

# Episode 52 Mixdown PROOFED

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## SUMMARY KEYWORDS

pollinators, bees, beekeepers, pollinator gardens, research, land, honey bees, honey bee colonies, clint, hive, colonies, grassland, forage, landscape, northern great plains, north dakota, crops, land use change, put, humans

## SPEAKERS

Stump The Chump, Guest, Jamie, Amy, Honey Bee

### 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. Welcome to another episode of Two Bees in a Podcast. In this episode, we will be joined by Dr. Clint Otto, who will be talking to us about land use changes and those changes' impact on pollinators. In our Five Minute Management, we'll be talking about proper colony inspection techniques. And of course, we will end today's podcast with our famous segment, I answer your questions, or at least try to, in our Stump the Chump. Hello, everyone, and welcome to another segment of Two Bees in a Podcast. Well, Amy, honey bees aren't the only bees on the planet. Did you know that?

### Amy 01:27

What? No way?

### Jamie 01:28

It's a surprise. Well, there are a lot of pollinators out there right there. Honey bees are just part of this larger umbrella or larger group of insects and bats and birds, etc. that actually move pollen between plants and help us out. And, as a result, there are lots of people who study pollinators from a lot of different perspectives. And I know all of our listeners are fully aware that humans make significant impacts on the landscape around them, and all these impacts that we make on the landscape can affect all kinds of things, not to mention pollinators. So in this segment, we're really going to focus on discussing land use change and its impacts on pollinators. And we're fortunate to be joined by Dr. Clint Otto, who is an expert on this topic. Dr. Clint is a Research Ecologist for the Northern Prairie Wildlife Research Center, the US Geological Survey in Jamestown, North Dakota. A lot of his research focuses on the development of decision-support tools for informing natural resource policy and management. Some of his current research projects include modeling the effects of agricultural and land use change on pollinator habitat, health, national pollination services, etc. So, Clint, I'm really excited to have you

join us on Two Bees in a Podcast. Thank you so much. I appreciate what discussion we're about to have.

**Guest** 02:42

Thanks for having me.

**Jamie** 02:43

Clint, one of the ways that we like to do this is every time we have a new guest, and you're a new guest for us, we just want to hear a little bit about your story. How did you get into bees and bee research, and working with pollinators? And how did you find yourself at the US Geological Survey?

**Guest** 02:59

Well, I'll say I grew up in central Wisconsin. And at the time when I was pursuing my undergrad in Biology, I thought I wanted to be a career amphibian biologist. So I went on to grad school and I actually majored in Biology with a focus in Herpetology, which is the study of amphibians and reptiles. So I saw myself wandering around the tropics, catching frogs and learning about their populations for the rest of my life. And I pursued research that looked at how human disturbances affected amphibian populations. And I continued that through my PhD. So it wasn't actually until I arrived at Northern Prairie Wildlife Research Center in 2012 that I actually ended up looking at pollinators. And I did that through strong mentoring. See, my mentor at the time, Dr. Chip Ullis, helped me understand how the plight of the wildlife that I was studying was very similar to the plight of the bee. And he also helped me understand what was sort of unique about the plight of the bees and bee declines, which is that there was a much more vocal societal outcry about declining bees when compared to the vertebrates that I study, compared to the frogs and the birds and so forth.

**Jamie** 04:29

That's kind of crazy to me, I tell you, because you're working on amphibians, and then you transitioned to bees and other pollinators. Just with bees, there are 4000-4500 species in North America. I mean, even though you had kind of that basic ecology and landscape impacts on organism background, did you find it a steep learning curve to have to become familiar with bees and the different species and identifying them and stuff?

**Guest** 04:56

Absolutely. And to be clear, I am not a pro at identifying bees, as you point out. It's great because I get to be a student of my own research. I recognize my own deficiencies in the field of entomology, and I get to build a team around me to help fill those deficiencies. I have great entomologists, people with bee background that are part of my team. For me, I have this wildlife background so I take a different approach to the science. And I've applied tools that I've learned as a wildlife biologist to the field of entomology, so I think it brings a little bit of a different perspective to me, in terms of how I ask questions about pollinators and pollinator health. For example, in doing honey bee research, I like to think of myself as having my head outside of the bee box, looking at how things around in the local landscape surrounding that honey bee colony affects what's going on inside that honey bee colony itself. So, I've enjoyed my journey in doing pollinator research, and it's kept it fresh in that, again, I get to be a student of my own research. And of course, that's tremendously challenging. But I've got to work with some great people, very knowledgeable people that have helped me out on that journey. And

so I've been doing that, I've been doing bee research since 2013 and really have never looked back. And of course, all my research, as you alluded to in the introduction, it really focuses on landscape change and how that affects pollinators and also, the stuff that we care about that pollinators do for us humans. So, specifically, pollination services. I get to work with a variety of partners to do applied ecological research, for example, documenting what what flowers honey bees and wild bees are using in our region so that they can use the data to inform the design of pollinator friendly seed mix. So it's a little bit about my journey as to how I got to be doing bee research.

