherms or the different temperature gradients inside the colony work. Bees have an incredible sense to figure out what the ambient temperature is because it's always hitting their cluster in some way. They know. The bees know that it's 50 degrees outside or 55 degrees outside, and we can take a cleansing flight. So those are the two big ones. The real confusion about insulation for beekeepers, and the one that I would encourage beekeepers to really look at, is the use of substances that are sort of pseudoinsulation, like tar paper being wonders. That is not insulation, but a lot of beekeepers think about it as insulation. It's a building material that was used to wrap houses, or it's still used to wrap houses, to keep out their wind, the infiltration of wind.

Jamie 22:23
It's so funny that you mentioned that one as an example because a lot of the things that I see that people sell as colony wraps, to me, look very thin, and like they would have essentially no R-value at all. You're mentioning tar paper, but I've seen these kind of black shells, too. So I mean, I think this is spot on. A lot of people think they're getting benefits from stuff that they're likely not getting benefits from, right?

Bill Hesbach 22:44
Absolutely. The other insulation material that is -- people will realize that tar paper may not be insulation, because, first of all, it has to have mass. It has to have thermal mass and it has to have an R-value. Of course, tar paper has none of those. But the other one is homasote. Now, Homasote was a popular, is a popular addition to winter beekeeping up here in the north. I would discourage anyone from using Homasote on a colony for any reason. First of all, it's a paper product, and it's put together with different adhesives. And one of the features of Homasote is that it was used inside building envelopes. Building envelopes require insecticides, so they put borate in it. So, this is a percentage of insecticide in all good Homasote. Now, when I wrote this in my article, I got a letter from one of the

sales managers in the region for Homasote, and he wanted to have this discussion with me about, why was I saying this bad thing for beekeepers and Homasote. Then he sort of acknowledged my thoughts about it. He validated my thoughts that they use borate solution inside their Homasote for insecticide. So, my opinion about putting -- and then, by the way, also, if you think about it, it does have half of an R-value when it's dry. But if you put it on top of a cluster, where most people put it, it gains moisture very rapidly because it's paper. When it does that, it not only loses all of its R-value, but it becomes a block of frozen material on top of the bees, which absorbs heat and radiates cold back to the cluster. So I would discourage that. By the way, the other big misconception about insulation is that -- and I see this all the time -- people will put insulation above ventilation. That does absolutely nothing. That negates the complete use of any kind of insulation. So they'll put quilt boxes on top of bee colonies in place of the inner cover, and then they put materials inside there to collect moisture and they drill holes inside of the box, get really inventive about it. And they filter a lot of cold air right over the top of the cluster and and then they put an insulation on top of all that, which does absolutely nothing. That would be like putting insulation in your backyard, hoping that it would help with your heating bill on your house.

Jamie 23:25
Bill, I --

Amy 25:20
That doesn't work.

Jamie 25:34
So, Bill, I think this leads to a really important kind of grand conclusion. So beekeepers, maybe you're listening at this point going, "Okay, I know not what to do." So what, then, do you recommend? People, I don't know, maybe a third or half of the world's beekeepers are keeping bees in cold climates. So what do you recommend regarding ventilation and insulation? What do you think is necessary to do?

Bill Hesbach 25:58
Well, I fall into a marginal category of beekeepers that subscribe to this whole idea that if you can get your colony back to where it functions in concert with the way bees have lived in trees, that's what you do. To do that, in wintertime especially, you run insulation over the top of your cluster and nothing else, no top ventilation at all. Most beekeepers put top ventilation in even if they have an insulated cover, and what occurs there, and then, lots of guys like Derek Mitchell and all those folks can do the fluid dynamics much better than I can. As a matter of fact, the formulas make me go crazy. But, you can get thermal siphons and draw cold air right to the center of a cluster and defeat everything that the bees are trying to do to maintain heat in that cluster. So I suggest that if folks are really interested in this and they want an idea for it, if you're going to link my article to it, I explained how to make that. In the back of that article, I explain how to make the box that I recommend people use over winter. And it basically lets the bees regulate the hive gasses exactly the way they want.

Jamie 27:17

Then, we will make a point, Bill, to link that in our show notes so people can have a look. So it seems like some take-home messages are do not ventilate. There's no top ventilation. Number two, insulate over the top of the hive. And could you give us just a brief overview of what that looks like? Are we talking two or three-inch layers of what? With the R-value of what? I mean, what does this look like?

