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I. Abstract

Our experiment involved the effect of soil water saturation on the biodiversity of ant species on Long Island. Soil water saturation is characterized as the volumetric water content of soil, which is the ratio of water to soil in a unit of soil. It was hypothesized that increased soil water saturation would lead to higher ant biodiversity. Three soil samples were collected from different areas around Grant Park. The water saturation of these samples was analyzed by determining the initial weight of the soil and then determining the weight after the soil was dry. Ants were obtained through hand collection and the use of Berlese funnels. 13 ants in total were collected, but we were only able to determine seven of the ants' species. Each area had a different species of ant, indicating that water saturation does have an effect on ant species. However, there was not enough data for a statistical test to be conducted, which means that the null hypothesis was accepted.

II. Introduction

- Biodiversity is defined as the level of different of species in a specific environment
- The biodiversity of ant species is important because it is indicative of larger climate trends that affect the entire Earth
- The effect of soil water saturation was investigated because it has not been studied in depth before
- Soil water saturation falls under the larger field of soil quality (O'Geen, 2013)
- It can be expressed through the ratio of water to soil in a given unit of soil (Datta, Taghvaeian, & Stivers, 2018)
- There are 84 known species of ants in New York state, of which we will find a few (State/Province: New York, n.d.)
- DNA barcoding will be used to determine the species of ants that we find
- DNA barcoding allows us to identify the individual genes in an ant's DNA
- These genes can then be compared to an advanced database of known genes to determine the species of the ant
- Past experiments have indicated that areas with either an extremely high or low level of water saturation have not been ideal for ant survival (Folgarait, 1998)
- However, very low water saturation seems less favorable, which is why we hypothesized that increased soil water saturation would lead to increased biodiversity (Folgarait, 1998)

III. Materials and Methods

- With the help of other barcoding groups, we collected soil from 3 different locations
- Each area was at a different distance from a pond in the park
- We measured the water concentration of the soil at these three locations
- We did this by determining the initial weight of the soil and then allowing it a few days to dry
- Creating a ratio using the initial weight and the final weight of the dry soil allowed us to analyze the soil water saturation
- We collected ants near these locations through both hand collection and the use of Berlese funnels
- After this, a pestle was used to grind up the ants, exposing their DNA
- The DNA was then isolated using silica resin
- This DNA was copied using PCR, which was done in a thermal cycler (Cold Spring Harbor Laboratory, 2023)

The Effect of Soil Water Saturation on the Biodiversity of Ant Species





Figure 1: Image from I Love New York, n.d.



Figure 2: DNA Subway tree for samples 5, 6, and 8





Figure 4: Image from Soil Science Society of America, n.d.

- The three areas all had very different water saturations

- Ants 1-4 were collected in the first area
- Ants 5-10 were collected in the second area
- Ants 11-13 were collected in the third area
- Ants 1, 3, and 4 were Formicinae Lasius Alienous
- Ants 5, 6, and 8 were Dolichoderinae Dorymyrmex
- Ant 13 was a Formicinae Prenolepis Imparis
- Figures 2 and 3 are images from DNA Subway

Each site had one species of ant

- The results support the idea that certain types of ants live in certain levels of soil water saturation We collected 13 samples but only 7 were identified for species
- The results could not be put to a statistical test due to limited sample size
- In the future, we could identify the species of more ants for more accurate results

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These images were created from comparing the DNA from known ants to the ants we collected

V. Discussion

This means that the null hypothesis was accepted

VI. References

VII. Acknowledgements