**Amy 07:12**

Clint, I have a lot of questions for you. Now, I'm supposed to only ask you one, but I'm going to ask you multiple. So my first question is, do you only focus on bees? Or do you focus on other types of pollinators?

**Guest 07:25**

Well, I would actually say I go well beyond just pollinators. And as you know, there are things out there, vertebrates, even, that are actual pollinators, hummingbirds and bats, for example. But I still do work on grassland birds, for example. So beyond just pollinators, but again, I see this connection, that the stuff, the threats that our bees face are the same threats that are being faced by our wildlife species. But now, the focus, the societal focus seems to be on bees. And so I can use bees as my model organism to understand how stuff that we humans do to the landscape, how that affects bees, and recognizing, though, that there's a lot of value to other species and biodiversity in general.

**Amy 08:19**

Sure. And so when you're talking about landscapes, are you talking about backyard residential landscapes or more like ag land? Does that make a difference?

**Guest 08:30**

For the focus of my research, it's mostly on ag land. So I live in the northern Great Plains, which is this sort of mosaic of grasslands and agricultural lands that are used either as pasture and grazing lands for cattle, or crop farmland. So when I say landscapes, I'm typically from my own research, I focus on the agricultural communities of the Midwest.

**Amy 08:58**

Cool, perfect. Okay, so then how does land use change impact pollinators?

**Guest 09:05**

Well, I think it's a pretty straightforward question. If we know that plant pollinator interactions are sort of the basic framework for our terrestrial foodweb across the globe, flowering plants need pollinators to facilitate sexual reproduction, and our insect pollinators, they need plants to supply them with pollen and nectar, their sources of carbohydrates, protein, and lipids. So when a natural or human disturbance affects the availability of flowers on the landscape, we can evaluate that this is going to impact our pollinator communities as well. And so I've chosen, through my research, to look at land use change as one of those factors that affect the availability of flowers for pollinators. And I'm going to just give you a little example of what I mean by land use change. In the past 15 years, there has been a considerable amount of native grassland and conservation grassland that's been converted to row crop in the

northern Great Plains. For example, where I live in North Dakota, we lost about 1.6 million acres of conservation grassland since 2006. And just to give you a reference, I had to look this up prior to our meeting, but that's about 1/3 the size of the Florida Everglades, just in one state over a 15-year period. So if you can imagine losing that much habitat in just 15 years in a single state, and these grasslands, of course, are where the flowers grow. I mean, that's where honey bees go to forage, native bees forage as well, and they nest there, it's where monarch butterflies lay their eggs on milkweed. These grasslands are really, really, really critical habitat for our pollinators, as they are for the rest of biodiversity. So, concurrent with the loss of this grassland, in this region, we're also seeing this rapid increase in corn and soybean production. Corn being wind-pollinated, so there's not much in the way of bee nutrition there. And soybeans have their legume in a relatively brief flowering window. But this far north, they don't actually produce much nectar, and so there's not much in the way of season-long forage for bees in either corn or soybean fields. And that's sort of the way the winds are blowing. We're seeing more and more corn and soybeans pop up out here and less and less grassland. And these are, I want to understand, I want to recognize that your audience is very diverse, and they probably have never seen the Great Plains. And so don't don't think of these as little five to 10-acre patches of corn and soybeans intermixed with tree rows and meadows. I mean, these are large-scale monocultures where over a quarter mile or even a whole square mile, there may be nothing growing except the individual crop that was seeded. So the agriculture out here is highly mechanized, and we're seeing more and more of it as time goes on.

**Jamie 12:19**

So, Clint, I'm sitting here listening to you answering your comments, and I'm thinking about you this conflict between this growing human population and this growing demand to feed humans. So that sucks up more and more land really around the world. This isn't really just, as you noted, limited to the Great Plains. But then I think about the conflict between that and then preserving habitat for pollinators that are so important for food production or other organisms that are just important for life. And so it's really tricky. I know that there are so many discussions going on around the world about how to deal with this. I work in a college of agriculture at the University of Florida and there's always lots of conversations about how to grow more food on less land. It's just tricky, and there's a lot of science going into that at the moment but, kind of getting down back to pollinators and how land use change affects them, all these things that you mentioned about native pollinators, that's true. I work with honey bees and the land use can change. This can also impact honey bees. Can you share some ways that land use might impact honey bee colonies as well?

