

Laura: You're listening to Just Food, a podcast about cultivating justice and health.

This is a series brought to you by the Berkeley Food Institute, at the University of California, Berkeley. I'm your host Laura Klivans and I'm here with reporter Alissa Escarce.

Alissa: Hi, Laura.

Laura: Today we're talking about bees. Bees are super important to our food system - but over the last few years, beekeepers have noticed changes in their hives....

[[AUDIO FROM NEWS STORIES ABOUT COLONY COLLAPSE/BEEES DISAPPEARING: Bee colony deaths began rising a decade ago. But now it's getting much worse. The extent that we need these little magical insects is phenomenal...]]

Laura: Last summer Alissa visited some farms in Yolo County, California, just east of Sacramento. The farmers there are dealing with the bee crisis head-on.

Car ambi, fading in

Colin: So these are my bees right here. And these are the cucumbers that they're pollinating. These cucumbers will be harvested fairly soon here.

This field on Colin Muller's family farm in Northern California is about 150 acres, with rows of ankle-high cucumber plants as far as the eye can see.

Ambi, rustling around in cucumber field. Colin: So cucumbers, like many of our crops out here, require pollination.

Dozens of honey bees hover above the plants and crawl in and out of their bright yellow flowers.

Single bee ambi.

Muller Ranch is a big, commercial farming operation. Colin's grandfather started it in the sixties, and Colin's been helping out since he was a little kid. He works with his dad and uncle and cousin, and the family grows all kinds of crops –

Colin: And then I grow some flowers, wheat, corn...

And they grow A LOT - Colin says this field alone will produce tons and tons of cucumbers. Eventually they'll be turned into pickles.

Colin: and the briner sells these to Subway, McDonald's, Burger King.

But Colin isn't focused on the cucumbers - he's concerned with the bees. Colin is the head beekeeper at Muller Ranch. And without his hives, these cucumbers will not produce a fruit.

Colin: We have the cucumbers that require pollination, almonds... and all of the summer crops, pretty much, are a hive and a half per acre.

Getting all the plants pollinated isn't easy. Colin needs six or seven million bees to work these cucumber fields. That means more than 200 hives. And MANY California growers rent their beehives from commercial beekeepers. But not Colin.

That's because of those bee disappearances that beekeepers started noticing in the mid-2000s. The technical term for the problem is "colony collapse disorder." Scientists aren't sure what causes it, though they suspect some combination of pesticides, and parasites, and poor nutrition.

Whatever the cause, colony collapse hit local beekeepers hard a few years ago. Colin says the price of renting honey bee hives doubled as the number of bees started to decline... and that hit Muller Ranch's bottom line.

Ambi – getting in car, turning on engine

Colin: So people were scrambling around looking for bees, offering, you know, more money than the guy next to them is paying for bees to see if the beekeeper would put them in their field instead...

So five years ago Colin decided to start keeping his own hives. But it didn't quite go as planned..

Car ambi. Colin: The first year we did it we had very, very good results. Almost no bees lost in the winter. And the second year we lost almost 90% of our hives.

Alissa: 90%!!??

Colin: 90%. Which isn't unheard of.

With such big losses, Colin had to start over. And things went better for him over the last couple years – he has about 1500 hives now, enough to cover most of the farm's pollination needs. But to get to that point, he's had to watch his hives closely, making sure they don't get sick. He even feeds them sugar syrup when there aren't enough flowers around.

So far, so good. But he and his fellow farmers aren't out of the woods yet. This issue of colony collapse, it has a lot of people worried, all over the world. Over the last few years the U.S. government has spent millions on research into honey bee health.

But conservation biologist Claire Kremen says that farmers and policymakers need to look beyond the honey bee to solve this problem. Claire is a professor at the UC Berkeley School of Environmental Sciences, Policy, and Management... and she's an expert on pollinators. But instead of focusing on honey bees, she studies wild bees and other pollinators that are native to

the areas around farms.

Claire: There are these green sweat bees, they're really, really cool looking.

And bumblebees,

Claire: Most people are familiar with those - black and yellow, fuzzy bees. Or the big, shiny carpenter bees...

