The Impact of Invasive *Phragmites australis* on Biodiversity in the Massapequa Preserve

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Abstract

The presence of Phragmites is an increasing problem across the United States. As an invasive species, this common reed harms the surrounding biosphere and dominates the areas in which it is present. It was hypothesized that there would be less biodiversity in an area if *Phragmites australis* was present compared to an area where *Phragmites australis* was not present. Samples were collected from the Massapequa Preserve in areas where these common reeds were found. By collecting samples of phragmites and the surrounding plants, a decrease in biodiversity should have been seen compared to an area without phragmites. Unfortunately, no data was obtained when electrophoresis was run and therefore no valid conclusions can be drawn. Problems may have occurred in almost every step of the DNA extraction and amplification making it unknown what specifically went wrong that prevented banding patterns to be obtained.

Introduction

Phragmites australis have become an increasingly dominant invasive species in North America, especially throughout Long Island wetlands and the Atlantic coast (Hazelton, 2014). The plants were believed to have been brought to the continent by European ships between the 1700s and 1800s (Phragmites, 2015). One haplotype of phragmites is native to New York, although it is very rare (Phragmites, 2015). The others, however, are invasive and harmful to the biodiversity around them. Invasive species include any organisms that are not native and have negative effects on the surrounding environment, economy, or health.

The presence of invasive phragmites have become an immense issue for the biodiversity around them. Biodiversity is crucial for the stability of a species and a decrease in biodiversity makes ecosystems susceptible to disease and other environmental factors. Thick leaves, tall stems and widespread roots of these plants can shade the area around them. There are often alterations to the habitat when the non-native reeds are in proximity including a decrease in water salinity and outcompetition of plants above and below ground. In addition, they absorb water and nutrients which are needed for species around the phragmites to survive. As a result, the occupancy can harm the surrounding areas and quickly weaken ecosystems (Hazelton, 2014). By collecting samples from an area with and without phragmites, it is hypothesized that areas that contain phragmites will have less biodiversity than an area without the reeds.

Materials & Methods

Materials needed while collecting samples included a GPS, permanent marker, and one plastic bag per sample. At the first location, one square meter of land that contains phragmites and other plant species was sampled and the GPS coordinates were found. One piece of the phragmites' stem and one piece of the leaf was sampled, as well as five samples of various other surrounding plants within the square meter. Only a small piece of each sample was taken to minimize damage to the plants. Each sample was placed in individual plastic bags and labelled. This procedure was also repeated at another location where phragmites were present. In total, 20 samples were obtained. Back at the lab, pictures were taken with each individual sample (Figure 1). To store the samples that were collected until DNA extraction, the plants were pressed. Then DNA was extracted, amplified, and ran in an electrophoresis gel. After six samples were approved, the data was inputted into DNA Subway for identification.

Data Collection

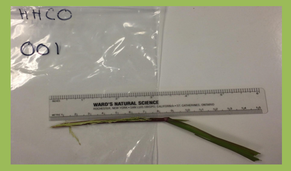

Figure 1 (above) shows a picture taken of a specific sample after returning to the lab and prior to being pressed.

Figure2 shows the banding patterns collected from seven samples after sending it to the Cold Spring Harbor labratory.

Sample Number(s)	Latitude	Longitude	Name of species based on description	Name of species based on DNA
NTX-001	40°41'3"N	73°27'38"W	*Phragmites australis*	*Pancium flexile*
NTX-004	40°41'3"N	73°27'38"W	*Phragmites australis*	*Phragmites australis*
NTX-005	40°41'3"N	73°27'38"W	unidentified	*Artemisia argyi*
NTX-006	40°41'3"N	73°27'38"W	*Taraxacum platycarpum*	*Coreopsis tinctoria*
NTX-008	40°41'3"N	73°27'38"W	unidentified	*Chrysanthemum maximum*
NTX-009	40°41'3"N	73°27'38"W	*Phragmites australis*	*Phragmites australis*

Figure 3. Data table showing where each sample was taken and the species based on physical properties and DNA.

Results and Discussion

Unfortunately, no banding patterns were found when a UV light was used to check for the presence of DNA after gel electrophoresis was run. However, after the samples were submitted to Cold Spring Harbor laboratories, the samples were run again and banding patterns were found in seven samples (Figure 3). Six samples were submitted for sequencing. The lack of results after performing this experiment the first time can be due to a variety of issues. After examining the tubes to see if any visible errors occurred, it was clear that incorrect use of the silica resin may have been the source of error. Of the accepted samples, two were phragmites and four were diverse species around them (Figure 2). This data prevents valid conclusions from being drawn regarding the effect of phragmites on biodiversity because the samples that were accepted were all from an area where phragmites were present and therefore no comparisons can be made to the areas without phragmites. If this experiment were repeated and data from an area without phragmites was found, conclusions could be drawn to further support or refute the proposed hypothesis.

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