Bill Hesbach 27:36
Yeah, so it's enough to use one inch of foam, in my experience, but folks that have adapted my box method have gone to extremes with the top insulation and put on, say, R-25 or so, but I usually go around R-7 insulation. That's just a one-inch layer of foam. I make a sleeve that also goes over the outside of the same material, and then I also make a special sort of telescoping cover that goes over both of those. So if you look at the way my colonies winter, they winter inside an insulation shell that would be similar to a tree. The closest I could get it. Then, during the winter, I check on, all the time, when I think it's appropriate for me to get in there and take a look at the inner cover, and I can see on my telescoping cover, when I lift my telescoping cover, I can see the patterns of moisture on it, and there is never any droplets of moisture over this center cluster. By the way, the bees will then find their way up to that insulation and they lay on it all winter long. So my bees winter on the top box as a result of that. It's the same way bees would winter in a tree as high as they could possibly get.

Amy 28:46
So do you have beekeepers that have taken what you use for practice between ventilation and insulation? Or I guess, lack of ventilation and insulation? Do you see that other beekeepers are also doing this? And have you worked with commercial beekeepers versus small-scale beekeepers on this and what does that look like it? Is the practice different? Has it worked differently for different beekeepers that you've worked with?

Bill Hesbach 29:10
Yeah, well, so, now, let me just back up a little bit and flesh out, just for a second what happens if you don't insulate. If you insulate, then you do need to put some kind of ventilation in that colony because if you don't insulate, you'll run into the original problem. You'll have a bunch of moisture that'll freeze on whatever cold surface that moisture hits, and it could drip down on the cluster. So, if people are obstinate and say, "Well, I don't want to insulate at all. You don't need to do that," and all that, there's a bunch of that, then they do have to provide some kind of ventilation or they're gonna run into a situation where they might kill their bees from excess moisture. Not excess moisture buildup in the colony but the fact that it condensed into frost and then melted and came back down on top of the cluster. So I'm not suggesting that everybody not ventilate. What I'm suggesting is that people run their colony with insulation over the top cluster and as much around the side as they want to build. If they do that, then they don't have to ventilate at all, and they shouldn't put a top ventilation in. If they don't insulate anything, and they want to let their bees run in cold boxes all winter long, then they do need to do something about the moisture because they will end up with a problem because the bees on the outside of that mantle will be generating heat to survive. Those on the outside mantle, those bees are only about 50 degrees or so, and they have to make sure that they're consuming lots of honey just to

stay alive. When they do that, they make a lot of moisture, so you can mitigate all of that by insulation. But if you don't insulate, you're gonna get a lot of moisture.

Jamie 30:58
I'm gonna just restate Amy's question, so how do you see that, Bill, differing between -- I could see small-scale beekeepers running out and doing this, but what about a beekeeper with 10,000 colonies? Is this a recommendation for them too? That's not, no. The beekeepers that I know that have 10,000 colonies, they're down in your neck of the woods right now. They don't stay. They don't overwinter in cold climates. Not that I know of, and if they do, they probably don't pay -- I don't know any of them that actually stay cold, big operations that stay cold in winter. And if they do, they do it like they do in Canada. They'll put them in wonderful, big spaces that they've designed to winter bees in. The trend, as far as I know, from my discussions with Matt and those folks up in Canada, they've sort of perfected the art of cold wintering by putting them in storage units that keep everything at about 40 degrees and 40 degrees is the perfect ambient temperature for wintering bees. They use the least amount of resources, and they don't fly because the ambient temperature doesn't allow their flight muscles to work. Before that temperature, when it's colder than that, they don't move and they generate a lot of heat around 40. They're in that sort of sweet spot. And then, as it gets above 40, they become more active and use more fuel. So people that overwinter understand the notion that they have to maintain that sort of temperature, that 40 degree temperature, big operations that do that in the commercial sense. Then the other thing that they do up north, which I think is incredible, is they have begun to winter over in single boxes, and they actually bury all their single boxes in igloos of snow, no ventilation, no outside sunlight, nothing hits them. They replicate that sort of environment of an inside wintering situation under an igloo of snow yards, with mounds of snow, which in all logic, people would look at that and say, "You just killed your whole yard of bees." But when they dissect those things later on in the season, if you were to cut one of those in half diagonally, you would notice that the bees have excavated a portion in front of the colony, even under that dome where they can fly and have their cleansing flights and go on and manage their cluster the way they would in a 40 degree environment. So it's kind of interesting. When I travel a lot at research meetings, one of the big topics these days is indoor cold storage, just like what you said that Canadian beekeepers are doing that, a lot of beekeepers up north. And you're right. Commercial beekeepers basically do one of two things. This is an overgeneralization, of course. But you're right. A lot of them come down to warmer climates over winter, where it's warmer or, they're exploring some of these newer strategies like overwintering in cold storage units, basically, large refrigerators that are able to accommodate thousands of colonies. So Bill, let me ask you a burning question. This will be the easiest set for you today to spike this question down. I get this question asked to me, probably, every third talk I give. What about screen bottom boards? Do you suggest closing screen bottom boards on colonies during winter, given everything that you've just said? For screen bottom boards, I suggest that folks put some piece of Lauan or something that will block even a sticky board, something that would block that screen. And the only reason is that, again, if you look at it -- I don't want to get too technical about it -- if you look at the fluid dynamics piece of it, it's not likely that you're going to get currents to go up through the colony through the screen. I always think we have nor'easters. We had one just a couple of days ago, different interesting patterns of wind occur around the colony, and that could drive some real cold air streams up into the colonies. So just to block that,

