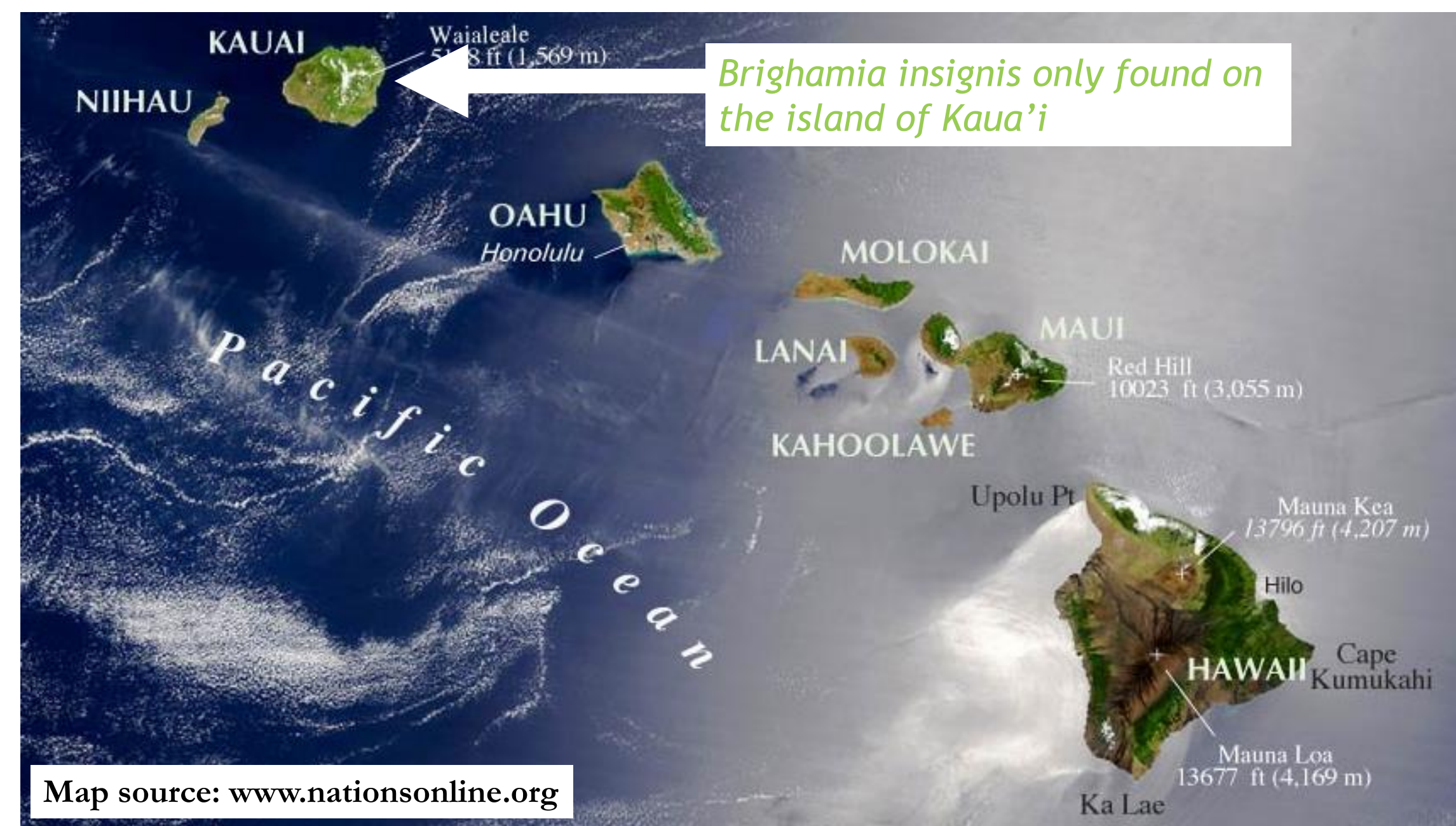


## Introduction

*Brighamia insignis* (Campanulaceae) is an endemic Hawai'ian species found only on the island of Kaua'i. Due to invasive animals, natural disasters, and the likely loss of its pollinator populations of *B. insignis* rapidly declined and it is now functionally extinct in the wild, with only one individual reported to be alive in 2013. Prior to its decline, seed collections were made from some of the remaining wild plants to build an ex situ conservation collection at National Tropical Botanical Garden on Kaua'i. Many of these wild collections were shared with other botanic gardens in the United States and Europe. Because *B. insignis* cannot be stored in seed bank, the plants growing in botanic gardens are essential to long term survival and potential restoration to the wild.



