The Effect of Pesticides on the Biodiversity of Ants

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Abstract

This study will determine if herbicides affect the biodiversity of ants as a part of the DNA Barcoding ant campaign. This research will collect ants from two different residential houses in the same town. One house has used the herbicide Weed B Gon (Ortho, active ingredients are dimethyl amine salts) for over a year. However, the other location has been pesticide free for over a year. Before DNA is extracted from each ant, they are identified through the process of taxonomy. For a more accurate identification, DNA from the ants collected at both locations will be isolated, amplified, and identified using DNA Barcoding and DNA Subway. Once the ants are identified, the biodiversity of the ants with or without pesticides will be evaluated.

Background

DNA Barcoding is a taxonomic method that uses a genetic marker in an organism's DNA to identify the species. This information is used to find the biodiversity in that environment. The steps to DNA Barcoding are isolate the DNA of the ant, amplify the barcode portion of the Cytochrome c oxidase gene by PCR (Polymerase Chain Reaction), and analyzing PCR products by gel electrophoresis. The sequence is then submitted for sequencing. Using DNA barcoding for our research will determine if pesticides have an effect on the biodiversity of ants.

Purpose

The purpose of our project is to determine the effect of the herbicide Weed B Gon on the biodiversity of ants.

Hypothesis

If the herbicide Weed B Gon is used on an area, then the biodiversity of ants in this area will decrease.

Procedure

Sample collections, ranging from ten to twenty were collected to reassure that we were able to successfully collect enough samples for the DNA barcode process. One collection site currently has pesticides being used on the grass, meanwhile the other collection site does not use pesticides. The ants will be collected from both sites in a grassy area on top of the soil with gloves and will be placed in sterile test tubes. The invertebrates will then be frozen for several hours in a freezer while still in the test tube after they are collected. Once the invertebrates are in the lab, photos were taken of each ant using the moticam X3 Wi-Fi camera and the moticam app. We used morphology to identify the ant before we analyzed it with taxonomy. Next the DNA of the specimen was extracted. After the DNA was extracted, the Cytochrome c oxidase gene was amplified using the CO1 primer. The DNA was isolated, amplified using PCR, and identified using DNA Barcoding and DNA Subway. Then the gel was viewed using UV or LED trans illumination to determine if the DNA was successfully isolated amplified. After this, the data will be reviewed in the BLAST database.

Collection Site One

Figure 1

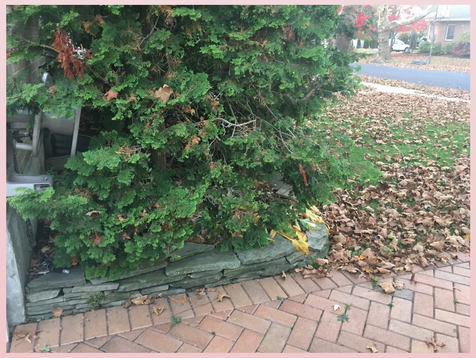

Figure 1 shows Collection Site One which uses pesticides

Figure 2

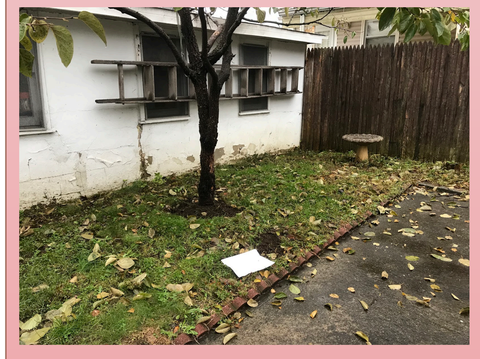

Figure 2 shows Collection Site Two which does not use pesticide

Gel Electrophoresis

Figure 3

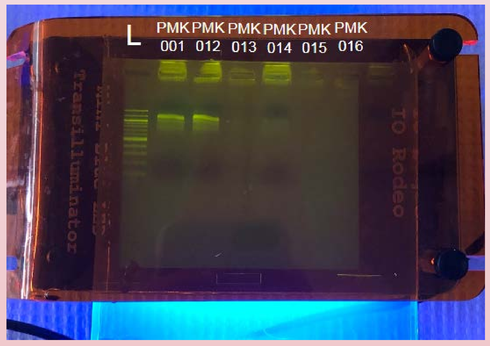

Figure 3 shows the gel electrophoresis of ant samples 001-016

Figure 4

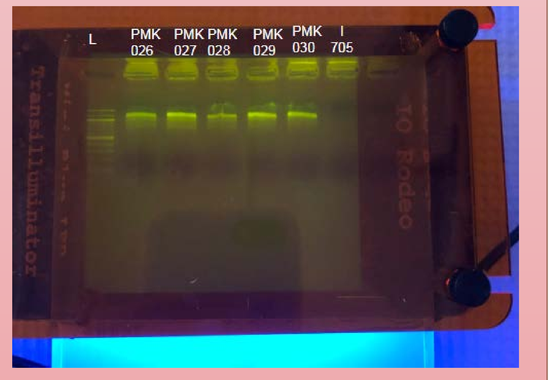

Figure 4 shows the gel electrophoresis of ant samples 026-035 and the control invertebrate sample

Taxonomy

Through taxonomy research the ants that were collected are identified as Lasius Niger (Black Garden Ant). This conclusion was made since the ants have similar traits to this species such as their dark brown color and length of 3.5mm. Also they were collected in the environment where Black Garden Ants can be found.

Further Research

After isolating the DNA of the ants and amplifying DNA by PCR, the next step is to analyze PCR products by gel electrophoresis. DNA barcoding will create a barcode sequence for each ant. The next step is to wait for the barcode sequences to be uploaded to the DNA subway site. The data will then be interpreted to determine if pesticides reduce the biodiversity of ants.

Refernces

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