

PLANT PEOPLE Season One Episode Seven 'Native Plants' Transcript

DOUG TALLAMY: There's a beautiful caterpillar in the Okefenokee swamp. It's called the Okefenokee Zale. And I've been wanting to take its picture for years.

JENNIFER BERNSTEIN NARRATION: Doug Tallamy is an entomologist. That means he studies insects. And you can kind of understand his obsession with this caterpillar. It has a striking look, with black and white zebra stripes down its body, and orange and black tiger stripes across.

DOUG: Well, you have to go to the Okefenokee swamp to find the Okefenokee Zale and it's on climbing fetterbush.

JENNIFER NARRATION: Fetterbush is an evergreen shrub found in wet environments, like the swamps of Southern Georgia. In the springtime, it makes small flowers that look like pink, white, or red droplets. And, it's a host plant to the Okefenokee Zale.

DOUG: We drove down, went to the Okefenokee Swamp, and I said, well, this'll be easy. All I have to do is ask the rangers there: where's climbing fetterbush? Well, they never heard of it. They didn't know what it was. Nobody knew what climbing fetterbush was, so we had to kind of piece it together ourselves.

JENNIFER NARRATION: Insects and plants depend on one another for survival. Take one away, and you may lose the other. In other words: No Fetterbush? No Zale. These regional relationships between plants and insects are crucial. And Doug was only able to find his elusive caterpillar once he found its native host plant.

DOUG: We did find Climbing Fetterbush. It really is climbing. It really is a vine. It took us two days to find it, but once we found it, we found the caterpillar in 15 minutes. I had to learn about that plant to satisfy my caterpillar itch.

JENNIFER BERNSTEIN: You're a plant person by way of caterpillars.

DOUG: Yes, yes.

JENNIFER NARRATION: You may have heard a friend or neighbor talk about native plants and wondered why it matters. Aren't all plants good? Well, plants are just one component of a complex web of biodiversity.

Native plants are special in that they support local wildlife. Imported plants can't harbor other kinds of life the way natives can, and sometimes become invasive. That's when they grow out of control and push out other forms of life.

NYBG's Native Plant Garden is home to nearly 100,000 trees, grasses, shrubs, and flowers that originated here in the Northeastern United States. And as a result, these 3.5 acres teem with life. This is the best spot on our grounds to see squirrels, frogs, birds, butterflies. They are drawn like a magnet to these native plants.

What we plant in our gardens impacts all the life around us, for better or worse.

This is Plant People from NYBG. I'm your host Jennifer Bernstein, CEO & The William C. Steere Sr. President at the New York Botanical Garden. In this episode we'll learn all about the importance of native plants—and why the relationship between insects and plants is key.

JENNIFER: Well, Doug, welcome to Plant People. We're thrilled to have you on the podcast today.

You began your career as an entomologist, which is someone who studies insects. What led you to that and then what led you to plants?

DOUG: Well, I was born loving nature. I liked snakes and turtles. And I had snakes and turtles as pets. I knew nothing about insects until junior year college. I took a course in entomology at Allegheny College from Robert Bugbee. And if you're going to learn about entomology, Robert Bugbee is a good place to start.

JENNIFER: I'd say so. That's quite a name. Hahaha.

DOUG: So yeah, I went to graduate school in entomology and got very interested in behavior. So I would call myself a behavioral ecologist who works with insects. One of the things that you study in graduate school when you're an entomologist is plant insect interactions. Plants and insects combined are the most numerous groups of organisms on the planet and how they interact with each other determines an awful lot of other things in ecosystems.

So we studied that for, oh, five, six, seven years. Then I kind of tucked it away, didn't use it much. I got into interesting things like how insects take care of their young, how cucumber beetles choose their mates. They're interesting things, but nobody cares about them. I moved into conservation really when my wife and I bought a piece of property in southeast Pennsylvania.

It was a farm that was broken up into ten-acre lots, and we got one of those lots. It was thoroughly invaded with Asian invasives. And I mean thoroughly. Ten acres of invasive vines, and autumn olive, and multiflora rose, and bush honeysuckle, and oriental bittersweet. So step one was to try to get rid of that stuff.