insulation on the bottom is not necessary. Well, Bill, let me just say that I've learned so much during this interview that I'm now going to start answering questions differently than I have in the past.

Amy 35:09
Yeah, we actually have an answer.

Jamie 35:10
Yeah, I feel like I need to run back and rewrite a couple of things. But it's too late for that. Bill, that was great. Thank you so much for spending time with us on Two Bees in a Podcast and sharing with us your knowledge about insulation, ventilation, and overwintering colonies. Yeah, it was a lot of fun, and there's so much more to talk about in terms of the dynamics of that winter cluster. It's a science in itself. If your readers are interested in some of the things we talked about, and also some of the points I made, some of the science that I'd suggest that they look at it a little bit and do some research, Mobis is one that synthesized a lot of this research into an article he wrote in ABJ back in '89, that's available, and they could get that. Look at Southwick's work, if there's technical folks that that want to read some more. There's a bunch, but Southwick has a bunch of interesting science on the winter cluster and how it operates and what it does with moisture and how it gets into these low metabolic rates and all that. There's lots of other ones. Owens, as I mentioned, up in that Canadian study. Lots of good information around. What I've discussed about how the winter cluster operates is not my opinion. There's lots of solid science behind it. Well, Bill, I'll tell you what, we'll make a point and link to these articles you suggest. That way, when people hear this podcast, they'll be able to read these documents on their own. So thank you so much for that. This has been a great discussion. Everybody, that's been Bill Hesbach, who wears a lot of hats, has a lot of background, but we'll say he's a master beekeeper for the Eastern Apiculture Society, a master beekeeper at the University of Montana, writes articles regularly for the American Bee Journal, Bee Culture, President of Connecticut Queen Breeders Cooperative, soon to be the President of the Connecticut Beekeepers Association, he runs his own apiary out of Cheshire, Connecticut called Wing Dance Apiary, certainly a good expert on overwintering colonies, insulation, and ventilation. Everybody, I hope you enjoyed that segment, learned a lot. Make sure and check out the show notes so that you can learn more about strategies that you can do to your colonies or use on your colonies to overwinter them successfully.

Honey Bee 37:22
Have questions or comments? Don't forget to like and follow us on Facebook, Instagram and Twitter @UFhoneybeelab.

Amy 37:47
All right, it's Five Minute Management time. Jamie, I have started the timer, and our topic for today is how to be a good neighbor.

Jamie 37:57
Yes. So, Amy, you made me nervous that you've started the timer because there's 25 recommendations I have on how to be a good neighbor. So before I even start to answer, we're going

to link a document I wrote about this topic in the show notes. Since I can't speak about any one of these for any great length of time, go to the show notes. Click on that link to this document and you'll see all of these expanded. So, Amy, here we go. All 25. Number one, locate your apiary or colonies away from areas where people or domestic animals frequent. You just don't want people to encounter your colonies a lot. That just make sense. Site your bee colonies away from property lines, don't put them right up against the neighbor's fence. Number three, make your colonies inconspicuous. Whenever possible, hide them behind bushes, put them around the corner, etc. I've discovered when people don't know your bees are there, miraculously they don't get stung. When they know your bees are there, somehow, they get stung all the time.

