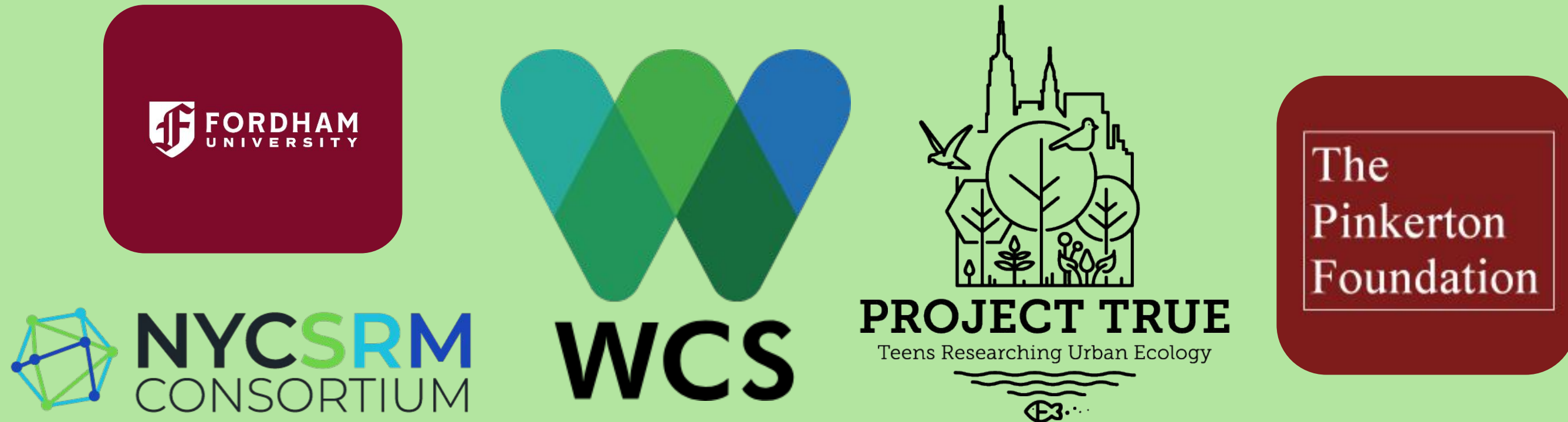


Spotted in The Sap: A Survey on *L. delicatula* Abundance & Fungal Activity in the Bronx Zoo

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Introduction

The spotted lanternfly (*Lycorma delicatula*) is an invasive phloem-feeding insect from the order Hemiptera, that is originally native to east Asia. They were introduced to the United States, first being sighted in Berks County, Pennsylvania in 2014, through concealed egg masses in imported tree species (Zhang et al., 2023). *L. delicatula* have become detrimental to the ecosystems they invade – due to their long term feeding in swarms of thousands onto individual trees – leading to a decline in health of the host tree species (Hoover et al., 2023). Their feeding habits also disrupt agriculture, being capable of making 90% of a grape vineyard harvest go to waste (Hoover et al., 2023).



Fig 1. *L. delicatula*, adult stage, enclosed within trap.



Fig 2. Visible sooty black mold on tree affected by *L. delicatula*.

L. delicatula are generalist feeders, with feeding observations on over 100 plant species across its native and invasive range, with a particular affinity for the tree of heaven, *Ailanthus altissima* (Soler J, Izquierdo J., 2024). *L. delicatula* excrete excess sap in a waste byproduct known as honeydew, which provides a nutrient-dense environment for the development of **sooty black mold** – a group of fungal diseases that can coat various trees associated with *L. delicatula* (Zhang et al., 2023).



Fig 3. Spotted lanternfly with foreign strands, possibly due to a fungal infection.

This project aimed to survey the abundance of *L. delicatula* in relationship to varying **host tree species** found within the **Bronx Zoo's Mitsubishi Riverwalk**, a temperate urban greenspace that serves as a small public park. Furthermore, along with identifying the species of trees hosting *L. delicatula* populations, visual surveys were performed to track the presence of **fungal activity** on host trees.