**Guest 13:28**

Oh, certainly. Yeah. And it goes back to what I said earlier. I mean, in short, if we have disturbances that cause flowers to disappear on the landscape, our pollinators are going to be affected and that includes honey bees. When we talk about wild bees, typically, we refer to grasslands as habitat because the wild bees are going there not only to feed but also to nest. When we talk about honey bees being a managed species, typically we refer to grasslands, as forage lands, because that's where honey bees are going to forage. They're going there to find pollen and nectar and all the flowers growing there. And that's why beekeepers come to this region because of the abundance of forage for honey bees. So we've had this rapid conversion of grassland to row crop in our region. And I'll give you an example of one of the studies we did. Starting in 2015, we set out to investigate how these land use changes were affecting honey bee colony health and we had the great privilege of partnering with some

commercial beekeepers in North Dakota, South Dakota, and Minnesota. We selected a variety of apiaries that they've used for, perhaps, even several generations. These beekeepers have used these apiaries and they had a different amount of row crop and grassland around them. So we tried to select apiaries across this landscape gradient of grassland to row crops. We had some apiaries that were surrounded by a lot of grasslands. So we thought it'd be a lot of forage for bees. And then we had some that were surrounded mainly by corn and soybeans. And we went into each apiary, and we monitored the health of the bees, we took health assessments in the spring and then the late summer after the growing season was complete. We analyzed pollen for crude protein, and also performed a genetic analysis to identify the pollens that the bees were bringing back to their colony. And then finally, we monitored the weight change. We used a digital scale that we put underneath a subset of the honey bee colonies, and we recorded weight every 15 minutes throughout the growing season. And through our research, we've shown that honey bee colonies that spent the summer in areas surrounded by a lot of grassland grew more rapidly than those colonies that spent the summer in areas surrounded by a lot of corn and soybeans. And in some cases, the colonies that were surrounded by corn and soybeans actually shrank in size over the summer. In effect, they got smaller over the growing seasons, and this makes sense, in the sense that colonies with less access to forage are not going to do as well as colonies with abundant forage. And what's more, we followed these honey bee colonies into the almond orchards in California some six months later, because all these colonies, of course, in the northern Great Plains, they don't spend the winter in the northern Great Plains. Nobody wants to spend the winter in the Northern Great Plains, and beekeepers are loading up their colonies on the back of trucks and they're transporting them, mainly to the Central Valley of California to pollinate the almond crop. And so we tagged each individual colony that we studied. And then we found it again in the almond orchards, some six months later. What we found is this continued land use signal in the colonies that we had tagged, that is colonies that spent the summer surrounded by a lot of row crop agriculture were much smaller during almond pollination, and thus, the delivery of the pollination service in California depended on the availability of forage in the Northern Great Plains. So I say often, half-jokingly, almonds are grown in the Northern Great Plains because the almonds aren't going to grow unless you have the bees to do the pollination. And there's other work out there that also shows that bees, honey bees, specifically, in natural land covers have better health and they're better able to fight off diseases and pathogens. The bees that also can consume a more diverse pollen diet have heightened immune system function. So those are some of the mechanisms by which individual bees respond to land use that ultimately culminates in colony health and the pollination services that they provide.

**Jamie 18:14**

I love that story. It's very poetic to think about how diverse landscapes in the Northern Great Plains where bees are visiting there can improve bee health to the point, and grow colonies to the point that those colonies, then, are able to go and help agriculture and other states. I mean, that's really exciting. I mean, we try to sell the same story here in Florida because about a quarter of the nation's bees end up passing through Florida at any given year, somewhere between a fifth to a quarter. We overwinter colonies here and we make the point that a lot of what happens in Florida could affect other states as well. This very poetic, very beautiful story of natural landscapes, this diversified pollen in floral sources for bees really improves their ability to assist in agriculture throughout the season, that's really neat.

**Amy 19:03**

Yeah, I feel like I'm gonna go a little off topic here. But a lot of beekeepers do migrate to Florida before they head out over to almonds in California. And so are there a lot of beekeepers, and this is for Jamie or Clint, I guess, a lot of beekeepers that stop in North Dakota before headed down, I know they probably don't go up to North Dakota, but is that part of a typical migratory route that beekeepers will go on?

**Jamie 19:27**

Actually, a lot of beekeepers do go up to North Dakota from here. There's a lot of honey resources, right, Clint? I guess clover is a pretty big crop grown up there. So a lot of beekeepers will pass through. In fact, if I'm not mistaken, Clint, you can maybe correct me if I'm wrong, North Dakota is one of the three leading honey producers in the whole US because of its abundant nectar resources.

**Guest 19:50**

Well, North Dakota is number one.

**Jamie 19:52**

Okay, there you go. I sit corrected.

**Guest 19:57**

Yeah. The beekeepers that I've worked with and been able to meet on this journey of doing bee research, many of them, their families have been coming to North Dakota for four or five generations, as beekeepers, I mean, every year. It's awesome. Every year, we have about 35% of all the honey bee colonies that are in the US, they are trucked to this area that we call the Northern Great Plains. And beekeepers do that because they know they can make a viable honey crop, and they can also have their bees recover from the migratory stresses that Jamie highlighted, the migration of beekeepers and their honey bee colonies. That's stressful. That's stressful for bees. They need time to spend and have access to clean forage and recuperate from that migratory pollination circuit. North Dakota is one of the principal places that beekeepers like to come.

