Vine Biodiversity in New York

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Abstract

Invasive species can pose a serious threat to native species and ecosystems. That's why they need to be handled at the earliest convenience. Our project was collecting vines from the Sunset Park neighborhood of Brooklyn and barcoding them in the GenSpace labs to find any invasive species. We were trying to find out if the majority of the vines in Sunset were invasive or at least non-native and prevent it from becoming invasive. Out main concern was to find non-native species so they we can call NYC parks and remove them. Our findings turned out to be that a large number of the vine species we found turned out to be nonnative.

Introduction

We thought that invasive species were already in Brooklyn neighborhoods but we didn't know for sure. Our plan was

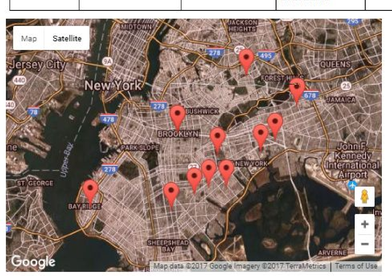
- We collected vines from Sunset park
- Barcode
- If we find evidence of invasive species after contact people to remove them

Materials & Methods

After collecting 14 samples, we extracted DNA from the nucleus. Centrifuging it for a specific amount of time,incubated it for 10 minutes ,and then we centrifuged it again to separate needed components. We performed PCR (heated and cooled) the DNA in order for it to be amplified. Many copies were made.

After that, we did gel electrophoresis to assure the validity of what we did and analyzed what samples we were going to send. We used a micropipette to load the DNA into the wells so the electricity could flow through. The gel separated DNA by size so we know what DNA was extracted and copied We sent it to GeneWiz afterwards. Bioinformatics were given to us. The DNA sequences determine the species of our samples and with websites like DNA Subway we identified species of the vines that was found. We then saw if the species were invasive to New York.

KGH-010	***Solanum tuberosum***	Aln.length:599 Bit score:1077 E-value:0.0 Mismatches:1	Latitude:40.7181 193798 Longitude:-73.8 789367676	USA & Mexico
KGH-011	**Vitis vinifera** (Grape vine)	Aln.length:599 Bit score:1077 E-value:0.0 Mismatches:1	Latitude:40.6327 144966 Longitude:-73.9 283752441	Native to central europe, south east asia and the Mediterranean
KGH-012	**Euonymus europaeus**	Aln.length: 599 Bit score:1076 E-value: 0.0 Mismatches:1	Latitude:40.6389 673438 Longitude:-73.9 14642334	Canada
KGH-013	**Hedera helix**	Aln.length:599 Bit score:1081 E-value:0.0 Mismatches:0	Latitude:40.6389 673438 Longitude:-73.8 981628418	Native to europe and west asia
KGH-014	**Luffa acutangula**	Aln.length:578 Bit score:1043 E-value:0.0 Mismatches:0	Latitude:40.6243 764559 Longitude:-74.0 272521973	United States of America



Results

Results:

Sample	Species	DNA Subway E-value Bit Score Mismatches	Location in Brooklyn	Native/Species
KGH-001	***Parthenocissus tricuspidata***	Aln length:565 Bit score:1020 E-value:0.0 Mismatches 0	Latitude:40.6780 83 Longitude:-73.9 44149	Nonnative - Japanese Creeper (came close with 1 mismatch with native-*Vitis vulpina)*
*KGH-001	***Vitis vulpina***	Aln.length:533 Bit score:957 E-value:0.0 Mismatches:1	Latitude:40.6780 83 Longitude:-73.9 44149	Canada Lower 48 United States of America
*KGH-001	***Vitis labrusca***	Aln.length:565 Bit score:1014 E-value:0.0 Mismatches:1	Latitude:40.6780 83 Longitude:-73.9 44149	Lower 48 United States of America
KGH-002	***Parthenocissus tricuspidata***	Aln.length:565 Bit score:1020 E-value:0.0 Mismatches:0	Latitude:40.6780 83 Longitude:-73.9 44149	Nonnative - Japanese Creeper
KGH-003	***Macropanax undulatus***	Aln.length:558 Bit score:989 E-value:0.0 Mismatches:4	Latitude:40.6780 83 Longitude:-73.9 44149	Mixed forest biome-China
*KGH-004	***Oenanthe javanica subsp. rosthornii***	Aln.length:578 Bit score:980 E-value:0.0 Mismatches:14	Latitude:40.6780 83 Longitude:-73.9 44149	Mixed forest biome-China
KGH-004	***Macropanax undulatus***	Aln.length:558 Bit score:989 E-value:0.0 Mismatches:4	Latitude:40.6780 83 Longitude:-73.9 44149	Central China
KGH-005	***Cynanchum dalzonii***	Aln.length:542 Bit score:939 E-value:0.0 Mismatches:9	Latitude:40.6222 917831 Longitude:-73.9 503479004	Cape verde
***KGH-005**	*Matelea floridana*	Aln.length:533 Bit score:922 E-value:0.0 Mismatches:9	Latitude:40.6222 917831 Longitude:-73.9 503479004	Native to florida
KGH-006	***Hedera helix*** -	Aln.length:599 Bit score:1081 E-value:0.0 Mismatches:0	Latitude:40.6618 894399 Longitude:-73.9 064025879	Native to europe and west asia
KGH-007	***Calystegia sepium subsp. angulata Hedge Bindweed***	Aln.length:574 Bit score:1036 E-value:0.0 Mismatches:0	Latitude:40.6723 059715 Longitude:-73.8 514709473	Canada native
KGH-008	***Cynanchum laeve; Media Honeyvine Milkweed***	Aln.length:569 Bit score:1021 E-value:0.0 Mismatches:1	Latitude:40.6972 990086 Longitude:-73.8 30871582	U.S native
KGH-009	***Argyreia osyrensis***	Aln.length=599 Bit score=1058 E-value=0.0 Mismatches=5	Latitude:40.6639 728764 Longitude:-73.8 652038574	China www.efloras.org

Discussion

- Our hypothesis on invasive species in the Sunset Park neighborhood turned out to be supported. A majority of vines in this neighborhood are non-native.
- Possibly mean that the native plants are being run over by the native plants but more research is required to prove this.
- These results can be used for specialists to get rid of these non-natives and more research can be done on how the non-natives harm the ecosystem of this neighborhood.
- The faster these species can get taken out, the faster it will be to reintroduce the native plants to this area. We are sharing this to the NYC Parks Department so they can remove these non-native species.
- We also were collecting leaves in the beginning of winter so many of them could have been too withered for accurate readings to be made. We would have to do this again to find out for sure is Sunset Park has a majority of non-native vines.
- Further research also needs to be made in regards to if the non natives have already become invasive and if they have what damage has it done.
- After we have found this out we can make steps into removing the non-native species and improving the Sunset Park neighborhood ecosystem.

References

Big City Conservation: New York City's Hidden Biodiversity | Ecology Global Network. (n.d.). Retrieved

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Larissa L, L. L. (n.d.). Growth and reproductive potential of the invasive exotic vine Vincetoxicum rossicum in northern new york state.

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Eleven species out of the 14 turned out to be nonnative to the United States. *Parthenocissus tricuspidata, Vitis vulpina, Macropanax undulatus, Oenanthe javanica subsp. Rosthornii, Cynanchum daltonii, Calystegia sepium subsp. angulata , Hedge Bindweed, Argyreia osyrensis, Vitis vinifera* and *Euonymus europaeus* were all nonnative species. Cynanchum laeve — Media Honeyvine Milkweed,Solanum tuberosum, and Luffa acutangula were all native to the United States.

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