## Objectives & Questions

The objective of this study is to determine how much genetic diversity remains in all ex situ collections of *Brighamia insignis* and how this diversity is distributed among botanic gardens. To explore this, botanic gardens were divided into three "management groups" based on geography and the likelihood of plants being shared among gardens. The three groups were: The National Tropical Botanical Garden (NTBG), U.S. botanic gardens, and all European botanic gardens. Another objective of this study was to determine what genetic diversity was missing from the "primary conservation collection" held at NTBG.

## Methods

- 283 *B. insignis* samples were collected and DNA extractions were performed by past REU students
- Genotyped all samples using 5 microsatellite primers (bin8, bin44, bin51, bin57, and lob33) and capillary gel electrophoresis
- Genetic statistics were calculated in GenAlEx, genetic clusters were created in STRUCTURE, and mean kinship was calculated in Molkin.

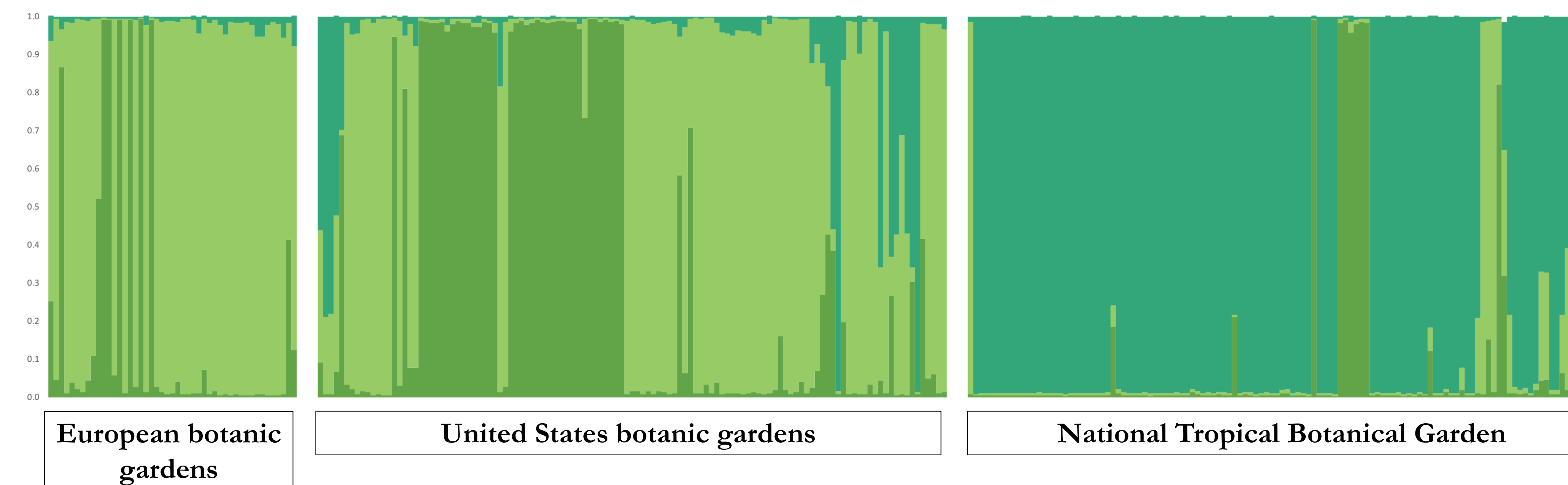
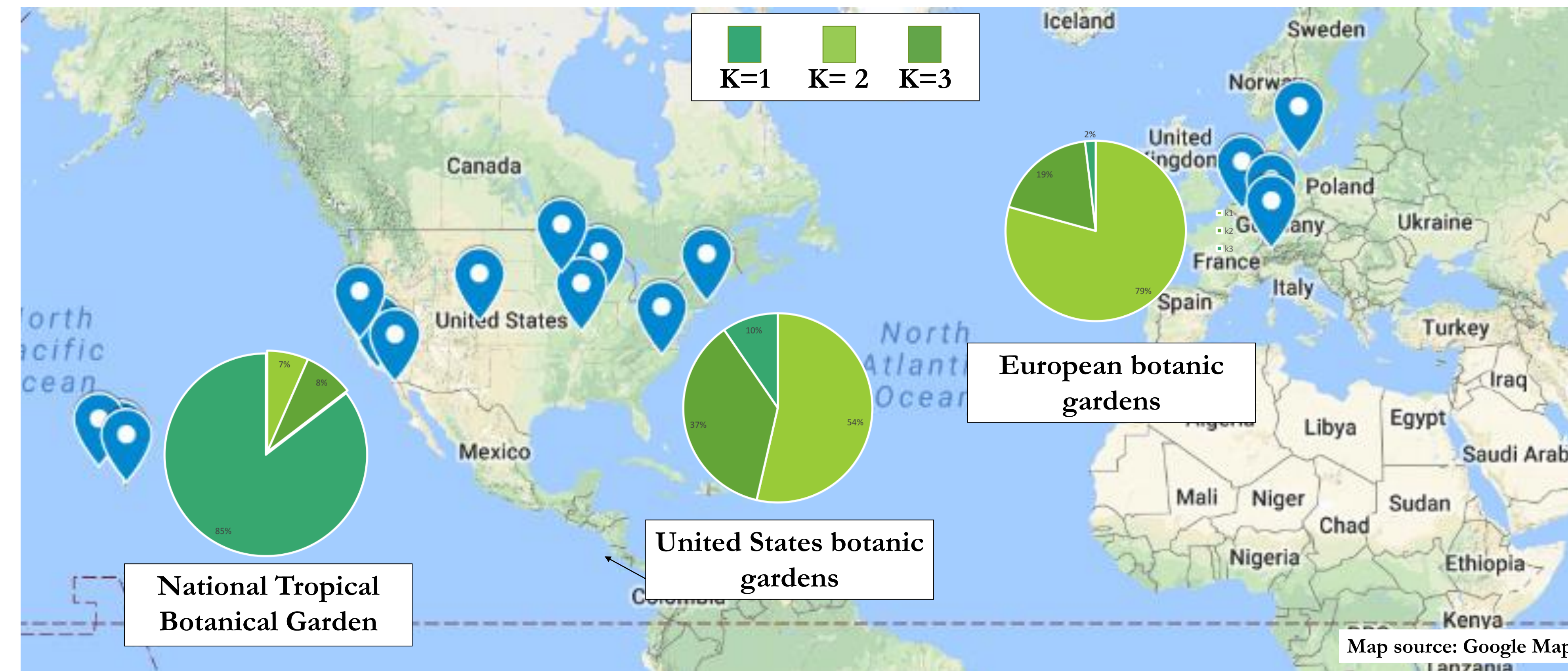
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## Results