**Jamie 21:05**

If you're a listener from overseas and you're listening to this podcast right now, I know it sounds very US-centric, what we're discussing, but land use is affecting beekeepers all around the world. But I just want to give you a sense of the scale of apiculture and beekeeping in the United States. Florida to North Dakota is a few thousand kilometers away from one another, but it's very common for our commercial beekeepers, at least, to move their colonies, thousands of them. If you consider all the commercial beekeepers, a million plus colonies moving all around the country, multiple stops for broad pollination services. Clint, you're spot on. They stop in North Dakota, which for some beekeepers like those in the state of Florida, perhaps Texas, might be 1000 or more kilometers away. And so this idea that they can come to North Dakota kind of as a safe haven because there's still a lot of natural habitat and preserving pristine habitat with diversified floral resources is very important. I think what we're talking about now, Clint, and your research, is very vital, in my opinion, to the long-term sustainability of beekeeping, not just in the US, but I think it's going to have broader implications for beekeepers around the world as they struggle with these same issues in their own areas, whatever land use change means to them. It's something that's going to affect their colony, as well as their general pollinator population health.

**Guest** 22:24

Certainly. This problem is not going to get any easier to solve when we have now 8 billion people on the planet and everything. We need lands for food, fiber, and fuel, we're going to continue to see changes to our landscape that we're gonna see pressure continued to be put on natural lands. And this is going to result in loss of habitat, unfortunately, for our pollinator community. And if I may, just to give context to what you had said earlier, Jamie, about the pollination circuit here in the US and how North Dakota is this sort of central hub, in North Dakota, we have about 700,000 honey bee colonies that are trucked here every summer. That's almost more honey bee colonies than we have human beings in the state of North Dakota. It's increasing every year because we're seeing more and more honey bee beekeepers and honey bee colonies being brought to this region, and it's also a time period where we're seeing fewer and fewer resources on our landscape for bees. So there are more beekeepers and more honey bees and fewer resources to go around. And as an ecologist, I'm concerned what that means for competition, not only between, well, beekeepers competing for space, but also individual honey bees and what that means for honey production. And it also runs the risk of greater disease transmission rates, right? We're packing these honey bees into smaller and smaller areas as forage lands continue to dwindle. We're just seeing tighter and tighter spaces. And this has effects on the beekeeping industry and their economic solvency.

**Amy** 24:22

So Clint, I guess, after talking about ag land, and you've mentioned food, fiber and fuel, I like that, so why is the topic of land use change important for citizens?

**Guest** 24:35

Well, I would say in the context of pollinators, it's important for any citizen that likes to eat food.

**Amy** 24:43

That's fair. I like to eat.

**Guest** 24:45

Yeah, okay. Yeah, I do. I do as well. And recognizing that we need our pollinators, honey bees, and our native bees, and all the other pollinators on this planet, we need them. I mean, they are the foundation both of our agricultural economy, as well as terrestrial food webs across the globe. I mean, if we don't have those plants, and the plant and pollinator interactions, it's going to affect our own human wellbeing. And that's kind of why this research that we're doing shows this linkage between the forage lands and the Great Plains and pollination services elsewhere in the country. I mean, that, to me, tells anyone, even if you're living in downtown Manhattan, why you should care about what's going on in America's breadbasket, with respect to the land use changes? Because it's affecting the ability of honey bees to provide that pollination service.

**Jamie** 25:49

Gosh, there are so many things that we could talk about in this context, this, how important pollinators are to humans, etc. And, Clint, you've talked a lot about the background, but in reality, there's got to be research done to address this issue. We've talked a lot about what the issue is. So I'm curious, then,

what are some steps that are actually being taken to improve forage for pollinators on managed land? What's the work being done to help address this issue?

