**Why are Bees disappearing?
 TED Radio Hour**

GUY RAZ, HOST: How much time do you spend with bees like, you know, on average every day?

MARLA SPIVAK: Not enough. These days, much of my time is spent in my office writing grant proposals or going to meetings or radio interviews.

(SOUNDBITE OF BEES)

RAZ: This is Marla Spivak. She's a scientist at the University of Minnesota.

SPIVAK: And I study bees.

RAZ: Do you think that a part of you thinks like a bee?

SPIVAK: I have to think like a bee. I had a mentor - one of my first mentors used to scream at me that I needed to think like a bee. He'd say, you're thinking like a human. You have to stop that. You have to think like a bee in order to be a good beekeeper and a good bee researcher.

RAZ: So what does that feel like?

SPIVAK: What does it feel like to think like a bee?

(SOUNDBITE OF BEES)

SPIVAK: Well, it's a wonderful world out there, really. I mean, they're quite respectful and responsive to environment, much, much more so than humans are. You know, they're very busy all the time. They don't spend a whole lot of time thinking about thinking like people do. That kind of reflective thinking that humans do, often, I think, gets in the way.

RAZ: Here's more on bees from Marla's TED Talk.

(SOUNDBITE OF TED TALK)

SPIVAK: Bees are the most important pollinators of our fruits and vegetables and flowers and crops like alfalfa hay that feed our farm animals. More than one third of the world's crop production is dependent on bee pollination. In parts of the world where there are no bees or where they plant varieties that are not attractive to bees, people are paid to do the business of pollination by hand. Tomato growers often pollinate their tomato flowers with a handheld tomato tickler.

Now this is because the pollen within a tomato flower is held very securely within the male part of the flower, the anther, and the only way to release this pollen is to vibrate it. So bumblebees are one of the few kinds of bees in the world that are able to hold onto the flower and vibrate it. And they do this by shaking their flight muscles at a frequency similar to the musical note C. So they vibrate the flower - they sonicate it.

(SOUNDBITE OF ORCHESTRA MUSIC)

SPIVAK: And the pollen gathers all over the fuzzy bee's body and she takes it home as food. Tomato growers now put bumblebee colonies inside the greenhouse to pollinate the tomatoes because they get much more efficient pollination when it's done naturally, and they get better quality tomatoes.

RAZ: And cucumbers too, right?

SPIVAK: Cucumbers, most definitely. All of the vine crops - squash, pumpkins, cucumbers, etc.

RAZ: So melons too, I guess.

SPIVAK: Of course, melons.

RAZ: Yeah. Carrots, no?

SPIVAK: You know, if you plant a carrot, you plant a seed. And in order to get that seed, it must be pollinated by bees.

RAZ: Wow.

SPIVAK: Bees are vital to the pollination and production of our fruits and vegetables, and even coffee that we drink. We depend on them quite a bit. Unfortunately, they're all in trouble.

(SOUNDBITE OF TED TALK)

SPIVAK: Seven years ago, when honeybee colonies were reported to be dying en masse, first in the United States, it was clear that there was something really, really wrong. In the United States, bees, in fact, have been in decline since World War II. And the reason is after World War II, we changed our farming practices. We stopped planting cover crops - clover and alfalfa. Clover and alfalfa are highly nutritious food plants for bees. And after World War II, we started using herbicides to kill off the weeds in our farms. Many of these weeds are flowering plants that bees require for their survival. And we started growing larger crop monocultures.

The very farms that used to sustain bees are now agricultural food deserts dominated by one or two plant species like corn and soybeans. And then there's pesticides. After World War II, we started using pesticides on a large scale. And this became necessary because of the monocultures that put out a feast for crop pests. Recently, researchers from Penn State University have started looking at the pesticide residue in the loads of pollen that bees carry home as food. And they've found that every batch of pollen that a honeybee collects has at least six detectable pesticides in it. This small bee is holding up a large mirror. How much is it going to take to contaminate humans?

RAZ: And it's not hard to imagine how that could happen and on a massive scale. Every year, the vast majority of honeybees in the U.S. wind up in one single place, to do one thing.