Amy 38:55
How does that happen?

Jamie 38:56
Out of sight out of mind. Number four, when people can access your colonies easily, make sure you mark those colonies with signage to signal their presence and to advise people to stay away. Number five, fence your colonies whenever possible. If you are able to put a fence around them to keep folks from stumbling across them, that's great to do. Number six is not something you have to do but some people have done and it's worked for them: rooftop beekeeping. Some people in subdivisions just put their bees up on their garage if they've got a flat roof and that keeps the bees all together out of the way of their neighbors. Number seven, and this is hard for beekeepers, be reasonable about the number of bee colonies you keep per unit area. If you live in a subdivision and have half an acre of land, don't put out 100 bee colonies. Your neighbors will not like you. So, be reasonable. Some people disagree with me on point eight, but what I always say is it's probably better to tell your neighbors about your bees. You can always tell them with a jar of honey. "Hey, I'm keeping bees on the property. Just wanted to let you know that. Here's a jar of honey so that you'll be okay with it." Some people say, "Don't tell your neighbors about your bees." But I tend to like to have everything on the table so they know where to go if there are some issues. Number nine, don't take guests close to your bee colonies if they're not protected appropriately. I have made that mistake plenty of times. It's very tempting to say, "Oh, I love my bees, and they're so nice, and I'm going to take my neighbor by them today." That's guaranteed to get your neighbor stung in the face. So only take your friends or neighbors or guests to bee colonies if they are protected appropriately. Number 10, give only professionally conducted tours and public demonstrations of the bees in your apiary. In other words, you want to do it well and right and not set yourself up for a problem, which leads me to my next point. 11, have insurance. If you're going to keep bees where people frequent, you might want to have some insurance to protect you from liability issues. Number 12, consider developing and using a sting waiver. If you're one of those people who like to take folks into your bees and you want to follow some good neighbor guidelines, have a sting waiver, something that says, "Hey, you're going to work bees with me and you could get stung. Here's what you need to know." Number 13, be mindful when managing bees in public places. People love to watch people work bees, just be aware of that. Number 14, take similar precautions when keeping bees on private lands. Again, if you might be keeping bees at a library but you also might keeping bees in your backyard, you want to just make sure that you're professional in both settings. Number 15, learn

as much as you can about bee stings, how to prevent them, and how to treat them. It's useful to be able to spot problems with stings, responses to stings, if you take people into your bees a lot. Number 16, provide your contact information to people who live near or frequent the area where your colonies are, that way they can get a hold of you if there's a swarm or the bees are doing something crazy. Number 17, register your bees with your state or appropriate local regulatory authority. Even if it's voluntary, it's good to be on their books. Number 18, ensure that your bees have a good source of clean water nearby, otherwise, they will end up where you don't want them. Your neighbor's swimming pool is a hotspot, as an example. Number 19, use bee stocks known to be gentle. Don't use bee stocks that are known to be defensive. Number 20, re-queen defensive colonies. Don't allow a colony to be mean. That colony will get after your friends and neighbors. 21, ensure that your colonies have adequate food reserves so they're not robbing or going after the sweet stuff in your neighbor's backyard or showing up at their picnics.

Amy 42:42
You've hit five minutes, but I guess I'll let you continue.

Jamie 42:44
I know. I only got a few more. I'm surprised that I'm actually making this much progress.

Amy 42:48
I added a little bit of time, I felt bad for you.

Jamie 42:50
22, don't place or leave anything in your apiary that's going to cause an apiary-wide feeding frenzy. In other words, if you live in a subdivision, don't put out a super to be robbed by your bees. That's just not good neighbor practices. 23, practice good swarm control techniques. You don't want your bees swarming into your neighbor's yard or clusters of your bees hanging out at the nearby school. So practice swarm control practice. 24, follow all locally adapted best management practices. In other words, whatever the experts are recommending for you, as far as management goes in your region, do it. 25, finally, work your colonies in a way that minimizes colony disturbance. Use smoke, be calm, do things that don't send your bees into a frenzy. And if you do all 25 of these things, you'll be doing lots and lots and lots to be a good neighbor with your bees and beekeeping. Don't forget to check out this document in the show notes. There's a lot more information. But Amy, that was as quick as I could do it. There are lots of pointers in that one.

