Speaker 1 (00:01):

Welcome to Earthly, a Clemson University podcast discussing issues of agriculture, horticulture, nature, and design impacting the world nation, state of South Carolina and even your home. Here's your host, Jonathan Veit.

Jonathan Veit (00:18):

Honeybees are a crucial part of the food system. In fact, they pollinate more than 100 of the food crops we eat, but a survey by Auburn University and the University of Maryland found that 48% of honeybee colonies we re lost last year. Today on Earthly, I talk to two experts in the protection and cultivation of honeybees. Brad Cavin leads a program that regulates the beekeeping industry in South Carolina, and Ben Powell runs Clemson extension's, beekeeping and pollinator program. They're going to explain the importance of honeybees, why they might be struggling, and steps we can take to help protect them.

Jonathan Veit (00:50):

Ben and Brad, welcome to Earthly. Let's start by talking about honeybees in general. First, what's the difference between the native bees? We might see flitting around our flower garden and the honeybees that we need to pollinate food crops.

Ben Powell (01:03):

The most important distinction is that honeybees, and to some degree, some species of bumblebees we refer to as managed pollinators. That means that humans actually cultivate, keep move them around for the purpose of pollination and other ecological services. That doesn't mean that they're any more important than the native and wild bees for pollination. And in fact, I would argue that the nearly 4,000 species of of bees that we have in North America are critical to ecosystem function. Everything from the deserts of the Southwest to the forests in the southeast rely heavily on these native bees and other pollinators. But for our crop systems where we are actually producing crops for food and fiber, we rely heavily on the western honeybee, which is managed by beekeepers and migrated around the nation to service these variou s crops.

Jonathan Veit (02:04):

So bees, native bees and honeybees are not our only pollinators. Can you talk about some other pollinators?

Ben Powell (02:10):

Well, let me make one other biological distinction, um, which is unique pretty much to the honeybee and, and maybe the bumblebees too. Most of our native bees are what we refer to as solitary bees. Uh, they live their lives by themselves. They do all of the work, the nest building, the brood rearing, and the foraging all by themselves. And, and that individual bee oftentimes occupies a very small area in the ecosystem. Honeybees and some of the other social bees like bumblebees, actually develop large colonies where they have division of labor, queens workers, drones, and, uh, they are growing a colony through the course of the year, uh, and increasing their numbers. But the honeybee, the western honeybee is unique even among them because it's one of the only insects that actually produces what we call perennial colonies. That means the colony actually survives the winter intact so that it can grow and be ready for the spring nectar flows.

Ben Powell (03:13):

That nature, that biology of, of keeping a colony living through the winter when there's no food, means that the honeybee is a manageable pollinator and, and is the most critical pollinator, but it's also lends it to some problems. And I think we'll talk a little bit later on about some of those problems and what beekeepers face. As for the rest of the, the bees out there, there are a number of different factors that are affecting both our managed pollinators and our wild pollinators. And I think a, a synopsis that was done in 2007 by the National Academy of Sciences, looking at the status of pollinators in North America, pretty much teased out that the number one factor that's affecting bees across the board is habitat, habitat degradation, um, fragmentation, the loss of the, the appropriate nesting and forage plants, uh, that, that all of these different species need. So really, the way we've changed the landscape is what is affecting bee populations the most. Now, behind that, we have some other factors. Uh, we are constantly importing and moving things around, so that means pests and diseases, are a particular problem, especially for the honeybee. And, uh, and then also issues with like pesticides, um, and, and other toxins that we, we put into the landscape. Uh, all of these factors is like death by a thousand cuts. Right? Um, and every different bee species responds differently to these various factors.

Jonathan Veit (04:51):

Can you talk a little bit more about the structure of the honeybee colonies? And I would imagine that's what makes them manageable is their sort of ability to organize themselves?