**Guest 26:17**

Well, there's a lot of work. There are a lot of great people out there that are doing work to address so I don't mean to suggest that it's all doom and gloom. I mean, we have a problem on our hands, as I mentioned, about a growing human population, and we all need access to lands for food, fuel, and fiber. But there are a lot of people that are working that recognize that we have to come together to resolve some of this stuff. And the basic goal is this, or the solution is we need to get flowers back on the landscape and also conserve what remains that's out there. And it really boils down to maintaining and enhancing the ecological integrity of the landscape. And so if we do that, we're going to improve conditions for our honey bees, our native pollinators, our birds, and the frogs, and all the other critters, including our own human well-being. I mean, we humans, we are a part of this ecological system. So I include that in ourselves when I talk about ecological integrity of landscape. So if that's the goal, how do we get there from here? That could be the subject of a whole 'nother podcast, I feel like. But some of the things that need to happen to prevent further pollinator declines, first, we have to help conserve what native habitats are left and reduce the conversion of grassland to row crop. We know that we're losing pollinator habitat. For example, the tall grass prairie that historically ran through the eastern part of the Great Plains, there's about 1% of the tall grass prairie that's left in the North American continent. We need to conserve what's left of that tall grass prairie. Secondly, conservation programs that are sponsored through, for example, the US Farm Bill, they can be enhanced to promote environmental stewardship and put grassland back on the landscape. And these programs are really vital in my part of the country because they target private lands. So most of the land that's out here is actually privately owned. So we can have the greatest impact in improving habitat and forage for pollinators by targeting private lands just because of the sheer footprint of private lands out here. And thirdly, and perhaps most importantly, I think we need to take a hard look at agricultural practices going on in the US, and indeed across the globe, and ask, is this sustainable for generations to come. And there's concepts of regenerative agriculture and precision agriculture that are gaining a lot of traction in parts of the Midwest in the US, not because they're just environmentally friendly, but because farmers can actually profit from them. So those are some of the things that I think need to be done and are being done. We have, for example, the Pollinator Health Task Force that came out in 2015 and issued three goals for bolstering pollinator populations. One of those goals was actually the creation or enhancement of 7 million acres of pollinator habitat by 2020. And that's been sort of an all-hands-on-deck approach where we've seen every line of government trying to take action to improve pollinator habitat. I work with a lot of great people within the US Department of Agriculture that are doing work with egg producers and landowners to try to create pollinator habitats on small portions of land and on farmland. And so there are people taking great action. But we have a lot more work to do if we're going to combat pollinator declines and sort of circumvent what's going on with respect to land use change.

**Jamie 30:14**

Clint, it's hard to watch the news at any point and feel good, like we're actually moving in a positive direction or anything. And as someone who works with bees, people only ever come to me with the issues, right? They don't ever come to me and say, "Hey, my bees are doing great, life is so good." It's always like, "My bees died, what's going on?" So, in that context, and given everything you've said, is the future bright for pollinators? Is this an issue that we humans are going to address successfully?



**Guest 30:44**

That's a tough question to answer. It really is. I am an optimist. I want to remain an optimist. I know, though, that our planet has a tremendous challenge ahead of it with our growing human population and climate change. I mean, climate change is the elephant in the room that we need to address not only for pollinators, but for our own human well-being. I like to think that when we look at a local level, that there are some really good people doing a lot of great things for pollinators. I want to hold on to that positive energy because you're right, Jamie, when you turn on the news, it's really easy to get down in the dumps about what's going on. But again, focusing on that global or that local level, I see a lot of positive action. I mean, even having friends, for example, that are willing to take their lawn in their own little quarter acre that they own in town and actually convert that into perennial cover or putting out some sort of pollinator garden, I mean, these are all little steps that we average citizens can take to help address bee declines and just get biodiversity back on that little piece of property that we may own or manage. I think those are really important steps. And so I think I think the future is bright when we get to talk to all the people at the local level that are trying to do things. And that's the positive energy I choose to hang on to.

**Jamie 32:23**

Well, maybe this is an incorrect statement, given all the attention that pollinators get, I find it, sometimes, difficult to get people like super duper excited about pollinators. Everybody's aware of the issue, and it seems to be growing and fancy, but I think if folks listening to this podcast today are people, just general citizenry, if they just plant a couple of blooming plants in their yard, and just take a moment to see what shows up and see the beauty, the biology, the behavior of the things that's going around, and then appreciate how important those things are to our own survival, then they can look at something like what you're researching in the Northern Great Plains and habitat loss and land use changes and all of this stuff with potential long term impacts on human populations, it should be quite, quite obvious and a rallying cry worth supporting. So Clint, I really appreciate the work that you and others like you and your collaborators, etc. are doing on behalf of pollinators everywhere and even beekeepers. This is kind of a beekeeping-centric podcast. But we owe a lot to research like this because these are issues we're going to have to address in the future. So I really appreciate you joining us today on Two Bees in a Podcast and talking about land use change and its impact on pollinators.

**Guest 32:38**

Thank you. I'd like to say, Jamie, too, that yes, everyone has a stake in pollinator conservation. If you were able to put out a pot of flowers outside, you're doing something to help protect bees. I've been amazed on my own little property that I own, just in a normal, rural American neighborhood. My little front yard, my wife and I have been able to put in some nice perennial cover and my goodness, have the bees returned. It used to be a barren rock bed and grass. And now we have a ton of different native bees showing up. We have monarch butterflies that come through and land on some of our golden rod that we planted during the fall migration. It's been spectacular to watch the changes that we've had just on a very small level, on a patch of ground that measures about 15 feet across by another 10 feet. We've done our little part on a local level. If everyone can participate in activities like that, I think the future would be very bright for our pollinator communities.