Amy 43:57
There are lots of pointers on that one. Yeah. So now everyone knows how to be a good neighbor.

Jamie 44:01
Or at least a good neighbor with their bees. I don't know.

Amy 44:03

Yeah, that's fair.

Stump The Chump 44:12
It's everybody's favorite game show, Stump the Chump.

Amy 44:23
Alright, it's question and answer time. Jamie, the first question is regarding temporary queen pheromones. This person is asking, if they were to put a stick of queen mandibular pheromone in the hive when removing an old queen, will the bees sense or not sense queenlessness and not build queen cells? I didn't even know that queen mandibular pheromones were a thing.

Jamie 44:47
Yeah, so just like the name implies, queens produce pheromones from their mandibular region. There is a bouquet of chemicals in it but there's one or two key chemicals in it. And in this particular pheromone, this is one of the ways worker bees know that they have a queen present in the hive. You could actually purchase synthetically produced queen mandibular pheromone. It's impregnated in these little plastic strips. We've used them in the past, a lot, for research purposes. I know some beekeepers will use them in queenless colonies and things like that. So the listener is essentially asking, if I de-queen the hive and put in one of these queen mandibular pheromone sticks, would the bees believe themselves to still be queenright? I would argue, for a little bit of time, they certainly would. But, ultimately, it's not just queen mandibular pheromone that signals that she is present. There are also signals that the bees pick up through the presence of brood and other things. There are a lot of feedback loops that collectively would tell the bees, hey, we've got these conflicting messages. We're receiving information through queen mandibular pheromone that we've got a queen, but on the other hand, we don't have brood and we're missing some of these other chemical signatures. So I feel like maybe for a little bit of time, they might be fooled, but ultimately, they'll figure it out. I read ahead, this listener specifically is interested in knowing can this be used as a strategy to improve acceptance of new queens? Right? Am I reading that correctly?

Amy 46:29
Yep.

Jamie 46:29
Yeah. The idea is, is it a better way for them to accept queens? What I would argue is at the end of the day, the tried and true measures of re-queening colonies with mated queens is really the way to go. So right when you purchase a queen, she's in a wooden cage or a plastic cage. You stick that in there, and as the bees chew through the candy in that cage, by the time they release the queen, they've accepted her because they've spent some time getting to know her. What I would argue is, if you feel like using QMP is necessary for you to get bees to accept queens, if they've already failed to re-queen themselves, what I would argue is there's a much better strategy to do that than incorporating QMP into the queen-rearing strategy. And what I would say is that's using nucs to re-queen colonies. I have a document on that we'll make sure and link in the show notes for this particular question. Using nucs to

re-queen honey bee colonies, to me, is the best way to address a multitude of problems when you are losing a queen, and your colony may have failed to re-queen themselves, or they have laying workers etc. But, all the way back to the original question, you can use queen mandibular pheromone to stabilize colonies for a little bit of time in the absence of a queen. That's the reason we use it in our research. There might be times when we want to do research projects where we don't want a queen to be present but we still want the bees to be stable for a while, and we can put these QMP sticks in there and achieve that purpose.

Amy 47:58
That's pretty neat. Just as far as you saying to basically put in a new nuc when you're requeening, I guess I've never thought about that before. It's a great idea. I mean, you have all your resources, the colonies, basically put together, ready to go, and they've accepted their queen. So yeah, I hadn't thought about that before.

Jamie 48:14
Amy, that's spot on. When you're re-queening with a queen in a cage, what the bees get in return for that is a queen. When you're requeening with a nuc, you're getting a queen, brood, honey, pollen, and bees. And that's why I argue, you know, that's another question, maybe another segment for another day, but that's why I argue having a couple of nucs on hand in your apiary is very useful because I can't really think of a queen problem that would arise that's not best addressed through re-queening with a nuc. But I can think of lots of problems that would arise that aren't as well addressed using caged queens or things like that or allowing bees to make themselves a queen. So I love using nucs for that purpose. We'll make sure to link that document in the show notes so folks can have a look at that document and see some of my ideas.

Amy 49:01
Great. Okay, so for the second question, this person's wanting to know if you can explain the flight capabilities and the homing abilities of young nurse bees. So this is if they ever should find themselves outside the hive. So let's say, I'm a horrible beekeeper, no, I'm just kidding, I'm a great beekeeper. Let's say that I accidentally drop a full frame of bees and brood on the ground.