Ben Powell (05:01):

That's right. Oh, I, I mean, we could spend weeks, I mean, literally, I do a class where we took teach about the structure and biology of honeybees. It is the most dynamic biological system you can think of. Um, honeybees are amazingly adapted to be able to use their landscape, learn their landscape, forge across their landscape, grow a population, and work collectively to take advantage of that. So the honeybee colony is unique in that it creates a perennial colony. They, the bees grow a workforce and that workforce ventures out into landscape collecting food and other resources comes back, builds the colony. The honeybee actually excretes wax from within its body and forms that wax into the honeycomb. And then that honeycomb is used for storing food and raising brood in inside of the nest cavity. The work that's done in there is divided. The queen is responsible for regenerating the workforce by laying eggs and producing new bees.

Ben Powell (06:06):

The workers tend to those developing larvae, feed them, collect food, and manage the, the day-to-day chores of the colony. And then the drones, the male component in the bee colony is responsible for transferring genetic information to the next queens and next colony that's generated. So these different casts or, or, uh, types of bees in the colony have very distinct roles. And then the colony is organized by a tremendously dynamic system of communication. They use sound, vibration, touch, chemicals, pheromones, odors, a variety of different ways of communicating to regulate the activities of the bee colony. So anytime you have a problem such as a pesticide exposure or a disease or parasite that enters the colony, it disrupts that colony's ability to communicate and organize itself. And that's what has largely been one of the major issues with modern beekeeping, is some of these parasites and diseases disrupting the natural biology of the colony.

Jonathan Veit (07:16):

So, Brad, talk a little bit about the beekeeping industry. I, I, I've read that there are, you know, operations for hire that like transport bees all over the country to pollinate crops.

Brad Cavin (07:27):

Uh, yes, Jonathan, what you're referring to is the, uh, migratory beekeeper, and we're somewhat of a hotspot here in South Carolina for the migratory beekeepers. The migratory beekeeper. They transport their bees from up north to over winter their bees here in South Carolina, on average, we, we have 20 or so beekeepers a year that will do this and bring their honeybee colonies here to South Carolina. That process usually starts in November when the honeybees arrive. Um, the area of South Carolina that's most popular is along the coastal regions in spring, late January through March, some of these beekeepers do transport their bees across country to pollinate the almond crops. We probably certify on average about 20 tractor trailer loads of honeybees a year, uh, from South Carolina. Some of our states south of us, like Florida, they certify 100 or more tractor trailer loads of honeybees. So we contribute a small part to the almond pollination, uh, here in the U.S .from South Carolina.

Brad Cavin (08:33):

Once that pollination is done, many of those honeybees are sold off to other beekeepers, but most of those bees are brought back to South Carolina where the migratory beekeeper will make splits and increase their number of colonies and get ready to transport back north to go home. Um, when they travel back north to go home, uh, they do stop along the way. Some do pollinate blueberries in North Carolina. Others go up to Vermont and Maine to pollinate cranberries and apples, uh, before ending back in their, their home apiaries. These migratory beekeepers are responsible for bringing in, uh, on average about 20,000 honeybee colonies a year. And when they, they export the bees out of South Carolina, we're exporting anywhere between 30,000 to 40,000 honeybee colonies annually from South Carolina. The migratory beekeeper also supplies the beekeeping industry with honeybees. They make nucleus colonies to sell to beekeepers, they raise queens. So there's a lot of different aspects to the mi migratory beekeeper. Do we

Jonathan Veit (09:41):

Know how popular beekeeping is in South Carolina?

Brad Cavin (09:43):

Beekeepers aren't required to register as beekeepers in South Carolina. Uh, they're not required to register colonies or apiaries. So to give a concrete number on how popular it is, that's a really difficult answer, um, to provide. But I, I believe beekeeping is very popular in South Carolina, having the privilege of driving around the state and meeting with different local beekeeper associations. You know, it's, it's a, a very popular, um, thing to do to keep bees. Um, some beekeepers may manage two to three colonies. Some may have 50 or a hundred. It, it varies.

Jonathan Veit (10:22):

Ben, from an extension standpoint, do you have any idea empirically how, how popular beekeeping is in South Carolina?

