

No Difference in Biodiversity of Ants Found Around a Turf Field Compared to a Forest

Jack Byrnes & Sophia Diaz, Mentored by Jennifer Newitt & Vijay Suthar



Abstract

The goal of this experiment was to determine and compare the amount of biodiversity of ants from the Friends Academy turf field, and the Friends Academy cross-country course. After sample collection we accurately identified our samples using DNA sequencing and used the Simpson Index of Biodiversity to calculate which area had the more biodiversity of ants. Our results showed evidence that there may be a small difference in biodiversity however the two are very similar, showing that even though turf is an artificial environment, it is still habitable or even preferable for ant species. The data provided is relevant for scientists looking to gather various species of ants as well as those wishing to add a turf field to a local environment so they can know how the turf is going to affect the variability of the ants found in the area.

Introduction

The primary purpose of this experiment was to determine whether or not the presence of turf in an environment would affect the biodiversity of ant species with forested areas as a comparison. The initial hypothesis our team tested was that turf would negatively impact the biodiversity of ant species, as turf is known to increase the temperature of the environment it is placed within as well as lead to a loss of moisture in the surrounding soil. Although ants “normally prefer dry, well-drained soils” (Vittum, 2011), the lowered amounts of plant foliage caused us to suspect that the overall biodiversity of ants would decrease in turf areas. The results of this observational study will benefit both scientists and people working on the construction of turf, as well as people working in pest control.

Sample Number	Sample Genus and Species	Location of Extraction
CXN - 002 / CXN - 003	<i>Nylanderia flavipes</i>	FA Turf Field
CXN - 004	<i>Nylanderia parvula</i>	FA Turf Field
CXN - 026	<i>Prenolepsis imparis</i>	FA Turf Field
CXN - 024	<i>Aphaenogaster araneoides</i>	FA Turf Field
CXN - 022 / CXN - 014 / CXN - 019	<i>Nylanderia parvula</i>	FA Cross Country Course
CXN - 005 / CXN - 009 / CXN - 018	<i>Tenmothorax ambiguus</i>	FA Cross Country Course
CXN - 015	<i>Prenolepsis imparis</i>	FA Cross Country Course
CXN - 017	<i>Nylanderia flavipes</i>	FA Cross Country Course

Figure 3, Data table of our samples, identification, and area of extraction

Materials & Methods

- 1) Pitfall traps were set up in the areas of extraction
- 2) Manual identification of samples collected through pictures
- 3) Extracted the DNA using the silica protocol
- 4) Amplified a region of the DNA using a COI primer and sent the amplified DNA for sequencing
- 5) Using DNA Subway, we viewed the DNA sequences from PCR and used BLAST to match our samples to a species based off of the DNA sequence
- 6) Using the identification from the BLAST, we used the MUSCLE in order to confirm classification of the ant species
- 7) Used the Simpson index of biodiversity to calculate which area had more biodiversity