Jamie 49:24
So do horrible beekeepers drop frames of bee and good beekeepers not? I don't know, Amy. Seems like you dug a hole there.

Amy 49:32
That's why I said just kidding. No. So what if I accidentally drop a full frame of bees on the ground? Will the youngest nurse bees be able to find their way back inside?

Jamie 49:36
Yeah, I totally get the motivation behind this question. So if you had asked me this question about a year and a half ago, I would have told you a completely different answer than the one I'm about to give

you now. So we all know that bees start their home-finding ability flights somewhere around two weeks old. I'm rounding that off. That's a generalization. But about two weeks old, they'll start making small flights from the hive, figuring out where the hive is in context with other landmarks, and that prepares them for foraging, which they usually start somewhere around 19 to 21 days old. Again, biology is messy. You've heard me say that a lot. There's a lot of wiggle room there. All right. The reason I'm going to answer the question differently now is about a year and a half ago, maybe two years now, I forget, we set up an observation hive study where we were going to look at the impacts of pesticides on bees, but it required us to mark about 200 bees when they were newly emerged. We marked them and placed them into their respective observation hives. So yellow bees would go into observation hive one, red bees, observation hive two, blue bees, observation hive three, and we had 12 observation hives, each with different color newly emerged bees. Within 24 hours, we were finding bees in the other observation hives. Some of them, a few observation hives down the wall from them. That was incredibly surprising to me. I did not expect to see bees in the wrongcolony for about two weeks. But within 24 hours, 24 to 48 hours, it wasn't in high amounts, but we were seeing it. Yes, theoretically, they could have crawled out of their observation hive down the outside wall of our building and into the next observation hive, or the second or third one from them. But it was an easier explanation to believe that they just went out on a flight early on within their first 24 hours, and they ended up going into the wrong hive. Well, how this helps me answer this question is once bees bodies are hardened and they are capable of flying, somewhere between 24 and 48 hours, then yes, if they fall to the ground during an inspection, I have every reason to believe that they'll fly back into that hive, or maybe accidentally the wrong hive, just next door. So I don't worry about that at all. The only new bees that I worry about are those that are less than about 24 hours old, whose bodies aren't hardened and they're unable to fly. If they dropped to the ground, the only hope that they have of making it back into the hive is crawling up into it. So, where I live in the state of Florida, we have a lot of ant problems. If I'm working a hive and a lot of these newly emerged bees drop to the ground, they'll be taken out well before they're able to crawl back up the hive stand into the hive. So to answer this listener's question, I would argue the majority of those newly emerged bees will make it back into the hive, but you will have some that are unable to fly. I don't know what the ratio is, but my guess is at least 50/50 that they make it back. I've seen them crawl back up into the hive stand. I know a lot of beekeepers, especially hobbyist beekeepers, if they feel like a lot of bees have dropped to the ground, they'll rest sticks from the ground to the entrance. So bees will crawl up sticks to go back into those hives if the hive stand is difficult to navigate. But yeah, I would have answered that totally different a few years ago. I'd say "Well, you know, the bees can't fly and there's a low probability they'll make it back." But after seeing our preliminary results from this observational study, they're flying at a much younger age than I thought they were and certainly capable of making it back into the hive.

Amy 53:19
So what about the queen? Do you think that the queen, if she fell off the frame during inspection?

Jamie 53:24
Absolutely. I believe she'll make it back a good chunk of the time. But you have the same problem with her that you do with super young worker bees. And that's, oftentimes, when they're laying, they're

unable to fly. In fact, when they swarm, the bees have to stop feeding them so much and they have to make her exercise so that she loses weight. So the real problem with queens is not can she recognize her hive, it's can she fly at all? So it's a much bigger risk when you drop a queen to the ground than when you drop a few workers. I will say, though, there's a second way that people see their queens lose. I happen to release my queen -- when I'm re-queening using a caged queen, I will release her manually into the hive and queens that have been sitting in cages for a few days absolutely can fly. There have been times where I've opened up the queen cage and hoped that she would crawl down into the hive, and instead, she crawled up the queen cage and flew away. That leads to the next question. Will she ever find her way back? I will tell you, I have seen this happen dozens and dozens and dozens of times. I have always found her back in that hive at my next inspection. So I have seen plenty of them fly off of the comb, fly out of the queen cage, and me be superduper worried, only to find her seven to 10 days later back in that hive.