**Jamie 34:52**

I agree and I'm excited because I think people are starting to do it. To me, bees and pollinators are kind of one of those gifts that's just waiting to be unwrapped. So all you really have to do is go down to your local hardware store and find some pollinator plants, put a few out, Clint, like what you said. And you'll just be amazed at what shows up. I remember when my kids were super duper young, we had some nesting habitat out in the yard, and my kids were just amazed at the solitary bees and wasps that just used those. So I think about an area the size of a third of the Everglades disappearing over a 10 to 15 year period and how important that is to pollinators. Clint, we've got work to do. So thank you so much for your insight. I know this is going to be impactful and, hopefully, change the hearts and minds of a lot of folks out there and support this type of research.

**Guest** 35:40

Thanks for having me. I appreciate the time.

**Jamie** 35:42

Absolutely. Everybody, that was Dr. Clint Otto, who's a Research Ecologist for the Northern Prairie Wildlife Research Center, the US Geological Survey in Jamestown, North Dakota.

**Honey Bee** 35:57

For more information about this podcast, check out our website, UFHoneyBee.com.

**Amy** 36:07

Alright, Jamie, it's Five Minute Management time.

**Jamie** 36:11

I am ready, let's do this thing.

**Amy** 36:13

Okay, I'm not gonna push start until after I tell you what our topic is. But our topic for today is proper colony inspection techniques. And go.

**Jamie** 36:23

Alright, so just like many of these Five Minute Management things we've discussed thus far, Amy, I actually have a document on this and we'll make sure to link it in the show notes. But in that document, I kind of go through the steps of what you need to consider when working a colony. The first thing I like to do is I like to stand beside the hive. I don't stand in front of it or behind it. I don't stand in front because that blocks the bees coming and going. I don't stand behind it because it's awkward to pull frames. I stand beside the hive. Also, I make sure I have a well-lit smoker and I smoke those bees gently in the entrance as well as right under the lid right before I go into the hive. I make sure that I have own my personal protective equipment. Again, beekeepers can wear whatever they want to, suits, gloves, etc. but I always recommend that they at least wear a veil. Alright, so when I get to that hive and I'm standing beside the hive, the first thing I do is I look and see if flight activity is normal for the time of year. I also look for dead or dying bees on the ground around the hive because that can start suggesting if things aren't normal, or if things are taking a turn south. So I want to make sure from the outside of the hive things look normal. Also, while I'm working my hive, and I know this is one of those things that my mentor taught me forever ago, he told me that when you step beside that hive, lock your

feet in place. You don't want to move your feet around a lot because there will be bees falling from frames, hive boxes, etc. You don't want to step on those guys. So what you do is you lock your feet in place and you try to do everything just by squatting or turning or twisting but not moving feet. You minimize moving feet and you'll kill fewer bees. Also, when inspecting a hive, I try to be very fluid with my movements, no sudden jerks. I'm not yanking off the lid or removing with aggression that uppermost super. Everything is very methodical, it's very purposeful, it's very fluid. I always tell people a person who's working a hive well almost looks like they're conducting an orchestra. They're moving with fluid movements. That keeps the bees calm and really helps them do what you want them to do during the inspection. From there, I'll remove the uppermost super, if there is one, and I'll sit either beside the hive or perhaps on the lid on the ground. Make sure and not sit it flat on that lid or on the ground because you don't want to squash bees that are underneath that super. So you can rest it kind of catty cornered on top of the hive lid, or raised up on one end or the other when you sit it on the ground. I don't usually go into supers unless there's some reason I need to. I usually just can judge by their weight and the number of bees in there if everything's going okay. Usually, when I'm going for hive inspection, I'm going straight to the brood nest because that's where you're going to find out most of the information about that hive. So once I remove all of my supers and I'm in the brood nest and I'm standing beside that hive, I remove the frame nearest me. I usually inspect it for the queen, and then I set it on the ground beside me or on the stand if I have space on the stand, and I leave that frame out the remainder of the time because that gives me a space in the hive to remove the next frame, check it, put it back, and slide it towards me, remove the next frame, check it, put it back, and slide it towards me. So by the time I've inspected all the frames in the brood chamber, the empty space is on the opposite side of the hive. So when I replace that frame I took out, I can put it back over there. So, now, folks always want to know, what am I actually looking for? Well, I'm looking for eggs. If I see eggs, and I believe there's a queen, I'm looking at those larvae. I'm looking at the capped brood. Is it a solid pattern? Do they have enough honey? Are they bringing in pollen? Are the bees aborting brood? So you're looking for all of those things. You're wanting to make sure that there's no diseases or pests or nutrition stress. You want to make sure that your queen is present. You want to make sure that they have the food that's needed for them to survive, and you also want to make sure that all the activities are normal. Once I've done that, I simply put the hive back together in the reverse order from which I took it apart. The key is, though, when you're reassembling a hive, you want to make sure and do it carefully, slowly moving bees out of the way before you put frames back in, before you put boxes back together or the lid on because you really want to minimize the number of bees that you kill. And the last bit of advice is don't be afraid to use your smoker throughout the inspection to make sure the bees remain calm.