Figure 1, image of the Friends Academy Turf Field, First area of extraction

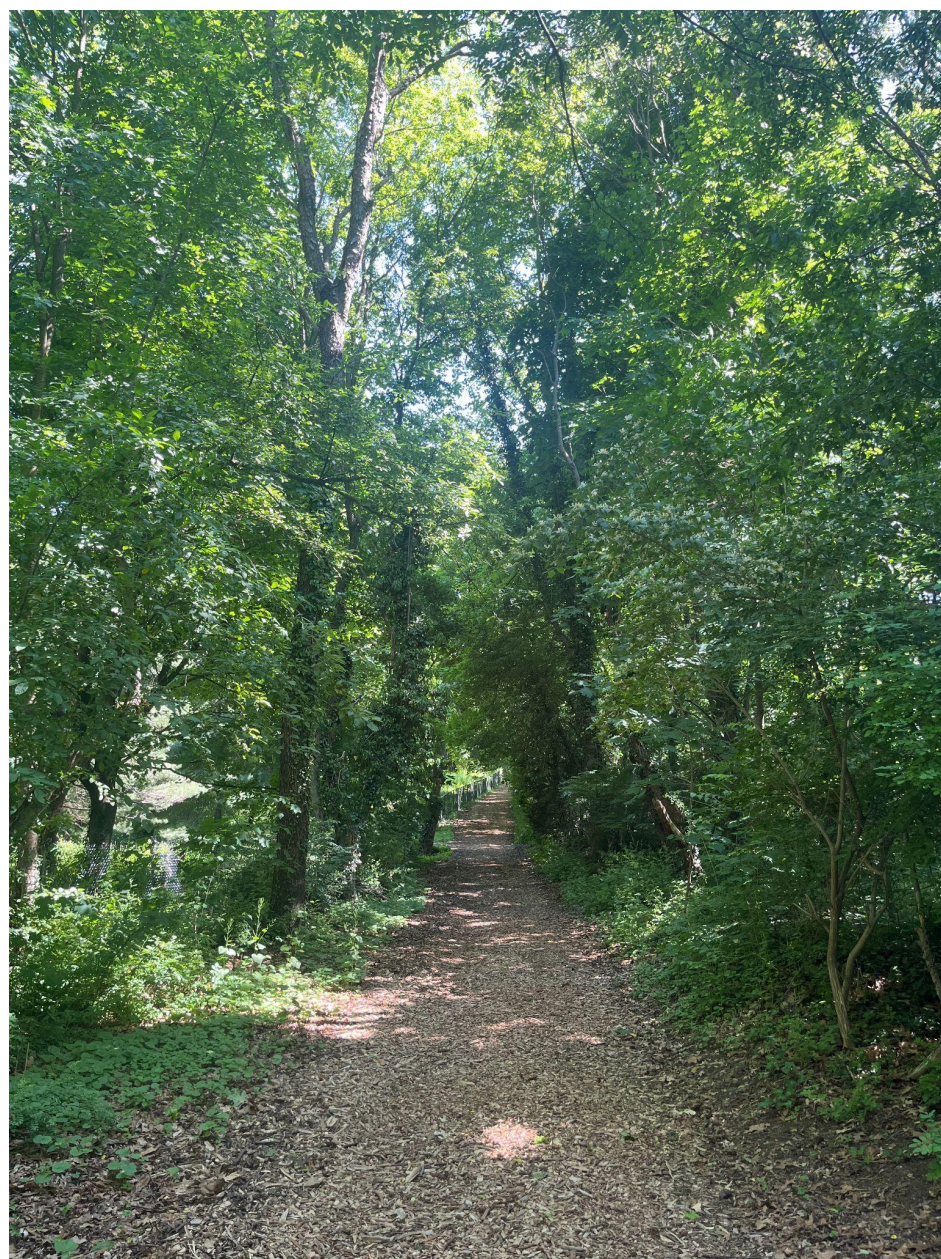


Figure 2, Friends Academy Cross Country Course, Second Area of Extraction

Results

By the end of the data extraction process, thirteen samples remained usable, with five from the turf field and eight from the cross-country course (See Figure 3). Once we achieved all of our data about our specimens species, we used the Simpson index of biodiversity to calculate which area was more biodiverse. After using the equation, the turf field had .72 of biodiversity between the species, while the forest had about .68. These numbers show that there may be a slight difference in biodiversity however overall the two environments seem fairly similar. However more specimens would need to be collected in order to have a more clear conclusion

Discussion

This data, although there was a small sample size, suggests that the turf field has a greater biodiversity of ant species than the forested cross-country course, disproving our initial hypothesis. Although the data was contradictory to our initial hypothesis, there is plausible reasoning behind it. The decrease in plant foliage allowed for more dirt patches to be formed on the ground, creating ample space for the development of ant colonies. Also, all of the ant species found in the turf field have shown to prefer dry and sandy areas (which turf creates as it dehydrates the environment) to develop colonies which explains why these colonies were exclusively found on the turf field and not anywhere in the woods of Friends Academy. Based on the limited data, we can conclude that the Biodiversity of ant species around the turf field of Friends Academy is likely greater than that of the Friends Academy cross-country course.



Figure 4, sample CXN-024 species: *Aphaenogaster araneoides*. It was found at the FA Turf Field.



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