Amy 54:51
Just kidding.

Jamie 54:52
The thing about it, Amy, that's remarkable to me is how does a queen who's never been free running in that hive, a caged queen that I just released, how does she know which hive to go to? So it's just remarkable to me. But if you have a fully mated and laying queen fall from a frame to the ground, I would say there's a much lower probability that she's going to make it back into that hive alive.

Amy 55:12
Awesome. All right, so for our third question, we are recording this right now in March, so it's springtime, almost springtime. It's getting warmer outside, and so people are wondering, what is the optimal way for bees to build new comb during nectar flow?

Jamie 55:29
Well, the good news is building new comb during the nectar flow is the easiest that you'll be able to do it throughout the rest of the year. Bees just have the propensity to build comb that time of year, and furthermore, it takes considerable amounts of energy to secrete and handle and manipulate that wax into comb.

Amy 55:47
So, what do we do to help this?

Jamie 55:49
Yeah, so the key is the bees want to do it anyway. So how do we optimize that? Well, you need to go into it knowing a couple of things. Thing number one, for every little bit of comb that they're going to have to produce during the nectar flow, it's going to cost you a little bit of the production of the honey that you otherwise would have made, right? So what I always tell people is comb is gold. You want the bees to make it that first year, you want them to make as much of it as you may ever need to use in that

hive the first year. And then, as you extract honey out of it, you want to store that comb in a way that they never have to build it again. You could freeze it. You need to protect it from wax moths, what have you. But pulled comb is gold. You really want them to make it the first year and then to be able to hold on to it. So then, how do you coerce the bees to do it during the major nectar flow? Well, there's no coercion necessary. They're just going to want to do it. If you give them boxes with frames of foundation, they're going to try to build comb. Just a couple of pointers though. Pointer number one, I do not like to mix drawn comb and frames of foundation in the same box when I'm trying to get them to pull that foundation. What I like to do when I'm getting them to draw comb or pull that foundation is give them an entire super of exclusively foundation. That way, they'll pull it correctly. The reason I say that is I know some people who will say, "Well, maybe I can coerce them to pull those combs faster if I give a frame of foundation and a frame of pulled comb, and then a frame of foundation and a frame of pulled comb." But what I see happen a lot in that scenario is they will make that frame of pulled comb fatter than it already is. Then, they'll pull out the foundation into cells that are really short, or worse yet --

Amy 57:34
So, you'll end up with like wonky comb.

Jamie 57:36
Exactly. Or worse yet, Amy, bee space will be violated. So what they'll do is they won't build comb on the foundation, but they'll build it hanging off the edge of the top bar. You get lots of wacky patterns. So I like to just give them, exclusively, a box of foundation. I don't like to cycle in a few frames here and there. I like just to make the whole shebang foundation. Then the question is where do you put that box? Do you put it on top of the uppermost box? Or do you put it below all the honey supers right up against the brood nest? Research has shown that it doesn't really matter. So you can just save your back, put it on top, and if the bees have the incoming resources necessary to pull it, they'll pull it. If not, they won't. So, there's a couple of pointers there. Don't mix pulled comes with foundation and just put the empty box on top. Again, you are going to lose honey production the first time that those boxes are pulled. It's just what's going to happen. As a result, some beekeepers will try to get bees to pull comb outside of the honey flow, and they'll do that by feeding. But that costs you other ways. It's the management costs as well as the cost of feeding them sugar syrup or corn syrup. So, that first year, it's a good idea to let them use the major nectar flow to pull out that comb. But those second and third years, it's a good idea to make sure that you protect those combs well so the bees never have to pull it out again.

Amy 59:00
Great. All right. Well, thank you so much. Hey, everyone, thanks for listening. Today, we'd like to give an extra special thank you to our podcast coordinator Lauren Goldstein and to our audio engineer James Weaver. Without their hard work, Two Bees in a Podcast would not be possible.

Jamie 59:26
For more information and additional resources for today's episode, don't forget to visit the UF/IFAS Honey Bee Research Extension Laboratory's website ufhoneybee.com Do you have questions you

want answered on air? If so, email them to honeybee@ifas.ufl.edu or message us on Twitter, Instagram or Facebook @UFhoneybeelab. While there don't forget to follow us. Thank you for listening to Two Bees in a Podcast!