Ben Powell (10:29):

Yeah, so like Brad said, we don't have mandatory registration in South Carolina like some other states do. So we don't have exact numbers, but I can give you some anecdotal numbers, which give you a feel for it. Uh, every year we run between 900 and a thousand beekeepers through our entry or beginner level, uh, training programs. And those are training programs delivered by the South Carolina Beekeepers Association. We provide some of the educational resources for that, and the, that's

delivered through local associations. There's about two dozen local associations across the state, and each of those maintains membership of, you know, 50 to a hundred. So on the regular, we have a, a lot of beekeepers that are meeting in these associations, but that's just a small fraction of the actual beekeepers in each county. Um, we would estimate there's probably four to five times that many beekeepers, and there's so many that are just ordering bees and keeping them in their backyard that we know nothing about.

Ben Powell (11:33):

Um, so I would say it's very popular and I think that popularity has increased exponentially over the past few years, um, largely due to population changes in South Carolina. We have received a, a seen a lot of population growth, especially along the coastal region of the state. And those are folks that are coming from larger cities, um, or larger urban areas that are finally retiring or they're moving to an area where they now have a little bit more space and they're like, ah, maybe let's try a hobby. Let's try beekeeping. And, uh, and we find out that when we do these trainings or, or events that their beekeepers come out of the woodwork. Um, one other thing I'll throw at you is if you actually look at social media, we have a number of social media sites, Facebook and Instagram, that have very, very large followings.

Ben Powell (12:28):

Um, there's a gentleman in Midlands, um, named Larry Cobel who manages a Facebook page called Beekeeping Hacks. I think there was a little double entendre there. He is like, we're hacks at keeping bees, or, or maybe these are some hacks you can use to keep bees. Um, and that membership in, or followership on that Facebook page is in the thousands. Um, so I, I believe that beekeeping even though there may not be a tremendous number of these large commercial beekeepers in South Carolina, beekeeping across the state is very common. And most people have a beekeeper nearby that they can call or, or interact with, uh, on the regular. In the beekeeping industry, we sort of group beekeepers into one of three groups. We consider hobbyists and hobbyists are not really into beekeeping for making an income that it's kinda like a pet. I mean, not really. I mean, they're much more intense about their, their bees than just a pet. Um, but hobbyist beekeepers, um, usually spend more than they take in. Sideliner are folks who have another job, but they really love bees and they use 'em for a second income. And we do have a large number of side liners across the state. Um, then the commercial folks are the ones that I say they're all in their entire livelihood or income is invested in honeybees, and most of those folks to maintain their operations end up getting into migratory beekeeper. One

Brad Cavin (13:58):

Thing I wanted to add about the migratory beekeeper question, why do they come to South Carolina? A couple years ago, I had a conversation with a migratory beekeeper from New York, and I was like, why did you decide on South Carolina for your winter operation? And once he told me the answer, it all clicked and made sense from New York. The coastal area of South Carolina is a one day drive, and it's the furthest point north in zone seven with plant hardiness zone. And so a one day drive means the bees aren't on trailers for multiple days, and there's an early spring buildup with pollen and nectar to help build up the honeybee colonies.

Jonathan Veit (14:40):

How do we keep track of where the bee colonies are throughout the state?

Brad Cavin (14:44):

Yes. So there's two, there's actually two surveys. There's one survey that the U S D A sends out to beekeepers on an annual basis where they enter in information about how much honey they've made or, uh, what their, uh, loss honeybee colony losses are. And then there's a second survey, there's a national honeybee survey where state inspectors collect honeybee samples to be sampled and analyzed for viruses. And also there's a pesticide component to that also. So there's, there's two types of honeybee surveys.

Ben Powell (15:21):

Well, and I'll add in, there's actually a third as well. Um, an independent, uh, group which is involved with stakeholders, universities, researchers, and and other folks in the beekeeping industry understood that tracking the trends in beekeeping was so critical to maintaining beekeeping into the future that they developed what they call the be informed partnership. And the Be Informed partnership does an annual survey, mainly looking at colony losses and the reasons for those colony declines, uh, that be informed partnership survey is accessible by any beekeeper. Um, the U.S.D.A surveys that, uh, Brad is talking about focuses a little bit more on the sideline or commercial scale of beekeeping.