Methodology

Site Description: A total of fifty traps for *L. delicatula* were distributed over the three main sites: Mitsubishi A (n=11 traps), Mitsubishi B (n=25 traps), Mitsubishi C (n=14 traps). All sites had varied degrees of vegetation and urban activity (Fig 3).

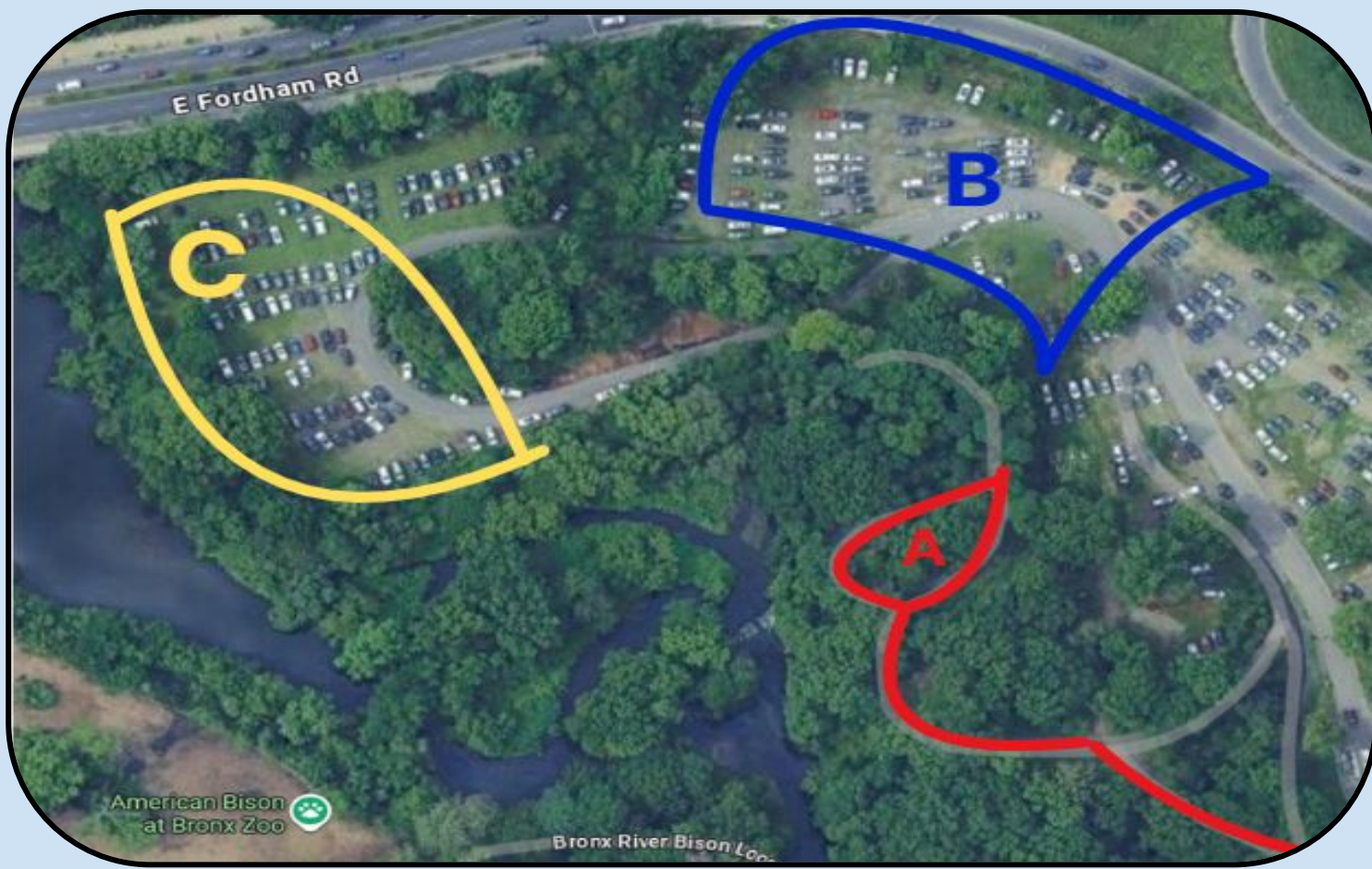


Fig 4. Three main sites (A, B, C) distributed along Mitsubishi Riverwalk with varying vegetation.