**Amy** 41:09

I have no idea how you just did that. You had six seconds left.

**Jamie** 41:14

Well, it was pure luck because there's plenty of other things that I wanted to say. But I'm like, I've got to be running out of time so I'm just going to stop now.

**Amy** 41:21

That's awesome. Thank you so much. Something that I feel like I learned was just keeping your feet in place. So we would love for our listeners to let us know what they learned from this segment.

**Stump The Chump 41:38**

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

**Amy 41:50**

Okay, it's question and answer time. We've had great questions coming in to our email and our social media pages. So thank you so much for interacting with us. It makes it a lot, I guess, easier for us because I basically just pull questions from you all and ask Jamie.

**Jamie 42:06**

I know, Amy. The only the only downside to it is we're getting so many questions now that there's just really no way we can keep up with it in the podcast. So there will be questions left behind, I'm afraid. But it's great that you guys keep sending them. Keep sending them and hopefully they'll make it to the air.

**Amy 42:19**

Well, we're trying the best we can.

**Jamie 42:22**

The best we can do. Right?

**Amy 42:23**

So the first question we have: do hives turn drone comb back into worker brood?

**Jamie 42:30**

All right, so let's think this thing through just a little bit. It's an interesting question, and there are a couple of different angles. Number one, when we start our colonies, we almost always put them on frames that include worker-sized cell foundation. The vast majority of foundation that's sold, the vast majority of foundation that's used has the imprint of worker-sized cells. So when we start bees in these types of hives that are given, essentially, exclusively worker-sized cells, the bees want to make drones. And so what will happen is, as they're constructing cells on that foundation, they will take a couple of areas on most combs and start drawing out drone cells. And it's always a really strange looking area. Again, the foundation is worker-sized, and so what they're having to do is change that a little bit to morph it into drone-sized cells. So you'll get some cells that are kind of intermediates between worker-sized cells and drone cells leading up to those patches that are drone cells. All right. Once they become drone cells, drone-sized comb, right, these cells, they will not revert them usually back to worker-sized cells. In fact, what I've seen in my beekeeping years is if there's ever a damaged section of comb, they will almost always build it back as drone-sized cells and not worker-sized cells just because, if you look in nature, up to about 20% of the comb, 20% of the cells are drone cells. And so they're taking what we give them and trying to convert some of it to drone cells, and they don't usually reverse that. They don't usually take it back in the other direction. If you feel like you've got too much drone comb, then you could always cut out some sections of that and see if the drones will build back worker-sized cells, or sorry, if the workers will build back worker-sized cells. I suspect, if anything, they're going to make it drone-sized cells again and not worker-sized cells.

**Amy 44:33**

So, if they're drone-sized cells, would a queen ever lay a fertilized egg in a drone-sized cell?

**Jamie 44:40**

So, Amy, biology is messy. So, absolutely, she's capable of putting fertilized eggs, so female eggs, and drone cells, unfertilized male eggs, in worker cells. But I would say it's the exception rather than the rule. The worker bees can detect when that happens and they'll abort those eggs to make sure that they're not developing in the wrong place.

**Amy 45:00**

Got it. All right. So we know that honey bees are very important to our crop pollination and a lot of people are really interested in adding pollinator gardens to their areas. So the question is, what is the impact of pollinator gardens on the pollination of these crops? So how does it impact that?

**Jamie 45:19**

Yeah, Amy, I'm going to give you the short answer before I give you the long answer. The short answer is this is a topic of active research. Alright. And the long answer will be me explaining that. So essentially, people have been hearing that honey bee populations are suffering, and then they heard that native pollinator populations are suffering. And so one of the chief recommendations that's been born out of both of these ideas is just plant more things for pollinators. And so a lot of homeowners are putting in pollinator gardens, libraries are putting in pollinator gardens, Cooperative Extension offices, schools, you name it.

**Amy 45:53**

Basically everybody.

