

## Tree of Heaven Episode transcript

**Intro music:** 8-10 seconds. Music is 'Ragtime Annie' as performed by George Ainley and the Springfield Springers. It is used with permission.

Elizabeth Welcome to Bud Buds, the podcast that takes you into the enduring realm of invasive plants and their seasonal changes, and what you might be witnessing out your window or in the woods in Vermont. I'm Elizabeth, a scientist for the Vermont Department of Forests, Parks & Recreation. I'm joined today, as usual, by my co-host and bud, Lina ...

Lina Hi, I'm Lina, a natural resource steward for the Vermont Department of Forests, Parks, and Recreation. Elizabeth, have you seen the news recently? In regard to invasive species of course.....

Elizabeth I did! I heard that in August (it's 2021, btw, just for listeners in the future), a new invasive insect, Spotted Lanternfly was detected for the first time in Vermont!

Lina That's right. It's bad news, and interestingly the detection only happened because one of our fellow Vermonters, who thought they may have recognized the invasive pest, captured it and brought it to our colleagues for identification.

Elizabeth Remarkable effort, we really do count on all Vermonters to keep an eye out across the state and help spread the word....

Lina ....and not the plant, err, in this case, the insect.

E/L \*laughs\*

Lina And our Forest Parks and Recreation colleagues, along with staff at the Agency of Agriculture, Food and Markets, have done a great job of collecting all detected insects, treating the shipping material the bugs came in on, and surveying for more around the detection site.

Elizabeth Sounds like a lot of work

Lina It was

Elizabeth Speaking of a lot of work, when the news talked about the impact that Spotted Lanternfly could have on Vermont, such as damage to important Vermont crops like apples, maple, hops, and grapes, did you catch what other plants it liked?

Lina Umm, walnut, oak, gosh, I think they said something like over 70 species! That little insect really can eat!

Elizabeth That's true, let me narrow it down a little, it was an invasive plant....an invasive tree.....

Lina Oh, yes! Tree of Heaven! This one I am not super familiar with ...

Elizabeth It's not one many Vermonters will be familiar with, so you are in good company. While spotted lanternfly will happily feed on any of those 70 species, Tree of Heaven -- an invasive plant -- is actually its preferred **host plant**

Lina Host plant, right,....um, like how milkweeds are so important to monarch butterflies?

Elizabeth Exactly -- a host plant is a plant that another organism relies on primarily to survive, for shelter or food.

Lina OK, so Tree of Heaven has this deep connection to Spotted Lanternfly, which sounds problematic enough, but you're telling me it's invasive too?

Elizabeth Yep! Like many species from all over the world that have come to be invasive in Vermont, it grows fast, is resistant to pollution, can grow just about anywhere -- we'll include some photos of it in the show notes growing out the side of buildings!

Lina The side of a building? Are you serious?

Elizabeth No lie

Lina But Tree of Heaven stinks! Its flowers and crushed leaves smell vaguely skunk-like and somewhat rotten. For me, that would be a hard trait to get over and make planting this tree seem worthwhile!

Elizabeth Agreed, and I don't think the full ramifications of the mass planting and spread of this tree were understood when it was introduced and popularized. It's now growing in cities, yards, and spreading to forests across the US. But, like I said, it's rare to find in Vermont.

Lina I mean, that's good, I guess. In places where it's abundant, scientists and land managers alike are seeing the negative impacts this plant has on forest succession and regeneration -- growing into disturbed areas and quickly outcompeting the next generation of locally evolved trees.

That wasn't the case where Tree of Heaven and spotted lanternfly **originally** evolved, together, in China, where they had a good co-evolved thing going as part of a bigger ecosystem. How did they get to Vermont, anyway?

Elizabeth Well, Spotted Lanternfly was introduced fairly recently, I believe it first appeared in Pennsylvania in 2014! Tree of Heaven however, was brought here in the 1700s as an ornamental plant, popular for urban settings....

Lina .....yes! I've seen them growing in cities on the west coast, and I know it grows here on the east coast too,...in fact the tree from Betty Smith's book 'A Tree Grows in Brooklyn', which symbolized the enduring perseverance of so many people who immigrated to the US, is a Tree of Heaven.....

Elizabeth .....and that endurance is relatable. So many in our communities have personal or family stories of hardship and perseverance. And I think it's important that we remember the lived experiences of our families and neighbors when we talk about invasive species. It is hard for humans to separate out those emotional connections and to be objective without seeming cold or heartless.

