



Street Plants: Invasive or Not?

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Abstract

Invasive plants are harmful to our environment because the most aggressive invasive plants emerge on disturbed ground and can infiltrate existing ecosystems. We did an experiment on the plants in our neighborhood. The research question is how many invasive plants are in New York streetscapes. The purpose of this project is to find how invasive plants can affect our neighborhood and the city's local plants. We isolated and amplified DNA. We had results for one sample, KMT004. Using DNA subway, KMT004 is chickweed, scientific name *Stellaria media*. It is a native of Eurasia that has become naturalized all over the world, thriving in disturbed areas and wastelands. This species can be used as a cooling herbal cure and it is planted for human and poultry consumption as a vegetable crop and ground cover. It is invasive, and we want to advocate for residents to eat this plant!

Introduction

- Invasive plants affect streetscapes and are a serious threat to biodiversity.
- They tend to appear on disturbed ground, and the most aggressive can invade existing ecosystems.
- Invasive plant species have an impact on the diversity of local species and can damage the quality of soil nutrients.
- We planned on collecting samples in our local areas and aimed to identify and locate the extent of invasive species in the streetscapes of our neighborhood as these species can threaten the city's biodiversity, resulting in environment and economic harm.
- The goal of this project is to find out which invasive species are present in different neighborhoods. By observation, we could look up what are the native or invasive plants in NY, and try to avoid getting those as a sample.
- To find and count how many species are affecting how many other species. We expected to find invasive plants because plants are located everywhere.
- The hypothesis of this experiment is to find the antidote to remove these invasive species and we expect to find the result of DNA in invasive species of our samples in the laboratory.

Materials & Methods

- We collected 18 samples from local areas near our homes and school in Queens
- We took samples by cutting them with scissors and placing them in ziplock bags. We always wore gloves and wiped our equipment with alcohol and clean paper before and after collecting.
- We stored our samples in the refrigerator.
- To determine if our plant samples are invasive, we used the chelex isolation method to extract DNA from the plant samples.
 - We amplified DNA by PCR and analyzed PCR products by Gel Electrophoresis. Samples that were successfully extracted were sent to a lab to be sequenced.
- We mixed the small amount of specimen tissue sample with the chelex to isolate DNA from the plant samples.
- We used an rbcL primer set to make a copy of a DNA barcode region.
- We mix the DNA directly into a PCR tube with primer and polymerase mixture.
- To determine if the plants samples are invasive, we used gel electrophoresis.

Results

Image 1, image 2, and image 3 displays the location of our all 18 samples, that we retrieved from. The samples were found only in Queens: Woodside, Elmhurst and Sunnyside.