But in spite of that diversity of pollinators, most farms depend entirely on honey bees - which are *not* native to the U.S. Claire says that's made our food system really fragile.

Claire: Anytime you rely on only one thing, you have no buffer. It's kind of like the stock market - most people recognize that investing all of their assets into a single commodity is not a wise idea.

The first time Claire drove up to Yolo County was 19 years ago. Back then she was just starting to study bees and agriculture.

Claire: My first thought when I got out there was, "woah, this is what farming looks like?"... And I was kind of shocked at how large the farms were. At how monotonous they were.

For most of human history, farms were small, and surrounded by wilderness, and native bees did most of the work. That's what Claire was expecting to see. But these days, most farms in California have enormous fields, each of a single crop. And that's bad news for native pollinators.

Claire: On monoculture farms, we see very reduced bee diversity and abundance.

But these days, most farms in California have enormous fields, each of a single crop. And that's bad news for native pollinators.

Most of the crops in those huge fields bloom for just a few weeks. For the rest of the year, there isn't much around for pollinators to eat. And native pollinators usually live alone, in tiny underground nests. Farmers can't move them from one field to another. That's why most farmers end up doing what Colin does - hauling *honey* bees around from one crop to the next. It's just easier, since honey bees live in these moveable hives. Over time, farmers have come to rely on them.

Claire: If honey bees disappeared tomorrow, we would definitely be compelled to change our farming system. We'd have to provide for the needs of native pollinators.

Claire has devoted years to studying practical steps farms can take to become better homes for native pollinators. And she says the main thing is that they need to be *diverse*.

Claire: So that means, having some natural habitat, or some grazing land around their farm... And then in the fields, if they can grow multiple different kinds of crops... if they can plant a hedgerow around most of the perimeter of the field, that will provide a lot of habitat for native pollinators.

Hedgerows. They're collections of native bushes and trees that farmers plant along the edges of fields - basically, little man-made patches of California wilderness. And they're an idea Colin Muller has been trying out on Muller Ranch.

[Back to farm – ambi of walking through hedgerows]

Even though Colin still relies on honey bees to pollinate his crops, he's planted four new hedgerows on his ranch over the last five years.

Colin: Some of the research has shown that it's helpful, and it also just kind of helps beautify the place up.

The hedgerows *are* beautiful... in a kind of rugged way. There are bushes, like coyote brush and elderberries, but also grasses and tall oak trees. Each plant blooms at a different time of year, so the native bees can stick around.

Ambi - walking through grasses.

Colin: You might be able to see some native bees...

Colin says he's seen longhorn bees, and bumblebees, and carpenter bees out here, along with pollinating flies and wasps, but today they're hard to spot.

Honey bee, honey bee ... It's all honey bees on here right now... Oh there's a - oh, no, that's a honey bee.

It makes me wonder - if his honey bees were to disappear again, would the native pollinators from the hedgerows be enough?

Colin: I don't really know what we would do without honey bees right now... Every hive, you have 300,000 bees out there. A native bee colony is nowhere near that strong.

Colin has put a lot of time and resources into his hedgerows, but at this point they're only about 5 percent of his land. Compared to the endless sea of cucumber plants, and the hundreds of acres of sunflowers and almond trees, they're pretty small.

There is one type of farm up here in Yolo County where Claire found that native bees do provide all the farmers' pollination needs. Farmers there don't rent honeybee hives at all. And it just so happens that one of those farms is owned by Colin's uncle, a man named Paul Muller. He grew up on Muller Ranch before he decided to go his own way.

Car ambi

Paul: When we first started, my wife and I, we realized, we wanted to grow organically - so we decided to start our own farm. And so we went with the principle of diversity.

Paul's place is called Full Belly Farm. It's just 30 minutes up the road from Muller Ranch, but the landscape is different. Endless flat crop fields are replaced by hills covered in trees.

GETTING OUT OF CAR AMBI

Paul: So this is a field of our early melons. There's probably 12 different varieties of melons out here, and you can see, it's not a huge planting of melons.

Walking around the farm, the differences are striking. That melon field - it's just about 4 acres. The other fields are small, too, and the crops alternate quickly - there's a chicken coop and an orchard nearby, and each bit is surrounded by hedgerows.