Population	Number of Samples	Number of Alleles	Number of Effective Alleles	Gene Diversity (He)	Private Alleles	Mean Kinship
National Tropical Botanical Garden	117	4.00	1.28	0.19	6	0.59
U.S.A. botanic gardens (n=11)	119	4.33	2.12	0.45	11	0.56
European botanic gardens (n=6)	47	3.33	1.74	0.37	6	0.78
Ex situ Metapopulation (all gardens)	283	3.89	1.71	0.34	-	-



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## Discussion

The genetic analysis revealed that there is a low number of alleles and effective alleles which suggests that there is relatively little genetic diversity remaining in the ex situ collections of *Brighamia insignis*. Gardens in the United States have greater genetic diversity (higher (expected heterozygosity) compared to gardens in Europe and at the primary conservation collect held at NTBG. NTBG had the highest mean kinship which indicates that the plants are very closely related, and there is very low genetic diversity. Structure analysis showed that the most likely number of genetic clusters was three and that NTBG and the European collection fall into two distinctly different genetic clusters, while North America is a mixture of the three different genetic clusters. These results suggest that NTBG should consider incorporating North American and European plants into their breeding program to increase genetic diversity and minimize mean kinship. Higher genetic diversity is important for eventual reintroduction into the wild, because it increases the ability of *B. insignis* to adapt and thrive in changing environments.



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