Jonathan Veit (16:09):

Well, this has all been very interesting about the industry and about the colony structure, but we clearly have a big problem with bee colonies dying off. Uh, do we know what the reason for that is? I know, Ben, you talked a little bit about the environmental factors, but what other factors are involved?

Ben Powell (16:27):

Okay, well, first of all, let's just discuss what the current status is. In fact, we just got numbers just recently and they were not pretty at all. Um, in fact, it was one of the highest annual colony loss rates that we've experienced since the Bee Informed partnership has been doing its survey, um, over 40% colony losses. I don't know any grower in South Carolina that could sustain 40% crop loss, livestock loss, whatever, and keep their business going. But beekeepers can do some amazing things, and of course, the bees and their adaptability lends themselves to that. The primary issue is a mite that was introduced into the United States, uh, back in the eighties. This mite is called the varroa mite, and it has the aptly named species epithet, varroa destructor, uh, which can kind of give you a little feel for what this thing does.

Ben Powell (17:22):

Um, imagine having ticks on you the size of softballs and those ticks transfer diseases. Um, that's what this mite is like in the honeybee colony. The, the mite gets transferred among colonies, and as it reproduces on the larvae of the bees, it introduces diseases and it weakens the health of the bees and makes them more susceptible to things that they normally would not be susceptible to. Um, so we can pretty much pinpoint that the vast majority of honeybee declines over the past 40 years have been largely due to varroa mite and the diseases it transfers. Um, but that's not the only thing. We, we've had background diseases, uh, European foulbrood, American foulbrood, a bunch of larval diseases, um, all of which can be somewhat seasonal and circumstantial. So beekeepers have learned to manage some of these problems over time. But now with this mite present that's exacerbating everything, making all, all worse, honeybee colony declines have, have increased. Uh, so we, we focus largely on educating beekeepers on how to manage the mites and these other diseases and pests. Um, and those that do manage the mites tend to do much better and are able to sustain their operations.

Brad Cavin (18:52):

I, I consider the varroa mite Beekeeping's Public Enemy number one. Um, like Ben said, it's the biggest problem. Um, the majority of calls that I receive, um, end up being a mite issue, um, and not one of the bacterial diseases like American foulbrood or European foulbrood. Um, you know, the, the, those diseases are handled much differently from how you would handle the varroa mite. They spread viruses. You can't identify the viruses by looking at 'em with your eyes. Um, there's specialized tests that you have to perform to analyze the bees to know what viruses they are or they have, um, and it's very expensive to do that testing. Um, so the varroa mite's public enemy number one to beekeeping.

Jonathan Veit (19:41):

I don't think I realized that the beekeeping population has been in decline for 40 years. It seems like it's a problem that has only been recently discussed.

Ben Powell (19:52):

Look at it the past a hundred years, there are ebbs and flows. Um, back in the 1920s, uh, beekeeping was really growing because American agriculture was growing. We were industrializing agriculture and, and developing new fertilizers and equipment and pesticides, and, and we were really making amazing strides in agriculture. And meanwhile, all of a sudden, this other mite, something called a tracheal mite, finds its way into bee colonies in Europe and starts decimating bees across Europe and, and, uh, the other parts of the old world that might showed it up in the United States, um, in the seventies, I believe. And boom, all of a sudden had colony losses. But the bees recovered and we started growing again. The peak of colonies, I believe, uh, occurred sometime in the 1960s, um, early 1960s. Uh, and since the 1960s, we've actually declined in colon numbers. That's probably due to pests and diseases, but also just trends in the beekeeping world as well.