Tree Identification: Utilizing a field guide, *Trees of New York* (Tekiel, 2022), and a NYC Parks Leaf Identification guide, visual identification surveys were performed on all trees containing traps for *L. delicatula*. Trees were surveyed by multiple observers to ensure accurate identification.



Fig 5. Mesh trap on tree funneling *L. delicatula* into a plastic bag.

Lanternfly and Fungal Survey: Bag traps set on host trees were used to track the abundance of *L. delicatula* across all tree species (Fig 5). A total of 50 traps were distributed unevenly onto the three main sites. Each trap within the assigned site would be surveyed once per week by two observers: the survey consists of counting all *L. delicatula* trapped within the bag by their instar stage. Observers also visually identified potential fungal activity on host trees such as sooty black mold, fruiting mushroom bodies, or other visible fungal activity surrounding the tree mount of the trees with bags. Once both surveys are complete, the bags containing *L. delicatula* are replaced with new bags and disposed. Fungal activity that is not immediately identifiable is returned the lab for further analysis under a microscope. The total abundance of *L. delicatula* per site was logged onto iMapInvasives, a citizen science platform that collects data on invasive species sightings from the public.

Abstract

Spotted lanternfly (*L. delicatula*), fungal activity, and tree identification surveys were conducted to examine which host tree species within the Mitsubishi Riverwalk area in the Bronx Zoo contained the most *L. delicatula* within their traps. **Fungal activity** was recorded in order to analyze if **Sooty Black Mold** was present in trees with a greater concentration of spotted lanternflies. The **Red** and **Silver Maple** trees were the tree species with the greatest average spotted lanternfly count. Moreover, the majority of trees with fungal activity contained sooty black mold. These results support the hypothesis that trees with an abundance of *L. delicatula* would have sooty black mold as the most common fungal activity. Results from this study will help inform *L. delicatula* management in infested areas and give more variety on their preferred host tree species.

Research Questions & Hypotheses

Research Question 1: How does *L. delicatula* abundance vary based on host tree species within the Mitsubishi Riverwalk?

Hypothesis 1: The tree species with greater sap sugar content–like maples–would contain a greater abundance of *L. delicatula*.

Research Question 2: Is higher abundances of *L. delicatula* on a host tree correlated with the presence of fungal activity (particularly sooty black mold) on that tree?

Hypothesis 2: Host tree species that contain a large abundance of *L. delicatula* will most frequently be affected by sooty black mold because they excrete so much honeydew, which promotes mold growth.