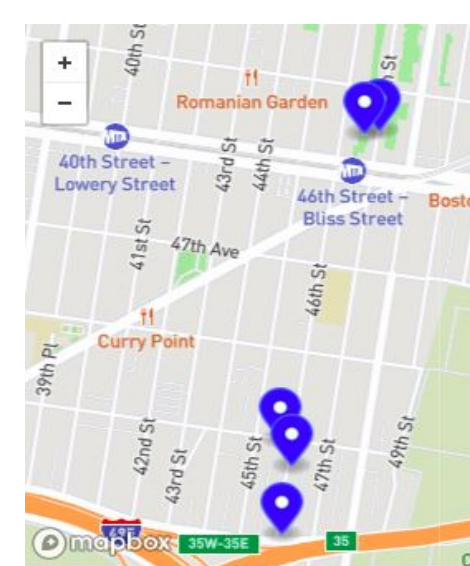


Image 1

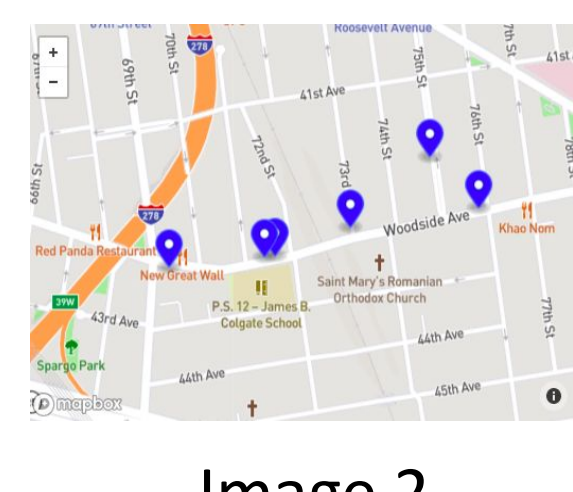


Image 2

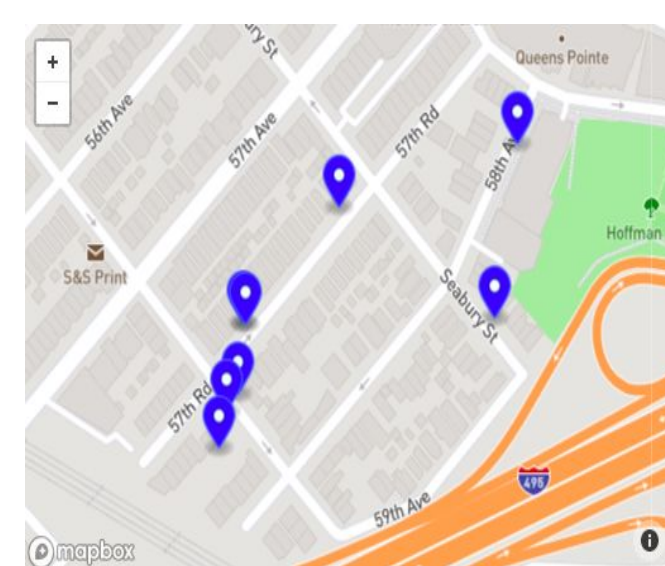


Image 3

- Out of 18 samples, only one sampled worked, KMT004. It was found in front of the apartment building, in the Elmhurst.
- In the image 4 : The specific blue pin is the area where we retrieved KMT-004, the only sample that worked.
- In the image 5 : It's the street where we retrieved KMT004.
- Image 6 and 7: These images show us zoomed in view of the plant and the area of the plant.