Ben Powell (20:57):

But in the eighties, something significantly happened. Um, all the sudden we started, uh, precipitous decline. And by the mid 1990s, we had given it this term colony collapse disorder. And I think that was a term a lot of people heard. It was in the news, it was all over the place. And what it was, was just basically us saying, we don't really know <laugh>. We think it's kind of this collage of different things that are causing it. Since that time, the research has shown that the mite and the diseases are the primary culprit, but there's also other factors, pesticides, environmental influences. People looked at cell phone towers and whether or not microwaves were involved, but a lot of that has proven to not be the primary issue, that it's the might. Um, the issue was we weren't really tracking colony loss rates very well in the eighties and nineties, so we didn't see it, even though it was already happening. The beekeepers anecdotally were saying that we're having problems. It was not until 2006 when the be informed partnership started its annual survey that we had real concrete numbers, and that's when the news caught wind of it.

Jonathan Veit (22:14):

So even though the, even though the, the colonies are dying at alarming rate, it sounds like beekeepers can replace them pretty efficiently because they're pretty ingenious, um, in how they do that. Could you explain that and also, um, explain the strain it must be putting on the industry and on these beekeepers?

Ben Powell (22:33):

Oh, yeah. Well, I appreciate that question. You know, the honeybee is one of nature's marvels. Um, it's adaptability. You think about where the honeybee's been taken, it's been moved from Western Europe and Africa, where it lives in forests, deserts, planes and meadows. I mean, just about every ecosystem type you can get. Um, and then it was brought to every other continent in the world and was able to survive there too, except for, I guess, Antarctica. Um, and, and so it's able to adapt to the, all these different ecosystems because not only is the bee dynamic, but the colony is dynamic. Um, and, and that adaptability means that it, it has plasticity. It, it has the ability to overcome insults. Um, now when, when you get pests and diseases starting to cause declines and, um, the colonies will collapse and the beekeeper can step in and, and do things to try to replace those colonies or augment those colonies, um, here's a fun number for you.

Ben Powell (23:44):

The honeybee queen can produce between 1500 and 2000 eggs a day. Each one of those fertilized eggs could potentially become a queen if it's managed correctly. If it's reared in the proper environment, you can turn a regular worker egg into a honeybee queen. So that means potentially you could have 1500 queens a day, and every queen is a colony, right? So what beekeepers do when they start experiencing these losses is that they, they have to increase their bee production activities. So they're grafting more queens, they're making more splits, they're growing more smaller colonies to replace the colonies they're losing each year. Here's the trade off, though. When you're pulling bees out of your honey production or out of your pollination contracts to replace those colonies and, and grow queens and new colonies, you're pulling bees away from those revenue streams and you're losing colonies. So you're, you're losing money from the colonies and you're losing money from the revenue streams that you would normally have to replace those. So that means that beekeeping has become exponentially more expensive and time consuming for the beekeeper than it was just 50 years ago. Uh, and now beekeepers, you know, using the biology of the, the, the bees to grow these new colonies are, are looking for ways to generate new revenue. And these pollination contracts and migratory beekeeping is really the one of the primary revenue sources that keeps the large commercial scale beekeepers going.

Jonathan Veit (25:31):

So I read it that the U.S. Department of Agriculture has granted a conditional license for vaccine that helps protect honeybees from a deadly bacterial disease. Can you talk about that? What is the vaccine and, and how is it administered?

Ben Powell (25:44):

This is a really interesting concept that, that the, a company called Dalan Animal Health has developed. Um, essentially what they're doing is they're developing vaccines in much the same way we do vaccine development for humans. They're taking, uh, the pathogen, they're killing it, and then they're either feeding it or injecting it right into a host organism, which develops an immunity to it because the, the pathogen is dead. It doesn't create disease, but it does elicit the immune response. So the same thing in honeybees. So what we're doing is we're this bacterium, this panabacillus larvae, excuse me, get it correctly, um, is a highly infectious bacteria that infects honeybee larvae and kills them, and then the bacteria proliferates within the colony and develop spores. These spores are very long lived. They live for decades, literally. And, um, and any beat larvae that are exposed to these spores, it, um, will develop the disease and create more.