Results & Figures

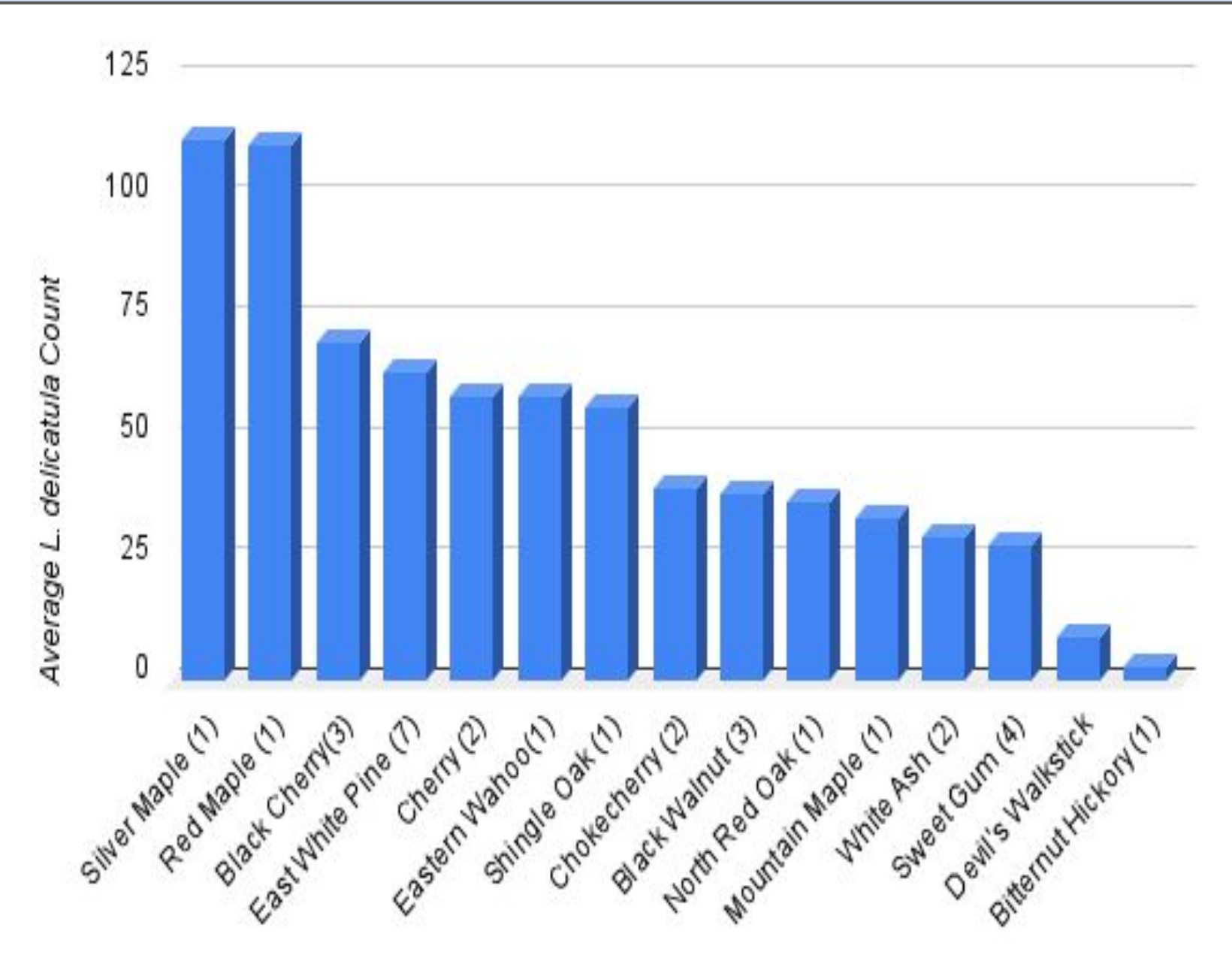


Fig 6. A bar graph showing the distribution of *L. delicatula* average abundance counts (average # of spotted lanternflies per tree) across tree species, with the number of trees surveyed per species in parentheses.