But in the process I realized, A: Our insects are not eating these plants. What does that do to the local food web? Of course, our North American insects are not adapted to eating Asian plants. They've never seen them before. That's what we learned in plant insect interactions.

So I didn't think this was news, but it turned out my colleagues really weren't thinking about that. We had talked about host plant specialization. You know, a monarch is a specialist on milkweeds. But we had never talked the impact of bringing in plants from other continents and how that would wreck those specialized relationships.

And that was really the shift that pushed me toward food webs, toward the impact on birds. Turns out working on birds is good if you're going to talk to the public. Talking about saving caterpillars doesn't mean that much to the public, but they like birds

So then I called caterpillars bird food and they liked that too. That was what got me where I am today.

JENNIFER: I love that story, that journey of really looking around at your own land and having that be the starting point for a new chapter in your professional life and in your work as a conservationist. What were the lessons that you were drawing from your land? And how did it change over time? I know that you've stewarded it very carefully.

DOUG: It had been mowed for hay before we moved in. When you mow for hay in Southeast Pennsylvania, you're mowing the rootstocks of all those invasives. Very few native plants there. So step one was to remove the invasives, put in natives, or at least allow them to come in. So we actually planted very little.

I planted a number of oaks because I had free acorns. You could just find them. But we bought very few plants. But the blue jays planted and the squirrels planted and the wind planted, and the property grew back. We have gotten rid of the invasives. You know, it's a constant battle. You always have to get the little guys that are coming in.

But now when I work on the landscape I do it with a chainsaw because we planted so much that I'm losing my light and I found out the trees really grow. Those acorns I planted in the year 2000 are now about 60 feet tall and I planted way too many of them. The interesting thing we've learned is that nature's really resilient.

So this was a barren landscape loaded with non-native plants. We put the native plants back. We have recorded 62 species of birds that have bred on our 10 acres.

JENNIFER: Wow.

DOUG: And I use as an index of the quality of the food web, I count the number of caterpillar species, actually just moth species, on our property.

And I've been doing it for seven years, but I'm up to 1,267 species that are now making a living on our property because we put those plants back. So that's the lesson. The lesson is we really can restore nature pretty much anywhere. So it's way too early to give up. Let's put it that way.

JENNIFER: I know you started out thinking about insects, but I would call you now a plant person. Why are you a plant person, Doug?

DOUG: I am a plant person in that I appreciate the vital roles that plants play. And I truly didn't used to do that. Actually people who studied moths and butterflies were much better botanists because they needed to know where the host plants were.

But again, I was studying, you know, how cucumber beetles choose their mates. All I needed was squash. So most entomologists know very little about plants. And I have expanded my knowledge that way.

JENNIFER: Yeah. Yeah. So, for our audience, most of whom aren't entomologists, can you talk a little bit about the evolutionary history between plants and insects and why that's important to our understanding of the ecosystem?

DOUG: Yeah. It's central to our understanding. Plants of course capture energy from the sun and through photosynthesis, they turn it into food and that's what they use to grow. They're not really anxious to share all that much food. So they protect their tissues mostly from insects, but from vertebrates as well, with chemistry; nasty tasting chemicals, secondary metabolic compounds that make their leaves either bitter or downright toxic. All plants do that to a greater or lesser extent.

Well, that means insects can't eat plants at all unless they have the adaptations that allow them to get around those chemical defenses. And over the eons, by focusing on particular plant lineages, they have developed specialized enzymes that can store and excrete and detoxify those compounds, behavioral adaptations and life history adaptations that minimize the insect's exposure to those compounds. And that allows insects, most of them have specialized on particular plant lineages, so we'll just call them host plant specialists, to eat a particular plant. And an insect that has not specialized on a particular plant can't eat it.

So that's where bringing in plants from other continents throws a monkey wrench into the whole thing because our insects have not been able to specialize on those plants, which means the energy that those plants gather from the sun and turn into food stays in those plants. Well that's great, except for the animals that need that energy. All animals depend on the food that plants produce. And if they can't have access to it, then you don't have any animals in your ecosystem. And then you don't have a functional ecosystem. And we're watching things disappear. I mean, we've lost 3 billion breeding birds in the last 50 years.