CHICKEN AMBI

A lot of this produce will be sold at farmers' markets, and in restaurants.

Walking ambi.

Paul: So out here there's snapdragons, and godecia, and zenias, and sweet williams, and cornflowers, and larkspur, and just a real mix of flowers.

There are about 2 acres of flowers. The farm sells them fresh over the summer, and Paul's coworkers turn them into dried wreaths during the cold months. But before they go to market, these blooms help provide nectar for native pollinators. Paul leads me through the rows, hunting for a native bee.

buzzing bee sound.

And then we spot one: a fuzzy, native bumblebee.

Paul: It's so funny what bees will like. So here's a big open flower that this bee is preferring... And he just flew off there, but he was a big fat guy.

There are also a lot of honey bees crawling around. Paul says they're probably visitors from nearby farms, or feral bees living on their own in the wild.

Claire Kremen spent a few years studying the pollinators here at Full Belly.

Claire Kremen: Pollination is not an issue for them. They got 100% of their needs met by the native pollinators, but they got something like 200% of their needs met by the honey bees that

were also there.

Because of that, Claire says the farm would probably do fine if honey bees disappeared. But when I ask him about it, Paul hesitates.

Paul Muller: You know, to me, to speculate on that is a really hard one, because I see there's a lot of resilience, even with colony collapse, there's a lot of resilience in these life forms.

Paul says the whole farm is designed to be resilient, and not just in terms of pollinators. The hedgerows, for example - they also provide a home for creatures that eat pests. Thanks to that, the farm doesn't have to use pesticides.

Paul: We're doing the things that are making the system biologically a little more stable and a little healthier.... if you don't, you're going to see things like honey bees disappearing, and then an argument over why they're doing so... And I think the culprit is the whole system... We are missing the big picture sometimes in agriculture.

Colin Muller devotes a lot of his time to bees - checking on honey bee hives, trying to keep them healthy, planting new hedgerows each year. And I wonder, why not do what his uncle Paul does - set things up so that native bees can do the work on their own? He pauses for a second - and then says that it's just way more expensive. Paul can afford to do what he does because he sells his crops at higher prices.

Colin: We grow food that's produced as efficiently as possible... and we sell it, and it's a ll, 90% of it goes to someplace that cans it, or brines it, or does something to it. Food would be very expensive if we tried to grow it like Paul grows it.

Colin says he does worry sometimes that people demonize farmers like him - you know: big, industrial farmers - for what they're doing to bees. Muller Ranch has taken a lot of steps to be more sustainable. But sometimes, Colin says they just have to use chemicals... like pesticides.

Colin: It's like, our trees get sick, and sometimes that's the only thing you can do. ... But we, at least on our farm, we do it at night, when the bees aren't around, or we do it before the trees flower, so there's no bees in the field... We're also the ones that depend on the bees. So it's like, why would we want to kill something that makes us our money?

For now, he plans to keep raising his honey bees, and keep planting hedgerows, and hope for the best.

Laura: Thanks for that story, Alissa. So after visiting these two farms, what do you think? Are native bees a viable alternative for farmers?

Alissa: At Full Belly Farm, it's pretty clear that native pollinators can do a lot of the work. But it's also complicated. Could we get all the pickles we want using only native bees? I don't know.

Laura: It sounds like we'd have to make some pretty drastic changes to our farming system.

Alissa: We would, to rely just on natives. But the kind of stuff Colin is doing, like planting hedgerows and being careful with pesticides - it also makes a difference. It definitely increases the number of native pollinators, even if it's not enough to cover the whole farm.

Laura: So there's a range of things farmers can do, even if they don't totally transform their farms.

Alissa: Exactly.

Laura: You're listening to Just Food, a podcast about cultivating justice and health.

This is a production of the Berkeley Food Institute. For more information about the institute and Claire Kremen's lab, visit [food dot berkeley dot E-D-U](http://food.berkeley.edu).

This episode of Just Food is produced by Lacy Jane Roberts and Alissa Escarce.

Theme music is by Roy Baril.

I'm Laura Klivans. Thanks for listening!