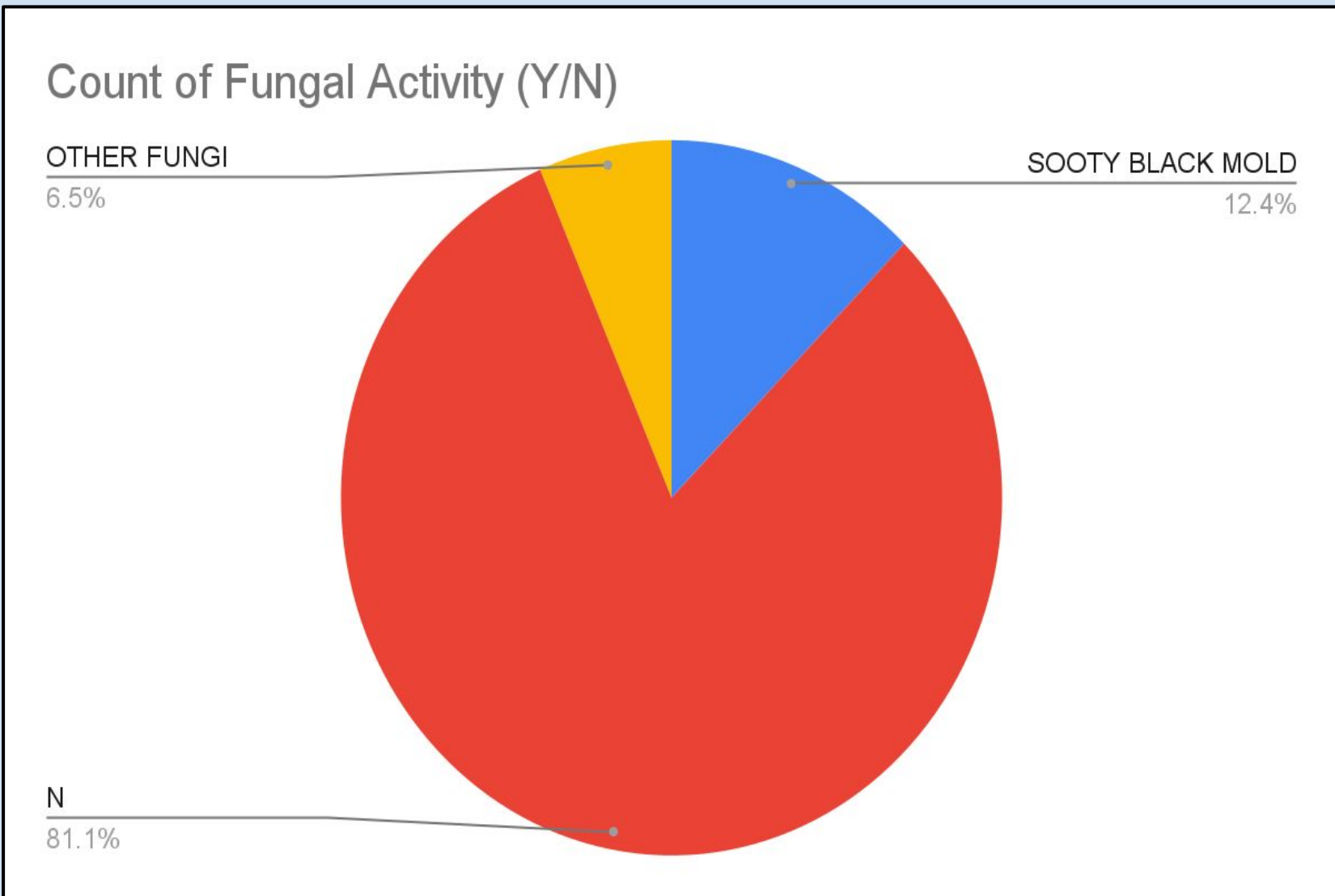


Fig 8. Pie chart of the fungal activity of host trees (N: No fungal activity; all other are designated as "Y" with either sooty black mold or other fungal activity).

