Submerged Aquatic Vegetation

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Abstract

The samples were collected from Van Cortlandt Lake, which was dammed off from Tibbetts Brook hundreds of years ago, which makes this lake an isolated ecosystem. The samples were collected from two different locations around the lake. The samples collected were used to show the biodiversity of submerged aquatic vegetation. The objective of this experiment was to see the biodiversity of submerged aquatic vegetation and which components correlate with the results. The methods we used were DNA extraction and amplification, the DNA was then shipped to the Urban Barcode Program to be sequenced. The procedures were found on the Urban Barcode Project website. The results showed that the species were to North America and little diversity. Due to limited results it was hard to create any conclusions from the results. Overall, the findings were as expected, but, the information collected was limited therefore, it can be ruled as inconclusive.

Introduction

The question asked in this experiment was, what is the biodiversity of submerged vegetation in Van Cortlandt Park? More specifically the biodiversity in Tibet's Brook. The factors that could have affected the diversity was, did the runoff from the golf course affect the plant growth? Did the fact that the pond was man made limit the diversity of the species inhabiting it? Did an ecosystem develop over time? Were all of the plants collected native to New York? The hypothesis tested was: The plants collected are all native to North America. Since the samples were collected in the end of October, which means the weather was cooler, therefore many plant blooms had receded, leaving little diversity in the lake,because only certain plants were able to sustain life in colder weather.

Methods and Materials

The samples were collected from two different spots around the lake. The samples were pulled from Tibbet's Brook, which derives from Van Cortlandt Lake. The criteria was that the plants had to be aquatic and in the lake. Once the samples were collected, they were separated by location and species and the tissue samples were placed in 1.5mL test tubes. Then the DNA extraction will begin, the samples will be ground up and 500µL of Tris solution will be added. Next, the samples sat in a hot water bath for 10 minutes at 65°C. Next, it was centrifuged for one minute on maximum speed. Next, the supernatant was transferred to a clean tube and silica resin was added, mixed and the tube was placed in a hot water bath at 57°C for 5 minutes. Then it was centrifuged for 30 seconds at top speed. And once again the supernatant was transferred to a new tube and 500µL of wash buffer is added, mixed and centrifuged for 30 seconds at maximum speed, and repeated. After transferring the supernatant to a fresh tube, 100µL of distilled water was added, and the mixture was centrifuged for 30 seconds. The supernatant was transferred to a fresh tube and it was stored at -20° until it was time for the next step. After the DNA has been extracted, it must be amplified. To start, primer mix was added to the DNA and mixed. The DNA was placed in the thermal cycler and the appropriate protocol was used to amplify it. Once again, it was stored at negative twenty degrees celsius. Next the presence of DNA in our samples needed to be confirmed by gel electrophoresis. Gel was poured and was set after twenty minutes. Once it is set, it was loaded and electrophoresed at one hundred and thirty volts for thirty minutes. The samples that resulted in DNA were sent in to be sequenced at Urban Barcode Project.

Results

Of the samples collected only five resulted in DNA. These five samples were all different species. Although, some of the samples had mismatches in the DNA, with which the suggested species the sample correlates with, the samples still matched very well and E-value was still very low. Sample three is a eutrophic/lean dominicae, commonly known as horsetail or cornsal. This sample had only two mismatches in the DNA. Sample five was typha domingensis, which is commonly known as cat tail. This sample only had one mismatch in the DNA. Sample seven was Elodea nuttallii, which is commonly known as Elodea. This sample had only one mismatch. Sample nine was Nuphar variegate, which is commonly known as Pond Lily. This sample had one mismatch but had a lower bit score than some of the other matches. Sample ten came back as Nuphar advena, which is commonly known as Spatterdock. This sample had six mismatches but a significantly higher bit score than some of the other matches, and still had a 0.0 E-value.

Discussion

The results found show that the submerged vegetation that was collected is native to North America, this was expected according to the hypothesis. These results are important because it shows that a new ecosystem flourished, it is included man made lake. The frustrating thing about this experiment is that not a lot of DNA was that was confirmed during the gel electrophoresis. These could have been more conclusions to draw from the results if there was more to work off of. There are some mistakes made that could have affected the results of the DNA sequencing. Some of these mistakes could have occurred in the extraction of DNA, which includes: not grinding completely, unintentionally disturbing the pellet, and leaving our sample in lysis solution for weeks.Or in he amplification the spilling of the DNA out of its wells and into the gel

References

"Van Cortlandt Park." Van Cortlandt Park Highlights | ... Accessed May 21, 2017. https://www.nycgovparks.org/parks/van-cortlandt-park/highlights/...

"Crystal (Crystalia Dam Demonstrans), a Native Aquatic Wilderness." Crystal (Crystalia Dam Demonstrans), a Native Aquatic ... Accessed May 21, 2017. https://plant.ncfgdm.edu/plant/2112.cfm.

"Non-native Invasive Freshwater Plants." Invasive Species. Egeria Densa. Accessed May 21, 2017. http://www.psc.wa.gov/programs/invasive/...

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