We've got global insect decline. We've got a biodiversity crisis. And the reason that matters is that it is biodiversity that runs the ecosystems that provide the life support that we all depend on.

JENNIFER: Why can't they make use of the plants that have been introduced, the non-native species?

DOUG: Alright, there's two ways that they actually can make use of new plants. One would be host switching. So you're a specialist on one particular native plant, and here's a new plant that comes in. Maybe you can start to use that. Host switches do happen, but they are rare, and they happen very, very slowly.

And that's because of all the mutations that have to occur in the sensory systems of insects and the physiological systems to allow them to eat this new plant. They have to be able to recognize it in this matrix of other plants. So there have to be mutations in their antennae. There have to be mutations in the tarsi on their feet.

When they land on the plant, they are tasting it, saying: is this the right plant? So those mutations have to happen simultaneously. Before a female lays an egg on the plant, she has receptors on her ovipositor that again taste the plant. Is this the right plant to put my egg on? Those have to have mutations as well.

Then the egg hatches and the larva starts to eat the plant. It has to be able to accept it as something that is edible. In other words, it has to taste right and they have to be able to physiologically use that plant.

So again, host switches do happen, but it's very difficult for all those things to line up at the same time, and they don't happen very often. When an insect does use a non-native plant, it's called host range expansion. And that happens when you don't require any new adaptations at all.

So let's picture the black swallowtail, which is a specialist on the carrot family. It already has the adaptations to eat pretty much anything in the carrot family. So when we bring in Queen Anne's lace and carrots and dill and parsley, they're all members of the carrot family. The black swallowtail is already able to eat them. It didn't have to evolve to eat them. So it can start to eat our parsley on our back porch and it happens right away.

We looked at host records on woody plants of caterpillars, moths, and butterflies in the mid-Atlantic states, and we found that, yes, there are records of them using non-native plants, but there's a 90% reduction in the insect's ability to use non-native plants compared to what they're doing on native plants. And those are mostly from the result of host range expansions, not host switches.

So, yep, evolution happens, but it happens really slowly.

JENNIFER: Really slowly, right, right.

So we've been talking about insects and how they're responding to these changes in the flora, but insects are also part of a larger food chain. So how are these changes filtering up to other larger species? You've talked a little bit about birds. Can you expand on that?

DOUG: Let's go back to bird food. And that's those caterpillars. 96% of our terrestrial birds rear their young on insects, and most of those insects are caterpillars. So caterpillars have been described as the meat and potatoes of terrestrial food webs. If you remove caterpillars, you remove so much of the bird food that they need in order to reproduce.

Well, it takes thousands of caterpillars to make one nest of bird. The figure I always throw around is Carolina chickadee. 6,000 to 9,000 caterpillars to get one nest of a bird that's a third of an ounce to the point where they leave the nest.

And after they leave the nest, the parents continue to feed them caterpillars another 21 days. So you're really talking about tens of thousands of caterpillars required to make one tiny little bird.

JENNIFER: That's a staggering amount of caterpillars. I think people would be surprised by that.

DOUG: Yes, they are surprised. I was surprised by it. But that's why we need the plants that make those caterpillars.

And most plants don't support a lot of caterpillars. So we have to focus on the few that do. I call them keystone plants because they're the support system that hold up that ecological house we're building in our yards. And in 84% of the counties in which they occur, oaks are the number one keystone plant.

They are making more caterpillars than any other type of tree. Now willows are close behind, and native prunus are close behind, and cottonwoods are there. But oaks lead the way in most parts of the country. So if you wanted to do a single thing in your yard that would help the local food web the most, in a way that's attractive, you plant an oak. It's that simple.

JENNIFER: Yeah, I love that you've been out there telling the tale of the importance of oaks. I loved your book [The Nature of Oaks](#). It was published around the same time that we opened our newly renovated Burke Oak Collection here at NYBG.

And you talk about nursing your own oaks from acorns. And it sounds like you've done just that. Is that right?

DOUG: Yeah, I'm very frugal.