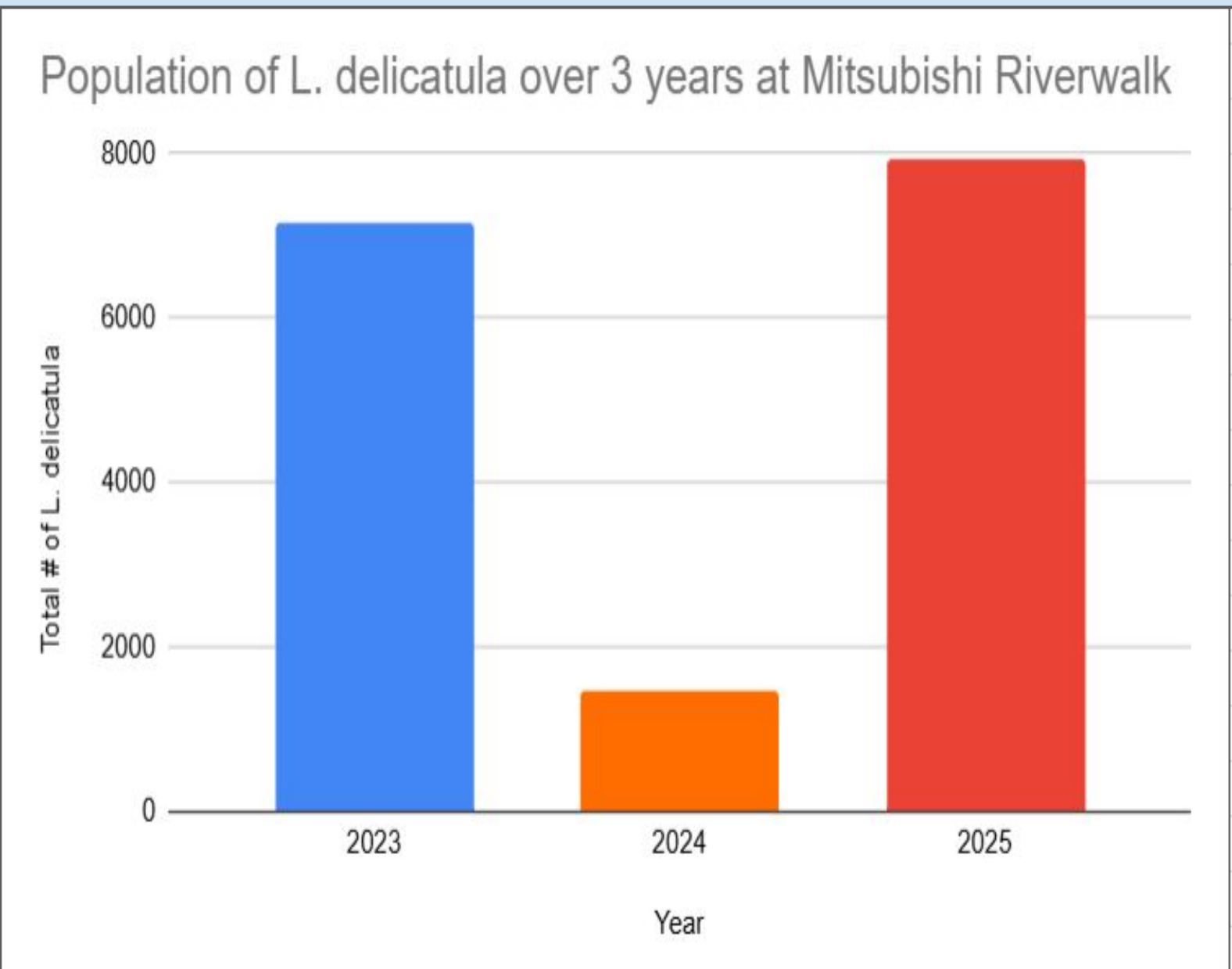


Fig 7. A bar graph showing the total abundance of the *L. delicatula* populations between the 2023, 2024, 2025 surveys for Project TRUE.

