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Suitability and Nutritional Analysis of Spotted Lanternfly Habitats

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Figure 3. tree-of-heaven

Figure 2. spotted lanternflies infesting a grape trunk.

BACKGROUND

The spotted lanternfly (**Figure 1**) is an invasive bug that has recently started taking over the Northeastern US, and has even made it to Rhode Island (1). Although this species is intriguing with its bright red back and spots, it is hurting native plant species and the agriculture industry by feeding on crops, like grapes and cherries (2)(**Figure 2**). It uses a tongue-like mouthpart to pierce through the plant and feed directly on the sap inside. This punctures plant stems and causes them to drip sap, wither, and even mold. The lanternfly's most preferred host plant is the invasive tree-of-heaven (**Figure 3**), which grows and spreads quickly due to its ability to thrive in unconventional habitats like urban areas (3).

Figure 1. Adult spotted lanternfly

My goal is to determine what nutrients the spotted lanternfly relies on and what habitats are suitable for them. To do so, I focused on sites in Rhode Island and Eastern Massachusetts that have tree-of-heaven. I used an elemental analyzer, which measured the carbon and nitrogen levels in the samples, to compare the nutritional value of three preferred host plants (tree-of-heaven, birch, and wild grape) and three less-preferred plants (dogwood, white pine, and sassafras)(4). These data will be used to prioritize sites for invasive species surveys.

METHODS

At each site, a 20-minute start and pause survey was conducted. I paused the timer when I reached a tree-of-heaven to survey. A survey maximum of 10 trees was established after pilot surveys.

For each tree-of-heaven, I measured the tree's circumference at breast height and documented the species within an 8-foot-radius of the tree, especially those that acted as host plants for the lanternflies. (**Figure 4**).

Five samples of each species (preferred and not-preferred) were collected, using leaves as a proxy for sap nutrition.

The samples were brought back to the Bonoan Lab and freeze-dried, weighed, and put into the elemental analyzer to measure carbon and nitrogen levels in each sample.

Figure 4. Conducting a tree-of-heaven survey at Gavin's Pond, Foxborough, MA

RESULTS

I collected data from 51 trees-of-heaven at 7 different sites, and collected samples from 6 species of preferred and non-preferred host plants from 2 of my sites **(Figure 5).** This map shows the sites in Massachusetts and Rhode Island that **at least** had tree-of-heaven present.

The percentage of carbon did not significantly differ between plant species (Anova, Df= 5, F value= 2.3844, p value= 0.06845) **(Figure 6)**. The percentage of nitrogen significantly differed between plant species (Anova, Df=5, F vlaue= 13.616, p value < 0.005) (**Figure 7**). The data showed a higher percentage of nitrogen in the preferred species that the lanternflies are known to feed on.

Figure 5. Map of visited sites and their suitability for spotted lanternfly habitat based on the species richness of preferred host plants, including tree-of-heaven, grape, birch, maple, and stone fruit trees (2).

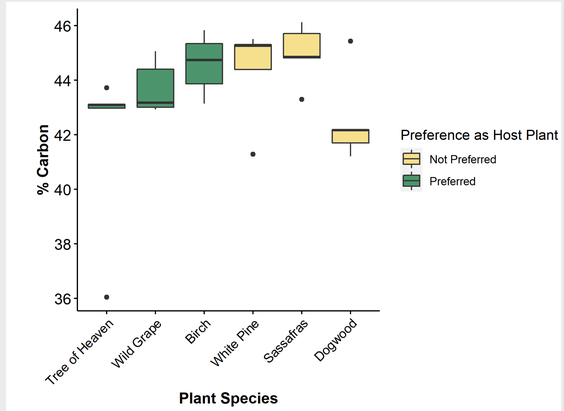

Figure 6. Percentage of carbon in leaf samples from each species, both preferred and not-preferred by the lanternflies.

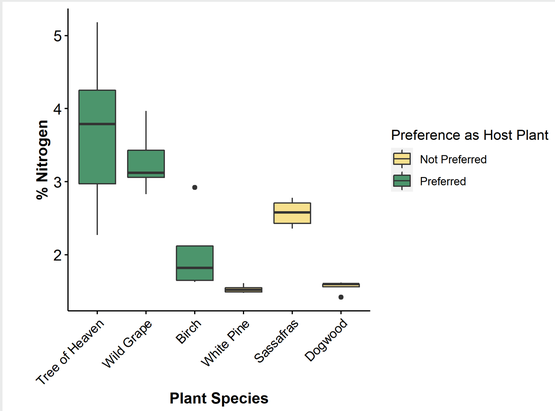

Figure 7. Percentage of nitrogen in leaf samples from each species, both preferred and not-preferred by the lanternflies.

CONCLUSIONS

Since the carbon (**Figure 6**) did not differ significantly between species and nitrogen (**Figure 7**) did, it is likely that the lanternfly relies more on nitrogen for its diet and nutrition. The tree-of-heaven samples, its favorite host (4), showed the highest nitrogen levels. Although sassafras is considered a non-preferred host species, it showed high nitrogen levels, meaning it is possible to turn into a preferred host species in time.

The most suitable sites, based on species richness, were Gavin's Pond Soccer Fields, Sharon, MA, Milford Pond, Milford, MA, and Knights of Columbus, North Providence, RI. All three most-preferred species were found in RI meaning there are suitable habitats in RI for the spotted lanternfly.

Interestingly, most of the sites had an urban disturbance, whether that be a parking lot or paved road (**Figure 8**). Further research would include looking into what role land cover type plays in lanternfly habitats and if they prefer urban areas to rural.

Figure 8. Urban disturbance at Gavin's Pond, MA.

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Figure 2. Biddenger D et al. 2021. Spotted lanternfly management in vineyards. *Penn State Extension*.
Figure 3. Dr. Rachael Bonoan
Figure 4. Dr. Rachael Bonoan

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