

Human Impact on Ant Biodiversity by Means of Deforestation Alex Biondi¹, Savvy Roderick¹, John Halloran¹ ¹Connetquot High School

Abstract

Ants play an extremely important role in the ecosystem, and their biodiversity can be affected greatly by humans. This experiment explores how humans affect the biodiversity of ants. Traps containing honey and tuna were set in 2 different habitats, the Connetquot High School Soccer Field, which is a manmade field, and the Connetquot State Park, a Pitch Pine Oak Forest, in order to collect ants. A 20 minute hand search was also conducted to target ants that foraged less. The DNA of ants were extracted and analyzed to compare biodiversity of both areas. The forest yielded more ants than the field, having 7 different species. Meanwhile the field had only 2 species. Lasius made up the majority of the ants in the field, which suggests the forest has greater biodiversity.

Introduction

Throughout history, humans have impacted animals and their habitats greatly. [1] Here, ants are used to help visualize the effects deforestation can have on forest inhabitants. Looking at ant biodiversity is important because it accurately depicts the health of the environment they inhabit. [3] Different ants fulfill different niches in ecosystems, and having a greater biodiversity can be a great bioindicator of a healthy ecosystem. [3] The survival of ants is extremely important for an ecosystem. This study measures the ant biodiversity in two different environments, the Connetquot High School Soccer Field, which is a manmade field, and the Connetquot State Park, a Pitch Pine Oak Forest with various trails and a river. The Soccer Field is an example of an area impacted by humans as the lawn is frequently mowed and it is subject to human activity, whereas the Connetquot State Park is an example of an area that is not modified by humans. DNA barcoding was used to determine the genus and species of the ants collected. Some ants can be difficult to identify by appearance, so by using DNA barcoding we can get a more accurate idea of the species of ant found. [5] The Connetquot State Park should have a greater biodiversity, due to its lack of human impact.

Materials & Methods

- Ants were collected on 9/18/22 in the Connetquot State Park (undisturbed by humans) and the adjacent field (disturbed by humans)
- Ants were collected using traps filled with 1mL of honey and 7g of honey
- 8 traps were spaced evenly in each section which had a perimeter of 40x20 ft, and left for an hour
- Hand search in each section for 30 minute
- Ants were stored in ethanol tubes and in -20C freezer
- DNA was extracted using the process found on BarcodeLI
- DNA was Amplified using the PCR process found on BarcodeLI, and PCR targeted the COI gene by using a primer cocktail
- Raw sequence files were analyzed using the blue line of DNA subway



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Results

- below
- biodiversity as a number

Forest Traps





Discussion

- the forest has high biodiversity.

Lasius Neoniger





The Family tree on the left has been made to display ant relations of the collected ants



• All ants collected with traps in the field were determined to be Lasius Neoniger • They were 4 different ant species collected with traps in the forest • Greater biodiversity was determined by Simpson's Biodiversity Index Scores found in the graph

• The equation found next to the graph was used to determine D scores which displays





• Our data suggests that there is greater biodiversity in the forest when compared to the field • There were a greater number of ants caught in the forest compared to the field • Simpson's Biodiversity index measures the biodiversity in an environment. A high D Score indicates low biodiversity. A high 1-D score indicates high biodiversity. This graph suggests that

• DNA sequences were analyzed and barcodes were created using the blue line of DNA Subway

Simpson's Biodiversity Index scores