JENNIFER: Efficient.

DOUG: Efficient, yeah.

You can find them, you can find a lot of them. members of the white oak group germinate in the fall, so you plant them right away. The red oak group germinates in the spring, so maybe you can put them in the refrigerator and protect them. But once that acorn germinates, the first couple of years growth is fairly slow because what they're doing is laying down a huge root mass. I think there's ten times more root biomass underground in the first two years than above ground biomass.

So they're putting out this big root mass, you can't see it, so it looks like, oh, they're growing really slowly. But then they take off. Survivorship is great. The big problem we have, of course, are deer, which love oaks. They love little oaks. They love acorns. They rub their antlers on the trunk and strip the bark. So deer are not the friend of oaks and you have to protect your young oaks from deer. But once you do that, you've got a really important plant. It's also a great way to reduce the area that you have in lawn.

Because you plant your oak, and then imagine that oak growing pretty quickly. You're going to put a bed under that oak. The bigger the bed, the better. And you can plant it with a ground cover. You can just have leaves from your oak. But that's really important because those caterpillars that the oaks are supporting, most of them will pupate in the ground.

They drop from the tree and they tunnel underground. When we have grass right up to the trunk, we're mowing and compacting the soil. And particularly in the summertime, when those caterpillars want to get underground, they can't. It's like a rock. So that means all those caterpillars that the tree generated won't be able to survive and reproduce and become moths and make more caterpillars.

So how we landscape under our trees turns out to be just as important as anything else that we're doing. This is new. I mean, we hadn't thought about that before. But it's perfect. It combines with the need to reduce the area of lawn. Just put beds under your trees and you've done it.

JENNIFER: And it's also taking cues from nature. I mean, all of these things have a purpose. So we look at leaf litter and we think, "Must be removed. Trash." But really it's performing a really important ecological function.

DOUG: Yeah, it's performing several functions. It's returning nutrients to the soil because all the nutrients your tree used that year are tied up in the leaves that fall and when you rake them away you're starving your tree. It's forming a blanket over the soil to protect the soil moisture. There are more species that live in the soil than above the soil and they all need high humidity. So that blanket of leaf litter protects the soil and the humidity. The mycorrhizae that are transferring those nutrients to your tree roots. It's a vital part of the system that we can't afford to rake away and throw away.

JENNIFER NARRATION: After the break, we'll find out more about how invasive insects and plants factor into this web of biodiversity, and what we can do

to help. Plus, we'll get even more advice about what to plant around our homes that can better support the environment around us. We'll be right back.

[BREAK]

JENNIFER NARRATION: Welcome back to Plant People. I'm Jennifer Bernstein, and my guest is Doug Tallamy, Professor of Agriculture and Natural Resources at the University of Delaware. Now that we've heard about some of the benefits of insects, let's hear about some of the harms. Invasive insects are a particular problem for local ecosystems. I asked Doug if controlling what plants you have around your home or community can help keep invasive insect populations under control.

DOUG: That is much harder because insects that we have brought in and have become invasive are already adapted to eating the native plants that we have. So I'm thinking of a spongy moth, which used to be the gypsy moth. It loves oaks. The emerald ash borer, of course, is an ash specialist.

So it's already adapted to eating our ashes. And our ashes are not adapted to handling pressure from the emerald ash borer, so it kills them. The hemlock woolly adelgid is already adapted to hemlocks. So invasive insects are, you know, it's a huge problem. Once they're here, you know, the genie is out of the bag, and the only successful hope that we have has been through biological control, bringing the natural enemies that keep that particular insect in check in its native lands over here, releasing them.

People worry about that, but they really shouldn't. There's a lot of regulations about how this is done. Anybody can't just go do it. You have to have a permit from the USDA. You have to test your introduced organisms on any related insect in this country. Those tests take about 10 years. Typically it fails. Sometimes it succeeds spectacularly and that's what makes it all worthwhile.

JENNIFER: So you talked a little bit about the emerald ash borer, and of course, it's wreaking havoc all across this region and beyond. Can you explain a little bit about where that stands?