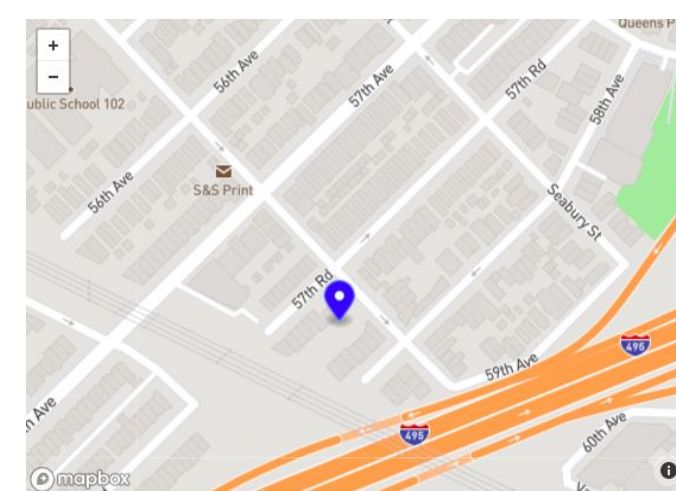


Image 4



Image 5



Image 6



Image 7

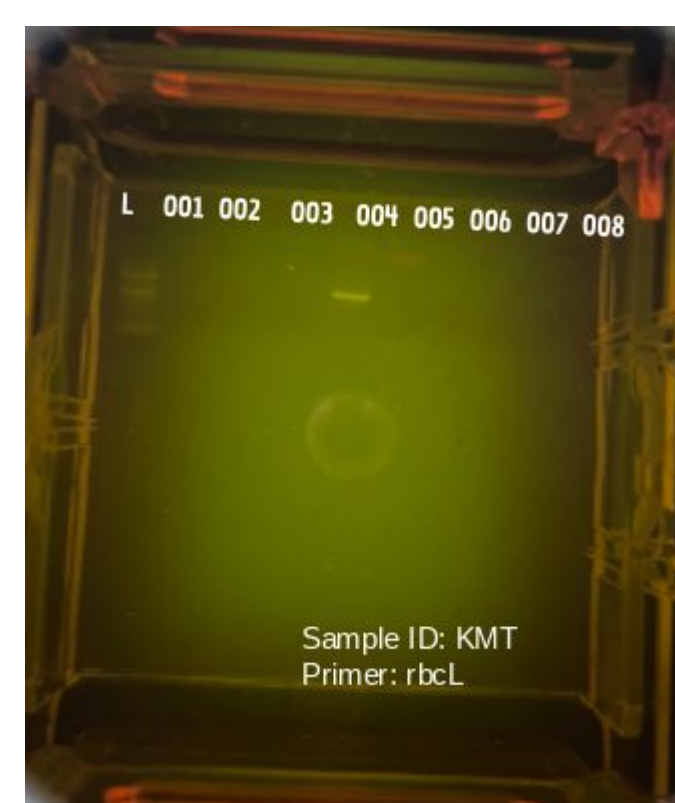


Image 8



Image 9

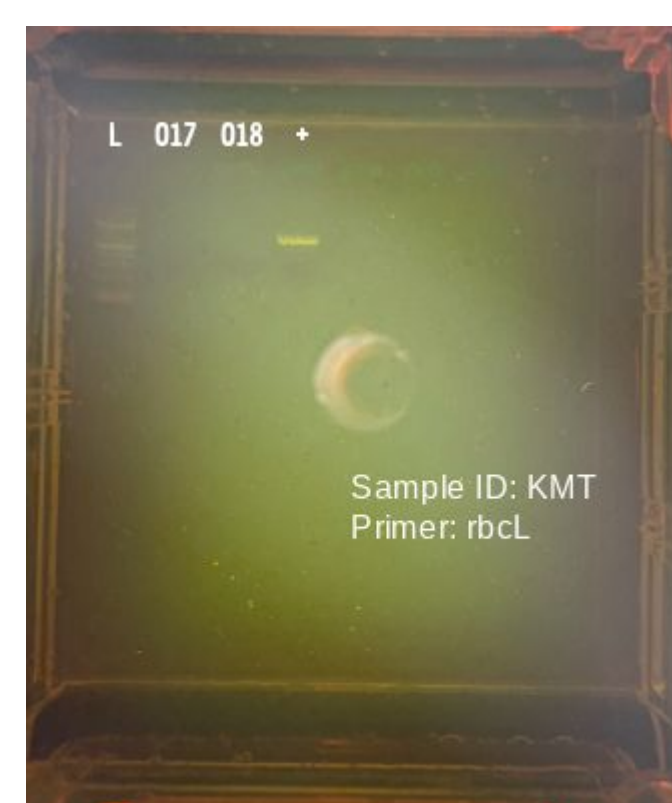
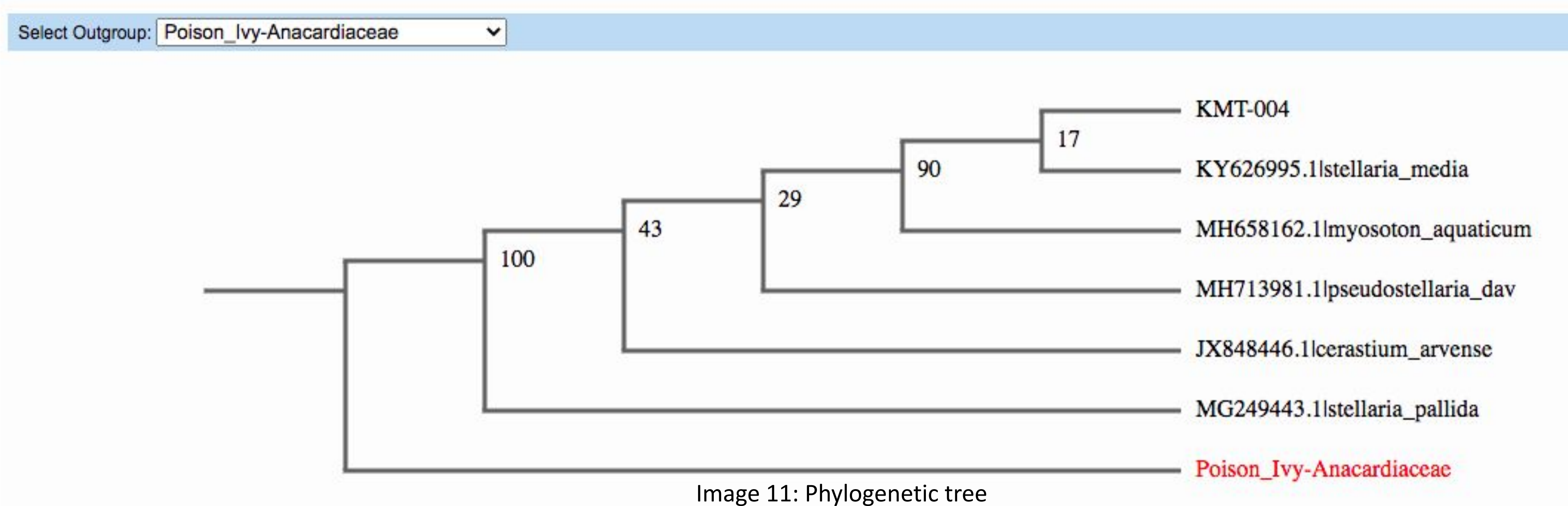


Image 10

Image 8, image 9 and image 10: In the gel electrophoresis result, we can see that only one DNA sample KMT-004 works, and unfortunately, others didn't. We also put a positive control to know whether the gel electrophoresis worked or not. A positive control shows whether the experiment is functioning properly as planned.



KMT-004 are the same. It is our sample. Poison Ivy is least related to our sample out of the all plants that were mentioned in the phylogenetic tree

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Discussion

- We only found sequence results for one species because we only had one DNA extracted.
- KMT-004 is the common chickweed. It is invasive.
- We believe that our hypothesis of finding invasive species in streetscapes was supported by this single result.
- The common chickweed can be found in everywhere in the area that have Dirt. This species is also said to be very common and can be added to salads and other foods that can be eaten raw or cooked as a vegetable, even after being uprooted, the weed can continue to produce seeds and even re-establish itself if left on the ground.
- One of the mistakes made during this experiment was incorrect labeling because, while extracting DNA from plants that we collected, one of our partners misplaced her species number 1 and we miscounted, and later when we received the results, we discovered that sample number KMT-004 was 005.
- We can now contact the building owner about the invasive species found in his house streetscapes because we discovered that sample 005 was invasive.
- The other reason we only got one positive sample is that we made our mistakes when isolating DNA by not using the same amount of samples and not grinding the samples for the same amount of time.
- We are confident that we did not make a mistake in the two-step procedure for amplifying DNA by PCR and Gel electrophoresis because we had a positive control during the experiment that worked.
- We will be more careful in following the isolating DNA protocol because this could be a point where we made a mistake with our DNA extraction.
- Next time, if the experiment is successful and we discover invasive species in our streetscapes, we will notify the New York City Department of Environmental Protection and a number of other organizations about the presence of invasive plants in our streetscapes.

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