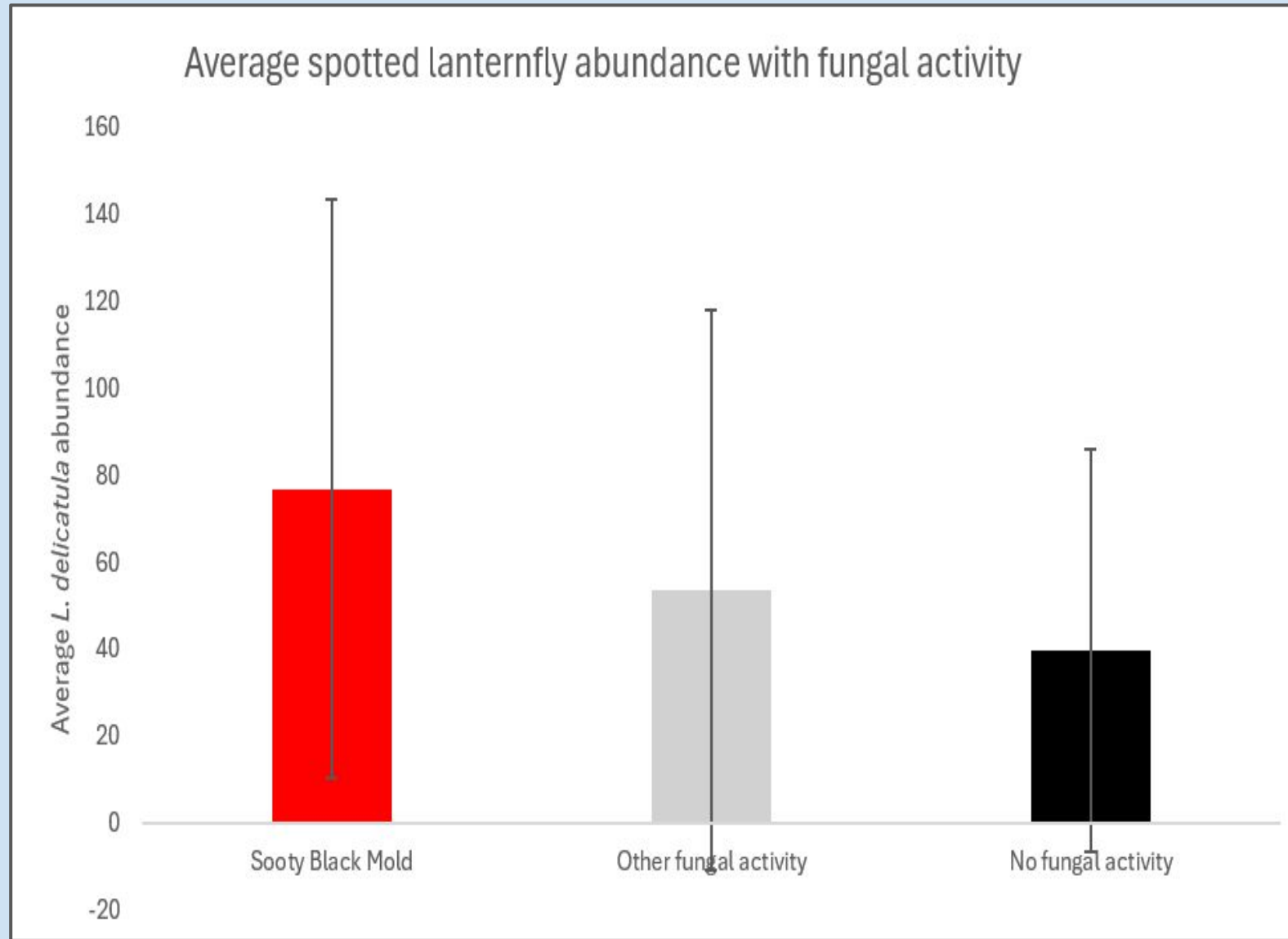


Fig 9. Average *L. delicatula* abundance associated with trees containing sooty black mold (Average 76.90 ± 66.41 Std. Dev), other fungal activity = (53.63 ± 64.50), and with no fungal activity = (39.81 ± 46.23).

Discussion & Conclusion

Conclusion: A total of 7902 *L. delicatula* were surveyed across 50 traps during the study period. These results are consistent with the high abundance surveyed in 2023 (n = 7104), but decidedly higher than the 2024 survey (n = ~1550). The majority of the trees did not have any fungal activity detected in the visual surveys. However, from those trees with visually noticeable fungal activity, the most frequently identified activity is sooty black mold (Fig. 8). **Red maples** and **silver maples** have relatively **greater average *L. delicatula* counts**, despite having a lower tree count compared to other tree species; the **Devil's walking stick** had by far the **least *L. delicatula* count average** (Fig. 7). This may be because red and silver maples have a high sugar content in their sap. These results are important, because they can be used to better manage and eradicate spotted lanternfly populations in the US. For example, park management can plant trees that are less likely to support spotted lanternflies, or trees that lanternflies seem not to prefer, such as the devil's walking stick.



Fig. 10. Silver Maple leaves



Fig 11. *Ailanthus altissima*, an invasive plant and a common host for *L. delicatula*

Limitations: Data was collected from trees using traps, and these traps only work on trees with relatively large trunks. ***Ailanthus altissima***, or Tree of Heaven, is another invasive species in the U.S., which seems to be the preferred host tree of spotted lanternflies (Hoover et al., 2023). Unfortunately, the tree of heaven has a very slim trunk, and it is difficult to secure a bag trap on a tree of heaven, which could be explored in further studies. For future research, we would recommend more efficient ways to identify tree species, such as automated AI tools used for image detecting tree species or AI tools such as iNaturalist with feedback from other identifiers of the trees.

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