**Jamie 45:54**

Yeah, a lot of people are planting for pollinators: wildflowers, bushes, shrubs, trees, etc. Alright. So you can look at that from two different perspectives. Perspective number one, you could say, hey, providing all of these floral resources is benefiting pollinators. It can only benefit pollinators because you're providing lots of nectar and pollen, a lot of pollinators, including honey bees, would be benefiting, therefore, all of these pollinators will spill over into our crops and benefit our crops, in general, because there'll be more pollinators to provide more pollination services. So that's one side of the argument. The other side of the arguments is actually equally valid, which is these pollinator gardens could be acting as sinks. That's the biological term we have, which means, essentially, that the pollinators may be pulled towards those pollinator gardens at the expense of the crops that we're hoping these pollinators are out there pollinating. So this is an active area of research. It was one of those things that quickly became a recommendation. The recommendation preceded the science. "We should just all go put in pollinator gardens." The best example of this is there was a huge push, and continues to be so, a big push about providing pollinator habitat around cropping systems with the idea of building up the native populations of pollinators out there because, of course, it could only help crops. But in reality, a lot of these crops that bees are used to pollinate, watermelons, cucumbers, cantaloupe, squash, almonds, what have you, a lot of these might be nutrient poor to the bees. And so if you're putting in wildflowers or shrubs or trees on the perimeter of these crops that are nutrient rich to bees, you might actually be diverting the bees from the crops to the pollinator flowers, etc, that you're putting out there. So, again, all the way back to the short answer is we're not quite sure about the whole impact, holistic impact that

these pollinator gardens have on things such as cropping systems. We believe that they're beneficial. We certainly know that they can provide a big benefit in the local setting for pollinator populations, but we're not sure what it would have downstream on crop pollination services. So now, I'm going to do the dangerous thing, and I'm going to answer not as a scientist, but just as a citizen, which is where I'll be a little bit more liberal in what I say. My guess is that the two don't overlap much, pollinator gardens and crops. My guess is that a lot of these individuals putting in pollinator gardens are helping very local populations of pollinators, but that the agricultural setting, these big huge cropping systems, neither benefit from nor are harmed by the small kind of patch pollinator gardens. Where we could really ask the importance of providing for pollinators are at these much greater scales that people are beginning to propose, like planting wildflowers on all the road sides or putting in pollinator habitat at farms. And that's where a lot of people are studying to see if there's benefits or drawbacks from putting in these things. So it's an interesting question, a lot of active research on it. And I think there's going to be a lot of information coming out on this topic in the near future.

**Amy 49:31**

Cool. I'm excited to see where the research goes and find out what people are actually finding out. That's neat. Okay, so the third question we have, this person is wondering about queen pheromones and the actual effects that they have on beekeepers. So this person says it may sound silly, actually, I don't think it's silly at all. But this person is more calm and focused when working bees, and I feel like a lot of people feel that way. A lot of people really enjoy working their bees because they do feel a sense of calm. Of course, there are other people who don't like bees who normally don't feel that sense of calm, but there are people. So are there any studies on the effects of, I guess, honey bee pheromones or queen pheromones at all on human beings?

**Jamie 50:18**

I can tell you, Amy, this is the first time I've ever been asked this question. What's the impact of queen honey bee pheromones on humans? Yeah, it's an interesting thing to consider. I'm going to chase a rabbit for a second. One of the things that I like to think about is there's this lecture that I give where I end up talking about pheromonal communication. Humans struggle to understand, well, we don't communicate through pheromones. But if you listen to a lot of scientists, they have argued in the past that humans did use scents. These days, we cover up a lot of our natural scents. We use, for example, deodorant to take out that smell that these days we think is not so good, but back in the day, may have been good chemical signals. And I always use this example, it's not uncommon for females who live in the same household to have synchronized cycles. And how does that happen if it's not chemically induced? And so there are a lot of these examples in the human world that a lot of people say, "Hey, see, humans might subliminally communicate with pheromones." So I guess what I would say as a scientist is it's not impossible for us to be picking up odors from bee colonies that have a calming effect. But my guess is it has more to do with whatever we find therapeutic that might be unique to us. For example, a lot of people find running therapeutic. I find it a struggle.

**Amy 51:48**

I am not one of those people.

**Jamie 51:50**

I have to do it because I feel like I want to stay in shape, but it is not in any way therapeutic to me. But on the other hand, beekeeping is. I will lose myself in time when I'm working bee colonies. But I feel like it has less to do with the odors of bees, the pheromones of queens or bees in general, and more to just do with what I find therapeutic. And I think some people get that out of fishing, some people get it out of dancing, some people get it out of painting. And I think we beekeepers just find that therapeutic release in beekeeping. But that said, I've given myself the escape route, saying, it's certainly possible that we're influenced, but I've just never seen research on it. And my gut tells me it has more to do with other things than the actual pheromones produced by bees.

**Amy 52:36**

Yeah, I think the great thing about us being about a year into our podcast is now we're getting these specialized questions that are a little bit more difficult to answer and there's so much out there that we still don't know.

**Jamie 52:49**

Oh, my goodness, so much. I'll tell you, if people want to study bees, I mean, most of the questions we've already addressed today are things that we could know a lot more about. So keep those questions coming. You're giving us great research ideas, if nothing else.

**Amy 53:11**

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 53:25**

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](http://ufhoneybee.com) Do you have questions you want answered on air? If so, email them to [honeybee@ifas.ufl.edu](mailto: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!