Ben Powell (26:56):

And then what it does is it creates rampage through the colony. The colony starts to collapse, and there is no way to cure a colony of this particular pathogen. Once that colony has, uh, developed the pathogen, the only solution is to destroy the colony so that you destroy the pathogen, and that's done by fire. So what Dalan has done is they've taken the dead panabacillus larva and developed a feed medication that is fed to developing queens. Actually, it's fed to the workers. Queens, believe it or not, don't actually feed on honey or, or pollen. They feed on the secretions that workers give them. So what we do is we feed a colony that has this vaccination. The workers then create secretions that they feed to the developing queen. That royal jelly that we talked about in that royal jelly is the, uh, immune response that the bees have developed, and that queen develops immunity as she develops.

Ben Powell (28:05):

The really cool thing is that in insects, there is a, an ability for vertical transmission of immunity. What that means is that through the egg, the queen can transfer her immunity to her young. And, uh, so theoretically, if you immunize the queen, you immunize the entire colony because all of her progeny are going to confer or, or receive this immune response. Uh, that means that if honeybees are foraging in the landscape and they encounter this bacterium and it comes back into the colony, if they already have an immune response to it, then they, um, that bacteria is not able to infect the larvae and then kill them and augment in the colony. The product that Dalan produced is designed to be fed to developing queens, and then those developing queens are certified as immune queens. The, the challenge though is, does that immunity that the queen confers to her workers then get transferred to the next generation of queens?

Ben Powell (29:18):

So let's say a colony swarms queen leaves with a, some of her workforce to go form a new colony, and they leave behind a colony that's developing new queens. What Dalan has shown is that those new queens do not have the same level of immunity. So the next level or the next generation of queens must be immunized again. So way this product is, is being rolled out, is through commercial beekeepers. They are doing a conditional license, um, for two years. It started back in January, and it is being delivered specifically to commercial beekeepers, uh, in their queen production, uh, activities. So these are certified queens, so a beekeeper can hopefully, uh, purchase a certified immunized queen. But if that queen swarms and leaves or the beekeeper wants to grow new colonies and make splits and produce queens themselves, they don't necessarily have that immuno, they're gonna have to buy other certified immunized queens.

Jonathan Veit (30:26):

How can beekeepers get ahold of this product?

Brad Cavin (30:29):

The way the process works, bee, if a beekeeper's interested in getting hands on this vaccine, they need to contact delaying animal health. Delaying animal health will then contact the South Carolina State Veterinary office and go through the process to get the appropriate approval. Um, one thing Ben said, um, you know, this is not a cure for American fbr. Um, the honeybee can still, uh, come in contact with the spores and the bacteria in the wild in the environment, so it, it's not going to cure it. But, um, one interesting thing, the the last confirmed positive case of American fab brood that I had in South Carolina was back in 2019. So it's been several years since we've had a positive finding for American fbr. And as

Ben said, it's, it's a highly infectious disease that can spread throughout a honeybee colony and then spread from one honeybee colony to another, to another.

Brad Cavin (31:34):

Um, so if a beekeeper thinks they're experiencing a foul brewed situation, um, if they're here in South Carolina, they need to contact, um, my office, or if they're in another state listening to this, they need to contact the state inspector in the state that they live in. Um, here in South Carolina, we do have a lab that we started, um, at Clemson where we do test for American foulbrood and European foulbrood. Um, it's a real simple process for a beekeeper to collect the sample and send it in. Um, it's also, uh, the beekeeper can contact me and someone from my program will come out and do an inspection and, and collect a sample, and we'll get that analyzed to see if it is positive for American foulbrood or European foulbrood.

Jonathan Veit (32:25):

What are some things that homeowners and landowners can do to help bees and other pollinators thrive?

