The Effect of AstroTurf on Ant Populations: DNA Barcodes of Ants Collected From Two Identical Courtyards with Natural and Artificial Grass.

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SEPA SCIENCE EDUCATION PARTNERSHIP AWARD
Supported by the National Institutes of Health

Abstract

This experiment studied whether AstroTurf affects ant diversity. Ants were collected from two courtyards with natural and artificial grass. Sample from Astroturf belonged to Tetramorium caespitum as it acted as pavement. Although the samples for the natural grass also belonged to Tetramorium caespitum, it is because the courtyard is surrounded by buildings which may have caused habitat fragmentation.

Introduction

This experiment studies whether AstroTurf affects the diversity of ant population in order to find out if they provide ants with the necessary habitual environments. They are made out of many contaminants which can negatively affect the ants. AstroTurf does not have exposed soil. Therefore, cannot provide the ants with its necessary prey. DNA Barcoding was used to identify the ant species.

Materials & Methods

Pecan Sandie cookie traps were placed in both courtyards for 90 minutes. Samples were separated and placed in bags in a freezer (-20°C) and in 1.5ml tubes of 99% ethanol. Samples were photo-documented and PCR was performed with COI primers (LCO1490 / HC02198). 20 samples with bands in 680 BP range were sent to Eurofins for Sanger sequencing. The silica method was used for extracting the DNA which were processed using DNA subway to produce barcodes. Lastly, the matches were blasted against NCBI GenBank.

Figure 1: Map of Collection Site

Results

20 samples with bands in 680 BP were chosen as representatives, 10 from each group. Ant samples T500, G200, G200, G201, G300, G301, and G500 were sequenced successfully. According to Figure 2, All tested samples belong to the species Tetramorium caespitum.

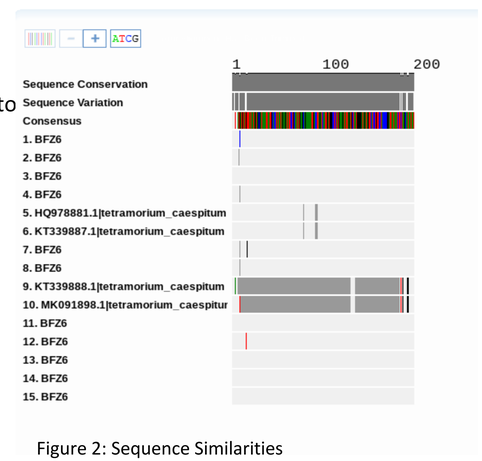


Figure 2: Sequence Similarities

Figure 3: Phylogenetic Tree

Figure 4A:

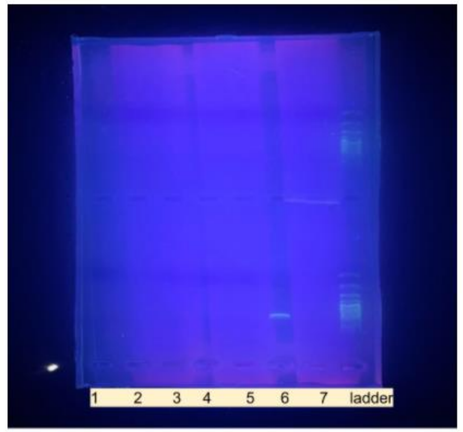
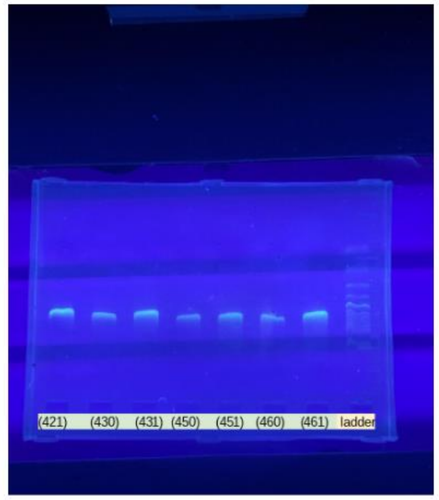


Figure 4B:



Discussion

Based on the results from this experiment, we cannot fully determine whether AstroTurf affects the ant population. There was not a wide diversity of ants in both areas, with all of the samples being the same species, Tetramorium caespitum. Astroturf may have acted as a pavement since it does not provide the environment in which many ants usually thrive. Although the samples from the natural grass group also belonged to the same species, it potentially may be because the natural courtyard is surrounded by buildings resulting in habitat fragmentation, as shown in Figure 1. In the future, this experiment should be done in areas that are not surrounded by buildings for the natural area, as it can provide more samples and give a more accurate representation of the diversity of ants in natural areas. Furthermore, the gel bands were mostly faded in Figure 4A. Using a different Taq polymerase for running gel electrophoresis in the future can improve the gel quality. Nonetheless, these results can inform scientists that AstroTurf and the areas surrounded by buildings affect the environment and lower activities in the ecosystem making them not suitable places for ant colonies or populations.

References

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Acknowledgements

Connetquot High School and Cold Spring Harbor Lab