Lina It's definitely easy to understand wanting to bring something beautiful from home if you're moving far away, and so many plants that are invasive in this area arrived just like that.

Elizabeth So when we talk about invasive species, let's be sure to focus on the *impact* they can cause, and recall that these are just plants or insects, growing and being plants or insects, and they got to where they are because they were transported by humans....

Lina ....and that these plants and insects are not inherently evil or bad, but a lasting reminder of humankind's ability to make mistakes....

Elizabeth And we are all just people doing our best. We're all learning and growing and working to protect the things we value today, like the biodiversity that evolved in Vermont...

Lina That's some deep stuff...

Elizabeth \*sigh\* yeah – always good to be willing to keep learning....

Lina And speaking of learning, I'd also like to know more about spotted lanternfly. The impact it has, and its relationship with Tree of Heaven seems complicated, and it might be good to have an expert on to talk with us about this ...

Elizabeth Good thing we've called in our friend and scientist for the VT Department of Forests, Parks & Recreation, Savannah Ferreira! Savannah, welcome to the podcast – you are officially our first guest!

Savannah Thanks for having me on to speak about invasive insects.

Lina Welcome Savannah! As you know, we're bud buds here, and we generally talk about plants. Can you help us get the scoop on this new invasive insect? The adults look like a really fancy butterfly, and between you and me, I think it's really beautiful. We'll definitely have pictures in the show notes.

Savannah Absolutely, so spotted lanternfly looks the part of a butterfly, but is actually a planthopper...despite what its name and beautiful wings may imply

Lina A planthopper? What does that mean?

Savannah Planthoppers move mostly by hopping, although they can walk slowly, and sometimes fly in adult stages. Both planthoppers adults and nymphs (known as immature stages) feed by sucking phloem or sap from host plants.

Elizabeth Fascinating. So, we talked about how it was introduced from China, but it also evolved in India and Vietnam. How did it get to North America?

Savannah It's believed to have arrived on a shipment of stones from Asia to a company based in Berks County Pennsylvania.

Lina Wow, that is so specific. It always amazes me that we can trace first arrivals so precisely. Anyway, what makes this insect invasive?

Savannah To get to that, can we talk about its biology a little bit?

E/L Totally!

Savannah Ok, the spotted lanternfly lives its whole life in one year – which means it hatches, mates, lays egg masses which overwinter, and dies within that time frame.

Elizabeth No time for regrets with a life span that short

Lina Yeah, fast AND furious!

Savannah And that ferocity ties into its invasive nature – it feeds on an array of plants, both herbaceous and woody. And although Tree of Heaven is a preferred host, new research is proving that spotted lanternfly can spread, grow and complete its life cycle absent Tree of Heaven.

Elizabeth Full stop – what?

Savannah I know....this is a relatively new invasive insect, so information is being updated and added all the time.

Lina So, Tree of Heaven is preferred, but not necessary for spotted lanternfly. That's no bueno for Vermont – I had hoped our lack of Tree of Heaven might help keep it at bay

Elizabeth Or maybe even just our cold Vermont winters?

Lina I know there are days when those have *me* California dreamin'

Savannah Actually, you're right about the cold – at least for the adults. Adult spotted lanternflies are not very cold tolerant, but unfortunately those egg masses are...

Lina uhoh...

Savannah Which means that every spring we get a new generation of voracious crop-hopping insects that feast on over 70 species of plants – some of which are integral to the spirit and economy of Vermont. And it gets more complicated because we don't know how the collective effects of climate change, like warming winters, are going to affect the spread of spotted lanternfly in the future.

Together \*collective sigh\*

Lina Ok, it's tough to hear, but good to know. Thank you so much for being so candid with us, Savannah – that honesty makes it much easier to prepare for what may be coming. Speaking of which, what can Vermonters do to help prepare for Spotted Lanternfly?

Savannah Well, an important first step is helping our communities recognize the signs and symptoms of a Spotted Lanternfly infestation.

Elizabeth To help prevent further spread?

Savannah You got it. For this to be successful, early detection is critical. If you or your neighbor know how to identify egg masses and the other life stages, we can all more effectively slow the spread.

Elizabeth We'll put pictures of every life stage in the show notes, plus links to other resources so you can get confident in IDing this insect.