Ben Powell (32:31):

You know, we'll, harken back to what the causes are, right? If you're gonna solve a problem, you need to know what's causing the problem. And like we said, that it, it is largely about habitat loss and fragmentation. Um, we are developing in South Carolina rapidly, and every homeowner has their own little slice of heaven, which could also be heaven for pollinators too, if they made the habitat in their yard more suitable to them. So let's think about what it, what it is that bees are, are needing in the environment. They need food, they need nest sites, and they need, um, clean air and environment around them. Alright? So in a, in a homeowner situation, um, if we plant certain plants that are, um, nutritious, uh, nectar and pollen producing plants, and I would argue that we need to focus more on native plants than non-natives because those are the plants that our native bees have adapted to and evolved with over so many millennia, um, that we can encourage bees to come visit the yard because we're providing food sources for 'em.

Ben Powell (33:41):

But that's not the only part. Nesting sites is critical. Most of these solitary native bees nest in the ground or in small cavities like in rock or in wood. Um, and our, our ground activities have a, a large effect on nest sites. So many, many of us love our lawns, right? We love that grassy clean lawn. And unfortunately, that is a very unsuitable habitat for ground nesting bees. One, it's, it's intensively managed with pesticides and a variety of other things to maintain that monocultural stand of grass. Um, that is, that creates a a hazardous situation. Also, many of these bees need bare ground, open ground or dirty ground. Ground is covered in leaf litter and thatch and, and things like that. Things that we don't normally think of as attractive in a home landscape. Um, so what I would tell folks is if you plant plants and you're encouraging bees to be there, also think about the places where they're gonna raise their young and leave some areas with some log piles or dirt, uh, exposed dirt, um, leave some areas that are naturalized, um, and, and allowed to vegetate naturally.

Ben Powell (34:57):

Um, they can be mowed or, or managed a little bit, but they, they don't necessarily have to be pristine, clean lawns. Um, and then the third factor is just keeping the environment within your yard conducive.

Um, some of our pollinators are actually night flying pollinators and lights that are on all night light all night long will disturb their reproduction activities. Uh, many of our bees, um, traverse large areas to collect the food, uh, that they do that they're, um, foraging for. And any impervious cover that we put out there is obviously affecting it. So, um, think about na natural native plants and, and we have guidance on, on suitable plants, uh, with Clemson extension. Uh, and then think about nest sites, and there's a wealth of information out there on, on actually building little mason bee houses or protecting ground for ground nesting bees.

Jonathan Veit (35:58):

My understanding is there's a concern about how honeybees interact with pesticides. Can either one of you comment on that?

Ben Powell (36:04):

The first thing I'll say is that Clemson is responsible for pesticide regulation in South Carolina, and that's done through the Department of Pesticide regulation. Brad and I communicate with them, but we are not involved with pesticide regulations. So if a beekeeper or the public was concerned about a bee kill that they experienced and wanted to determine if it was pesticide related, they need to contact the Department of Pesticide Regulation. They have inspectors all across the state that can open an investigation. But what I will say is that while pesticides are an issue and bees do get exposed to pesticides, um, both in urban and rural environments, um, it is not the primary issue. Now, this is, does not release everybody just go ahead and start using pesticides however you want. The, the trick is the compounds that are available to the public and to farmers and growers are regulated by the E P A and the Department of Pesticide Regulation.

Ben Powell (37:07):

If they deem that it is safe enough and, and a the need is necessary to have that pesticide available, then the product is available for use. The user though, can determine how that product is used. So it's critical that if you're gonna use a pesticide that you read the label, especially the sections on like environmental hazards and directions for use, because there's gonna be language very specific to protecting bees on that product. Um, the second part of that is that anything you can do to minimize the exposure of the bees will help them, even though the product may be toxic to bees, if the bee doesn't encounter it, then it's not a problem. So avoid applying pesticides to plants in bloom, avoid applying pesticides to areas where, you know, bees are nesting, especially ground nesting bees. Um, avoid applying pesticides while bees are active, which is mainly daylight hours.