DOUG: The emerald ash borer is a metallic wood boring beetle that was brought over on, I think, wooden pallets in the Michigan area. But it has spread rapidly. And already it has killed literally billions of ashes. It has spread from the Great Lakes east and then south. And recently, I think last year it was found in Oregon. So it has jumped the Rocky Mountains and it is a problem for ashes everywhere.

JENNIFER NARRATION: Why should we be so concerned about ash trees? Doug says that its endangerment would create a domino effect, threatening all kinds of other species.

DOUG: There are 95 species of animals. Most of them are insects, but 95 species that depend on ashes. I caught a beautiful moth at my house two nights ago. It was the purple plagodis. It is an ash specialist. Now, I have ashes at my house, but they're all dying from the emerald ash borer, and that may be the last purple plagodis that I ever see, at least at my house, because its host plant is being wiped out by that beetle. So there's a real consequence. We lose our ashes, it's not just a few species of ashes, it's 95 species associated with them. And then, you know, countless other species that are associated with those species. So it's a huge hit on biodiversity.

There is progress with the emerald ash borer though, and actually one of my students is working on this. There are four species of tiny wasps that attack the larvae and the eggs of the emerald ash borer. And three of them have been successfully introduced. The fourth one can't seem to make it through the winter.

But where they have been introduced, we're getting up to 50% control of the emerald ash borer population. Which is a whole lot better than zero control. At the same time, we're looking for resistance in ashes. Not all the ashes have died. Most of them have, but a few haven't. They're the resistant genotypes that are going to repopulate ash in this country. In combination with those parasitoids that help keep the beetle under control.

JENNIFER: So there's an example that I hope you'll talk a little bit about because I know that it's been so much in the public imagination in recent years. This connection between butterflies and milkweed. Can you say a word about that?

DOUG: Yeah. Of course, we're talking about the monarch butterfly, another species which is in trouble. And it's in trouble because of the way we have landscaped, particularly the road verges among agriculture. It used to be that they were loaded with milkweed and goldenrod and asters and all the things that our native bees needed and also what the monarch butterfly needed.

In 1976, and of course we had a lot of agriculture in 1976, that was the largest population of monarchs ever recorded. So the idea that agriculture and monarchs can't coexist is not correct. Well then we invented Roundup Ready Corn and Soybeans. So you can now spray roundup on the corn and the soybeans and kill any plants that are in the crop.

But, farmers said, well, let's just spray all the way up to the road and kill all the, quote 'weeds' that are outside of the crop. And we'll plant grass there instead. So we've removed the native plants that support a lot of biodiversity, especially that beloved monarch and replaced it with lawn that has to be mowed and adding carbon to the atmosphere, it's just a terrible decision. The good news is we're realizing that and starting to put back the, they're mostly native prairie plants along roadsides, and that will help the monarch.

Monarch butterflies are a perfect example of host plant specialization. They develop on milkweeds. No milkweeds, no monarchs. We've lost more than 90% of them.

JENNIFER: And the threat to pollinators too. I mean, you focused on the food web that's created in ecosystems, meaning the food web of caterpillars and birds. But there's also threats to our own food webs and food systems because of some of these problems. Can you talk about that?

DOUG: Yeah, of course there's a big push in this country to protect pollinators and that started with the decline of the honeybee. And as a matter of fact, the push has been so successful that wherever I go, all I hear about is pollinators as if those are the only important insects. They are enormously important. But they're just one type of important insect. And it's not the honeybee. It's our native bees. We've got between 3,600 and 4,000 species of native bees that did just about all the pollination in this country before we brought over the honeybee.

They're declining as well. And it's mostly because we've removed what they need. We've removed the forage. We also use toxic chemicals in our agriculture. And we use it by the ton. You know, you hear why we need pollinators and the media will tell you because they pollinate a third of our crops. I think that's a very weak argument. It's also wrong. They pollinate about a twelfth of our crops. And what you're doing is ignoring all the other plants that they pollinate. They pollinate 80% of all plants and 90% of all flowering plants. A few of them are our crops, but believe me, we need pollinators to keep the planet green out there. It's not just about our crops.