- Lina I mean, IDing is cool and all, but what are some other concrete actions we can all take?
- Savannah Well, we're trying to prevent spreading it more. Currently there is no known infestation in Vermont, but if you travel through other parts of New England or the Mid-Atlantic region, you should be on the look out! Take the time to inspect things that spend time outside and get moved around – vehicles, recreation gear like bikes, boats, kayaks, including paddles and trailers, for these could have egg masses or even hatched insects on and in them. Even a brief part-day or overnight stop could be long enough for an adult Spotted Lanternfly to lay eggs, or to catch a ride themselves.
- Lina Whoa!
- Savannah Yeah. The good news is that we have science on our side – understanding the growth stages and behavior of these insects....
- Lina The phenology of the insects?!
- Savannah Right! Understanding the phenology of these insects can help us monitor and manage spotted lanternfly outbreaks. For example, we've set up spotted lanternfly traps around the detection site in Vermont, to monitor the site and ensure no infestation has developed.
- Elizabeth And even more reason to learn about phenology and all that it can teach us about the world around us, amazing! Savannah, thank you so much for your time. Before we let you get back to the lab, to keep doing amazing scientific work protecting our forests, what are some take home messages for our listeners?
- Savannah **Be vigilant** – try to stay up on the new invasive species being detected, VTinvasives.org is great place to start  
**Be mindful** – if you know that you've traveled through a state with spotted lanternfly, check your vehicle and personal items (think tents, grills, that giant Yeti cooler on your tow hitch....) for hitchhikers – it could be an egg mass or even a nymph or adult stage insect catching a ride back to Vermont.  
**Report what you see** – if you think you've seen spotted lanternfly, please report it to state officials or through VTinvasives.org – and make sure to try to get a photo!
- Elizabeth That's great. Thanks so much Savannah! We'll make sure to have links to all things spotted lanternfly and to the report it tool in our show notes.
- Lina That was awesome – after Savannah's discussion, and the photos we're going to post in the notes, I think I've got a pretty good feel for spotted lanternfly. But Elizabeth you know plants are more my jam. So, given

that correct ID is so critical for management -- do you have any advice for how someone would know if they were looking at a Tree of Heaven?

Elizabeth Great question, let's start with some broader characteristics – It's a tree, so it can be quite tall, upwards of 80 feet for really tall ones, but an average mature tree is about 60' tall, with a canopy branching out 35-50' wide.

Lina You know I don't have a ruler that big....

Elizabeth Good point, \*laughs\* it's about as tall as a bowling lane is long. But if that's still not a useful measurement, we can also look at the leaves.

They are compound leaves, with upwards of 41 leaflets per leaf. And each of those leaflets have a smooth margin, but at the base of each leaflet are bumps visible on the underside of the leaflet – which are glands that produce that foul smell when crushed

Lina And that smell is even more prevalent on male flowers on male trees– that's right, Tree of Heaven has separate male and female trees

Elizabeth And that's our fancy science word for the episode – dioecious – when an organism has separate male and female individuals!

Lina Cool, but are there any popular look-alikes? I feel like Tree of Heaven sounds an awful lot like sumac!

Elizabeth Yeah! Sumac, ash, walnut, butternut, these for sure are all close look-alikes. We'll include some resources on how exactly to tell them apart,..... but looking for large numbers of smooth margin leaflets and those glands is a shoe in for Tree of Heaven. The glands would be absent from any potential look-alikes.

Lina So, if you find Tree of Heaven – or spotted lanternfly! -- please also let us know. They are both early detection species in Vermont. You can use the same report it tool for each one, and we'll make sure to include that link.

Elizabeth That's right Lina, each of us can play a role in helping to slow the spread of invasive spotted lanternfly and invasive Tree of Heaven.

Lina And, of course, if you see any other invasive plants, or have a topic you'd like us to address, please let us know about that too.

Elizabeth Until then, we'd like to acknowledge the financial and technical support provided by the USDA Forest Service, Northeastern Area State and Private Forestry that enables us to run projects and provide outreach such as this,

Lina           and our major project partner, the National Phenology Network, bringing together community members, scientists, managers, and educators, to advance the science of phenology.

Elizabeth    And most importantly, thanks to you, our listeners, for being interested in the science of phenology – of plants AND insects – and being willing to

Together     “Learn. Get Involved. And Make a Difference.”

**Outro music** - 8-10 seconds of 'Ragtime Annie' as performed by George Ainley and the Stringfield Springers, picking up where it left off at the beginning of the podcast