

The Ecosystem Value of the Dominant Native and Invasive Shrubs in the WSU Woods Transcript

Our next talk is by Jaedynn Duell, an undergraduate who worked in my lab. I'm John Stardon in the Biology Department. She'll be giving a short talk on her study of the ecosystem value of the dominant native and invasive shrubs.

Alright, so when you take a walk out in the Wright State Woods, typically you see a bunch of green understory. This is due to Exotic Amur Honeysuckle. It stays green even in late fall. So, even if you take a walk out there right now, you will still see a bunch of green understory.

So, why is invasive honeysuckle a problem? As I just said, it's dominating the understory of the Wright State Woods. It has a high tolerance of poor growing conditions, so it can grow in various parts of the forest, such as the edge along trails or even on the interior. It also has a long growing season, so it leaves out early in the spring, and it will stay green late into the fall. As we see, this can ultimately have negative impacts on native plant species.

But what is Amur honeysuckle? It was introduced from Asia in the late 1800s. It was mostly cultivated in people's yards, but it escaped cultivation in the 1950s. It has fuzzy and drip-tip style leaves, as you see up there, and is mostly spread by birds through the berries. But the berries aren't very nutritional for the birds; they're more like junk food because they lack fats and proteins.

So, here is a map of the United States. We can see that most of the Eastern United States is being dominated by this Amur honeysuckle. Since it's becoming more widespread, this can have a negative impact on native plant species.

Taking a look at the trophic levels for native plants, we typically see that a lot of energy will go to herbivores, and then that energy can then be transmitted to predators such as birds or spiders. With invasive species, we expect fewer nutrients to go through, as you see here, meaning that even less nutrients and energy will move up to birds and spiders. If this is the case, invasive plants won't be able to sustain these higher trophic levels as native plant species do.

So my main study question was: What is the impact of invasive honeysuckle on independent arthropod communities in higher trophic levels? To further define this question, I've looked into three separate categories. I want to see if honeysuckle supports the same abundance and richness of caterpillars as native woody plant species. Caterpillars are especially important to look at because they're a dominant herbivore.

And then, to further look into that, I looked into herbivory to see how much damage is being done on these native woody plant species and invasive honeysuckle. Lastly, to look at the trophic levels, I did an experiment on predation to see if honeysuckle and spicebush are similar in predation levels.

So, my native plant species that I looked at was Spicebush. It is a native ecological counterpart to honeysuckle. Spicebush is a dominant native woody shrub of the Wright State Woods. It's best

known for its potent smell, so if you rub the leaves, you'll smell like a spice, as it says in its name. It also spreads by birds with the red berries, and it's important to look at this native plant because it could be potentially replaced by this invasive honeysuckle.

With my experiment to address the question of caterpillar abundance and richness, to see how much is on honeysuckle and spicebush, I did some sampling. These caterpillars were sampled with a beat sheet, which is just a sheet stretched over some PVC pipe that you can hold under foliage. When you beat it, the caterpillars will fall into it, and then you can collect them. I brought these caterpillars back to rear them, so they were placed into cups with leaves of where we found them, and we let them grow to see if they would live or die on these plants. I also recorded the foliage sampled.

With herbivory, to see if the caterpillars are eating or getting any nutrients from these plants, I went out and actually collected them with unbiased sampling. I used an app called BioLeaf, where you can outline the leaf to get a more precise percentage on damage of the leaf. Any small holes in the leaf were just marked as 1% damage.

With the predation study, I made clay caterpillars around three centimeters in length, and each caterpillar was then glued to a branch. We tried to alternate it between honeysuckle and spicebush, so two per plant with about five meters in between. As you can see on the bottom here, this is the type of damage we were looking for, like marks, scuffs, any types of small details we wanted to examine.

So, with caterpillar abundance, a majority of caterpillars were found on spicebush, while around a tenth were found on honeysuckle. With richness, we also see a similar trend. A lot more number of species were found on spicebush, while a lot fewer were found on honeysuckle. These numbers are still relatively low on both, as you can see. It's like 0.25 is what spicebush is around, but since spicebush has so much more than honeysuckle, it still has some significance.

With herbivory, as you might expect from the previous graphs, the herbivory on spicebush was a lot greater. Honeysuckle experienced around less than half of what spicebush did. Still not a lot of percent damage, but still a lot more found on spicebush, which can have some significance.

With caterpillar predation, there was less proportion of arthropod and bird predation found on honeysuckle, but there were still only small percentages found on both. These differences weren't significant but can still be suggestive.

Here are some more examples of predation. As you can see on the bottom left, the caterpillar was just taken clean off the branch. We saw this with a few, but usually, you just see the bigger bite marks like you did on the previous slide. On the right, you can see near the head, more arthropod damage. It's more subtle, so we had to examine arthropod damage under a microscope. These could be from ants, wasps, or spiders.

So, what does this all mean? In my study, I found that honeysuckle supports fewer herbivores and experiences lower herbivory, which means that birds may also be foraging less on honeysuckles since they can't find the nutrients that they need. Predational model caterpillars did

not differ significantly; both species hosted relatively few caterpillars and experienced low herbivory. Honeysuckle could also lead to diminished ecosystems. To maintain the diversity of higher trophic levels in the Wright State Woods, the university should implement honeysuckle removal.

I'd like to thank Ari for helping me. He showed me how to set up the predation experiment. He also showed me around the Wright State Woods and how to collect caterpillars. So, he really helped get me started with this research.

Alright, are there any questions? [Applause]

Yes?

[inaudible audience member]

So, I found, I think Dr. Simon could help me a little bit on this, but I found mostly the same type of caterpillar on both of them. Which would be this type that I'm showing would be like sawflies.

[inaudible]

[Applause]