So yeah, really important. And the best thing we can do for our pollinator is to plant a sequence of blooming plants in our yards that bloom from April all the way to the end of October to provide the sequence of native plant species that they need, the pollen and the nectar that they need.

And we want to focus on the plants that are really good at supporting pollen specialists. About a third of the species of native bees out there can only reproduce on the pollen of particular plants. And some of the best plants at producing specialists are goldenrod, perennial sunflowers, so anything in the genus helianthus are native asters. If you had goldenrod, asters, and perennial sunflowers in your yard, there are about 40 species of bees that can be there that will not be there if you don't have those plants. That's pollen specialization. So it's not that a zinnia can't support generalist pollinators. It can, but it won't support any of those specialist pollinators. So that's where those native plants come in, even for pollinators.

JENNIFER: Yeah. So you think about first the balance between native and non-native and obviously the more native the better. And then you think about what kinds of natives and the degree to which they can support these specialist pollinators and contribute to the flourishing of the native bee population.

There's a lot to unpack, but that's what makes it fun, right?

DOUG: It's a new challenge for gardeners. It's not just, which new cultivar can we try, you know? Which new species can we try to save? That seems to me a little more rewarding.

JENNIFER NARRATION: When Doug isn't writing or teaching, he runs a non-profit called Homegrown National Park. This is one of the largest cooperative conservation projects ever attempted. It's an organization where home gardeners and farmers alike can pledge to remove the invasive species around them and replace them with native plants.

DOUG: Its sole goal is to get the message that if you're going to own a piece of the Earth, and I put own in quotes, you have the responsibility of taking care of the ecosystem on that property. So right away, that's a new concept to most people.

Public awareness is important. If The public recognizes that plants are more than just decorations, they have critically important ecological roles that impact us directly, then they can realize plant choice matters.

Nature's not just there for our entertainment, it is there to keep us alive on Planet Earth, or at least that's what it does. And we've got to protect it or we're going to lose those life support systems that we depend on.

We've got 135 million acres of residential landscape in this country. 44 million of those are lawn. That's an area bigger than all of New England combined. And if you have a lawn the way you're supposed to have a lawn, the way the marketers tell you your lawn should be, it's an ecological dead zone.

So I think about all the things lawns are not doing. They are not supporting pollinators, they are not supporting a viable food web, they're not sequestering carbon, and they're wrecking the watershed. We've got to turn the ecological dead zones that we've created because of these previous attitudes, we've got to turn that around so that everybody's property can be contributing to the local ecosystem in which it lies rather than detracting from it. So that transfers responsibility from a few conservation biologists and a few ecologists working at a national scale to a very local scale.

Everybody is now a future of conservation. And that's the message of Homegrown National Park. We want people to go to our website and register their property on our biodiversity map, the location of their property, and then the amount of area they're pledging to become a good steward of. Maybe you really are going to reduce the area of lawn. Maybe you're going to plant that oak tree. Maybe you're going to put an aster in a flower pot. It doesn't matter how small it is, and it doesn't matter because we're trying to change the culture as much as we are trying to change the landscape.

It is a huge challenge, there's no doubt. We've introduced more than 3,300 species of plants from other continents that have become established in this country. Many are serious invasives. One thing we can do, though, is stop selling them in our nurseries. That doesn't make a whole lot of sense. If everybody were to control the invasive plants on just their property, which sounds doable, we'd be 78% done in this country because 78% of the country is privately owned. 85% east of the Mississippi is privately owned. That's a huge first step, which is one step closer to getting control of invasives on these public spaces. I'm not talking about eradication. We're not going to eradicate these plants, but we can get them under control.

JENNIFER: We talk about right plant, right place as gardeners. And I think this is a sort of updated version of that, right plant, right place, not just in terms of how well that plant will flourish, but how well that plant will contribute to the ecology. I think it's very empowering because so many of these environmental issues that we face are really overwhelming and you don't really feel that you can make much of a difference as an individual, but this is a way in which you really can. To what

extent do you think that access to the plant material is a barrier for gardeners wanting to make a difference?