SPIVAK: One of the biggest crops that relies on honeybee pollination, in fact, is 100 percent dependent on bees to have a crop, is almonds. So we grow about 800,000 acres of almonds in the Central Valley of California, and the almond growers require 1.6 million colonies of honeybees at the end of February when the almonds bloom.

RAZ: So three quarters of all the honeybee colonies in America are right there in this, like, small patch of land in central California.

SPIVAK: Yes. And they're all piled in there. And this is true for many other crops - apples, blueberries, squash. Bees need to be trucked in to satisfy the pollination requirement and then they have to be trucked out because of the pesticide applications or because the area can't support that many bee colonies.

RAZ: Do we know how many colonies are dying every year?

SPIVAK: Well, if there's 2 million colonies of bees and 30 percent die every year - you do the math. That's a lot.

RAZ: But how is that going to work? I mean, do the math and - wow. I mean, in just a few years, they're all going to be gone.

SPIVAK: No, because the beekeepers are replacing their losses every spring. For example, lets say I'm a commercial beekeeper and I have 5,000 colonies of bees, which is not that unusual for a commercial beekeeper, and I lose 30 percent of them. Well, come spring, I need 5,000 colonies again in order to satisfy the pollination contracts I have with growers.

And so I take my remaining colonies and I split them in two, and I purchase a new queen bee and put it in half. And so I try to get my numbers back up to 5,000 so that I can supply the nation with fruits and vegetables and honey.

RAZ: Can you help me understand just like how fragile the situation is? I mean, I can still go to the grocery store and buy fruits and vegetables and, you know, and almonds are available and they're plentiful.

SPIVAK: They're - all of those fruits and vegetables are plentiful and available because beekeepers are out there doing everything they can to pollinate crops, and this is worldwide. It's a very big struggle for them to replace their losses. So other crops get, you know, subsidies and insurance and help when they lose their crop. But beekeepers are on their own and so it's a big struggle to keep the numbers of honeybee colonies up in the United States.

RAZ: OK. So you may be asking yourself - what can we do? I mean, there's the obvious stuff - be smarter about agriculture, fewer herbicides and pesticides. But Marla Spivak says the most effective solution could also be the simplest one - flowers.

SPIVAK: So last summer, I burned off my front lawn. And this summer, it's a flowering meadow and it's wonderful. I stand out there and watch the bees. I don't know what my neighbors think, but I love it. And so do the bees.

RAZ: Wait a minute. You burned your lawn? You, like, torched it?

SPIVAK: Yeah, I sure did. It was a great moment in history for me.

RAZ: How did you do that?

SPIVAK: Well, you let the grass die or you kill off the grass, and then you light a match to it. And now I'm in Minnesota where there's a lot of water. There's no fire danger.

RAZ: And is it, like, wild, growing all over the place or is there sort of some method to the madness?

SPIVAK: No. It's pretty wild.

RAZ: And do your neighbors complain, like, are they expecting like, a rusted, you know, car in front of your house as well, soon?

SPIVAK: Probably. In fact, last year I went canoeing and came home and I had a citation from the city of St. Paul saying, hey, mow this lawn. But what I did instead is put up a big sign that says pollinator habitat. And now, already, this summer, you know, neighbors have come over and saying, wow, this actually turning pretty. You know, it's got a lot of flowers in it. And next year and next year, it'll be prettier and prettier as we go. So...

RAZ: Wow. Did you pay the citation?

SPIVAK: Absolutely not.

(SOUNDBITE OF TED TALK)

SPIVAK: Maybe it seems like a really small countermeasure to a big huge problem - just go plant flowers. But when bees have access to good nutrition, we have access to good nutrition through their pollination services. Every one of us needs to behave a little bit more like a bee society, where each of our individual actions can contribute to a grand solution, an emergent property that's much greater than the mere sum of our individual actions. So let the small act of planting flowers and keeping them free of pesticides be the driver of large-scale change. On behalf of the bees, thank you.

(APPLAUSE)

RAZ: Marla Spivak is a scientist at the University of Minnesota. And please do it for Marla, do it for the bees - go plant some flowers. Keep it all connected and check out Marla's talk at TED.com.