

Measuring genetic diversity of *Cirsium pitcheri* in Wisconsin

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Introduction

Cirsium pitcheri, pitcher's thistle, is endemic species of the Great Lakes that grows in sand dunes. It flowers from spring to summer. Many factors threaten the specie such as clearing and development of beachside environments.

The populations studied were from Wisconsin where there are only 8 known populations of *C. pitcheri*. As these populations are at the edge of the species range, the genetic health of these populations can have important implications for management. Previous genetic studies have found that two population, Whitefish Dunes site and Kohler Andrae site, were distinctly different from one another genetically. Whitefish Dunes site had high genetic diversity and low inbreeding coefficient which suggest these populations are genetically healthy, while Kohler Andrae site had low genetic diversity and high inbreeding coefficient suggesting populations are in peril. The purpose of the study is to get an improved picture of the genetic health of *C. pitcheri* in Wisconsin by using additional samples collected from the Sturgeon Bay Canal site.



Figure 1. *Cirsium pitcheri* in Wisconsin (Picture from Robert W. Freckmann Herbarium website)

Methods

- Using CTAB Protocol for DNA Extraction of the thirty-six samples
- Setup of templates for PCR with seven different primers (Caca 01, Caca 04, Caca 05, Caca 07, Caca 17, Caca 20, Caca 23)
- Perform Gel Electrophoresis to ensure good quality DNA is present
- Beckman Coulter Genetic Analyzer 8000 was used for analyzing the size of the fragment peaks of each wavelength according to the specific primer

Results

	Kohler Andrae	Whitefish Dunes	Sturgeon Canal
Collection Year	2005	2008	2012
Population Size	3	4	3
SP	SP	SP	SP
% Alleles	74%	31%	60%
Fst	0.06	0.27	0.10

Site name	Collection Year	Population Size	%A	Hs	Fis
Whitefish Dunes	2005	3	3.43	0.46	0.06
Kohler Andrae	2008	4	1.29	0.13	0.27
Sturgeon Bay Canal	2012	3	3.00	0.37	0.10



Figure 2. Range of the study sites for *C. pitcheri* (Map from yourchildlearns.com)

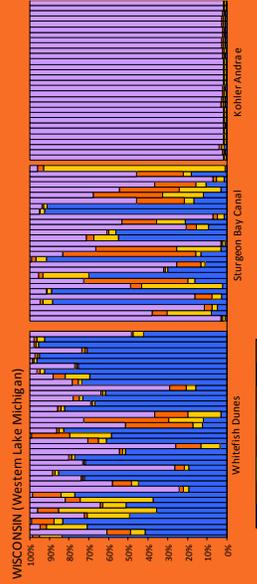


Figure 3. Genetic clusters (identified in program structure) depicted for individual plants and from the Wisconsin populations of *Cirsium pitcheri*. Each color represents a distinct genetic cluster.

Discussion

The genetic diversity coefficient found in the population of *C. pitcheri* in the Sturgeon Bay Canal site (He: 0.414) was closer to Whitefish Dunes site (He: 0.463) than Kohler Andrae site (He: 0.133), therefore both Sturgeon Bay Canal site and Whitefish Dunes site have a higher genetic diversity than Kohler Andrae site. The Sturgeon Bay Canal (F: 0.051) site had also similar inbreeding coefficient as Whitefish Dunes site (F: 0.061), lower than Kohler Andrae site (F: 0.274) which had a high coefficient for inbreeding. Such similarities between Sturgeon Bay Canal and Whitefish suggest that Kohler Andrae site is anomaly in Wisconsin, associated with this isolation and small size of this population rather than legacy of post glacial migration into the area. A more detailed investigation may be perform to determine genetically the depauperation of the population.

References

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Acknowledgments

Special thank you to Shelly Bender and Kathy Johnson of the College First program, Dr. Fant, Dr. Larkin of the Chicago Botanic Garden REU program, and my mentors Hosin West and Anna Braum for their mentorship, support and funding.