DOUG: It's a big barrier right now. The demand for native plants exceeds the supply. So it is a barrier, but it's a temporary one. It's a business opportunity too. Nurserymen just want to sell plants. There's no contract that they sign it has to be a plant from Asia or from South America.

JENNIFER: They'll go where the demand is.

DOUG: They'll go where the demand is. So if the public demands it, they will meet the supply. And I see it happening. More and more nurseries are carrying more and more native plants. There are issues of provenance. Native is, it's really a local term. A plant from Oregon is not native in New York.

Even though it can be grown there and shipped there, so we have to be a little careful about that. But I do see it happening in very positive ways.

JENNIFER: So the climate is shifting and that's changing garden planting zones and so many introduced species of plants are all around us. What makes a plant a native plant? How do you know that it's a native plant?

DOUG: A plant is a native plant when it acts like a native plant. You look at what it's doing in its native region. Where did it come from? What kind of insect populations is it supporting over there?

Let's talk about phragmites, which is highly invasive. It evolved in Europe, where it supports 175 species of insects. It was brought over here hundreds of years ago. It was packing in the earliest ships, so 300 years ago, 400 years ago, and they just threw the packing material out on the shore, and that's how phragmites got here. Well after all of that time, it still only supports five native insects, and it supported them right away. So that's a good example of host range expansion. Those five grass specialists were already adapted to using phragmites. But nothing else has jumped over onto it in the last three or four hundred years.

So that's how slow adaptation happens. Is it acting like a native? No. And it's pushing out plants that have all of those adaptations that they built up over the eons. So you've replaced a diverse marshland community with a single species of a plant that supports very, very little.

JENNIFER: A lot of people, when they start out gardening, will begin with vegetable and herb gardens because there's a lot of joy that comes from that. You're gardening with maybe small children. Are there things that are better or worse to plant in a vegetable or herb garden?

DOUG: Well, our goals there are very different. We're growing food for ourselves. We are not trying to increase biodiversity in our vegetable garden because...

JENNIFER: Yeah we don't want to share, actually.

DOUG: That's right. We don't wanna share. The typical pests that people have in their vegetable garden is the cabbage white butterfly, which is an invasive butterfly from Europe.

We don't want to encourage that. The other one they deal with, which is not an invasive, it's a native, would be the tobacco hornworm on your tomatoes. You know, the little white, people think they're eggs on the back of that tobacco hornworm caterpillar.

It's really a cocoon of a little parasitoid, a little braconid wasp, and there's often dozens of them on the back of a single caterpillar. Those wasps, as larvae, have already eaten the insides of that caterpillar. So, the caterpillar's alive, but it's really just about dead. And it's not going to eat any more tomato plant by the time you see those cocoons.

Well, people often take that and squish the whole thing. And what they've done is just kill the natural enemies that keep that tobacco hornworm in check. Where did those braconid wasps come from? The tobacco hornworm is a type of sphinx moth and they attack sphinx moths. So you've got to have other sphinx moth species around so that those natural enemies are always around to control your tobacco hornworm.

At our house, because of the native plants we have planted, I've recorded 17 species of sphinx moths. They all support that braconid, which means there's always a lot of natural enemies. At our house, ready to hit the tobacco hornworm when it comes. And it doesn't come very often, believe me. So most people have only tomatoes and just the tobacco hornworm with no other sphinx moths around.

So they're lacking the diversity that helps them control natural enemies. So that's one reason to not replace your vegetable garden but enhance the surrounding landscape with plants that will support other sphinx moths.

JENNIFER: So these things can go together. If you create a more biodiverse habitat in your home landscape, you can better support your growing of vegetables and tomatoes and all the things that people enjoy in the summer.

DOUG: Yes.

JENNIFER: Well, thank you so much, Doug. It's been a joy talking to you. Thank you also for just everything you're doing out in the world and sharing the story of how we can all contribute to biodiversity.

DOUG: I really appreciate your support in doing that. So thank you.

JENNIFER NARRATION: To find out more about Doug Tallamy's research and his work with Homegrown National Park, check out the links in our show notes.

Next time on Plant People, food journalist Dan Saladino speaks to us about endangered edible plants, what it would mean to lose these species, and what we can do to prevent it.

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