Ben Powell (38:11):

So if you're gonna spray, let's think, mornings and evenings, especially for honeybees, um, and then avoid, um, applying pesticides to attractive crops or if there are attractive plants within that crop. So sometimes we, uh, have issues like, um, somebody has an orchard, maybe they got some peach trees or plum trees. The peach trees and plum trees aren't actually blooming anymore. Um, so the bees aren't coming to trees, but there's dandelions and clovers and stuff blooming underneath those trees. So what we might try to do is actually mow the field or something to, to reduce the, the attractiveness of those flowering plants to the bees, and that reduces the availability of that pesticide to the bees.

Jonathan Veit (38:56):

Tell us about your individual programs and how they're working together to protect South Carolina honeybees.

Ben Powell (39:02):

So I started right when covid hit, um, and we tried to launch this program, which is the Clemson Apiculture and Pollinator program. It is a research and extension program for the university focused specifically on two areas, honeybees and beekeepers, and on native pollinators and, uh, pollination conservation. Uh, so we're working largely with two audiences, specifically beekeepers and the growers that they service, uh, and then also the general public on pollinator awareness. Um, so this is a, a holistic extension program where we do trainings and workshops. We have, uh, social media and publications, website resources for beekeepers and the public. Um, also have some, uh, demonstration sites. So we have a demonstration apiaries in the PD research station where I am housed. Uh, I have a pollinator test plot that we installed a couple years ago and are now starting to do treatments. I also work intimately with the South Carolina Beekeepers Association and other beekeeper groups to help them with their educational resources. So there's a master beekeeping program that is run by the State Beekeepers Association. I provide the educational resources for them to distribute through their members. And like I said, I think last year we had over 900 people go through the beginner training and, um, and we feel like we're making a good impact there and, and hopefully getting more information to beekeepers to help them be sustainable, productive beekeepers.

Jonathan Veit (40:42):

Brad, what do you do? From the regulatory side of things?

Brad Cavin (40:45):

My involvement with the beekeepers is protecting and promoting the beekeeping industry in South Carolina. Whether it's a beekeeper looking to import honeybees into South Carolina or export honeybees from South Carolina, there may be different requirements that a beekeeper may have to complete before being able to import or export. We also look for diseases and pests of honeybees. Um, if a beekeeper's experiencing a situation where they need an inspection and a possibly a sample pool for testing, we'll gladly do that. Um, we work with Ben and Clemson Extension to kind of work through some of these problems and provide management solutions, uh, for the beekeeper. Uh, another big component of, of what I'm doing is, uh, public outreach. Um, I speak at a lot of the local associations throughout the state. I'm also involved with the South Carolina Beekeeper Association. I'm also involved with the South Carolina Farm Bureau, uh, apiculture committee.

Brad Cavin (41:47):

Um, I'm also involved, um, with national groups. Um, one of the national group that I'm involved with is the Apiary Inspectors of America. And that group are consists of inspectors from all over the country and we meet and discuss problems and, and, and make, I might learn about a, a new problem. Um, another thing that I work with is, uh, the South Carolina public calling me for hornet identifications, um, with the Asian Giant Hornet, uh, in the news that's been found in Washington, I receive, uh, a lot of calls where people think they may have found the Asian Giant Hornet. By the way, it's still been found in Washington state and, and has been a almost a year and a half since it's been found. So it's not here in South Carolina. Um, we also conduct, uh, and complete the National Honeybee Survey with the U.S.D.A where we go out and work with beekeepers from all over the state and collect samples of honeybees and have them analyze for varroa mites and the viruses that the mites carry. Um, so we're, I'm involved

with a lot, uh, and I do have a website and if a beekeeper wants to get in contact with me, they can email me. My email address is scavin@clemson.edu or my program email address is honeybeeprotection@clemson.edu. So those are the best ways to get ahold of me.

Jonathan Veit (43:22):

Ben and Brad, this has been great. Thanks so much for coming on Earthly to talk about honeybees and their importance.

Ben Powell (43:28):

Much appreciated. Thank you for the opportunity.

Brad Cavin (43:31):

I appreciate it. Thank you for having me today.

Outro (43:37):

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