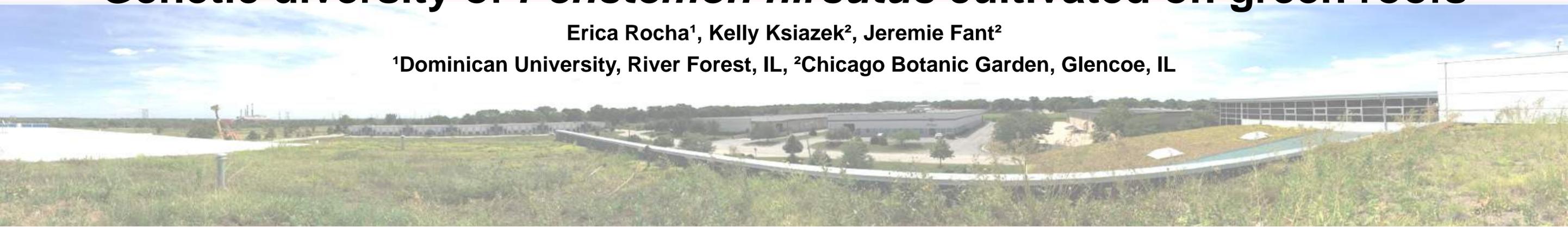


Genetic diversity of *Penstemon hirsutus* cultivated on green roofs

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Introduction

With an increasing amount of green roofs being built in the Chicagoland area and urban communities around the U.S., creating adaptable plant material for rooftop gardens has become essential. Wild populations are able to successfully adapt to changes in their environment due to genetic diversity. The Chicago Botanic Garden green roof currently contains nursery derived material as opposed to wild collected. Due to propagation methods used in plant nurseries, cultivated plants contain selected genetic material which can reduce genetic diversity or increase inbreeding. It is important to have a rooftop garden that closely resembles its natural population in order to ensure survival. Therefore it is crucial for plants to maintain high diversity with minimal inbreeding.



Figure 1:
Penstemon hirsutus (hairy beardtongue) native to the northeastern region of North America

Studying the amount of diversity used on green roof plants can allow for improvement of plant material used for future restoration projects and overall success in green roof gardens.

Objectives

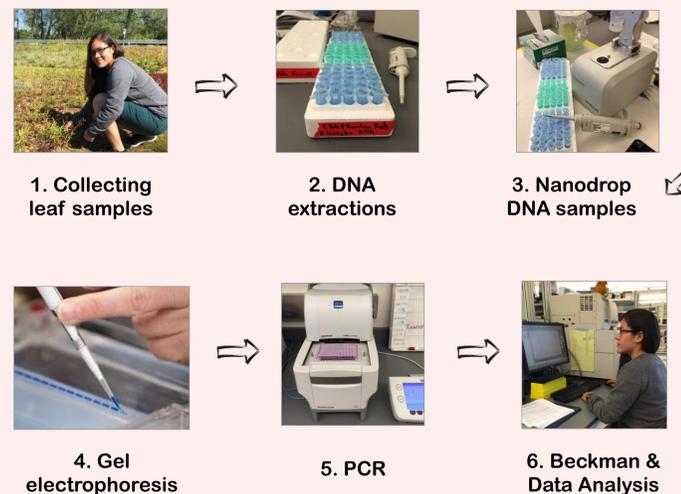
- Screen molecular markers to measure *Penstemon* genetic diversity
- Use these markers to determine:

How genetically diverse are nursery bought plants cultivated on green roofs?

Hypothesis

If the populations of *Penstemon hirsutus* cultivated on the green roofs are small and in close proximity then there will be low genetic diversity because of possible inbreeding and limited number of founders.

Methods



Results

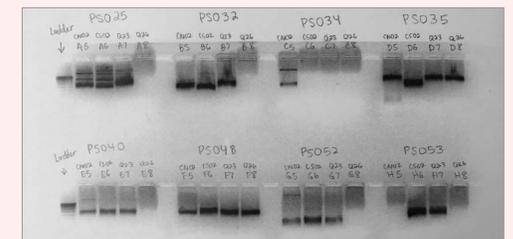


Figure 2:
Selected primers based on successful migration of DNA segments

Table 1:
Pairwise genetic differences (Fst) between populations

| Population: | CBG North | CBG South | Quinlan |
|-------------|-----------|-----------|---------|
| CBG North | 0.000 | | |
| CBG South | 0.183 | 0.00 | |
| Quinlan | 0.236 | 0.097 | 0.000 |

| Population: | N | Na | Ho | He | F |
|-------------|-------|-------|------|------|------|
| CBG North | 20.17 | 4.17 | 0.35 | 0.38 | 0.10 |
| CBG South | 19.00 | 5.167 | 0.21 | 0.52 | 0.61 |
| Quinlan | 19.50 | 3.667 | 0.31 | 0.42 | 0.30 |

Table 2: Comparing mean number of allele (Na), Observed (Ho) and Expected heterozygosity (He), and inbreeding (F) between the three populations

Conclusion

- 6/20 molecular markers successfully measured genetic diversity in *Penstemon hirsutus*
 - FST values indicate moderate differentiation between *P. hirsutus* from CBG North & CBG South and CBG North & Loyola Quinlan; CBG South & Loyola Quinlan indicate little to no genetic differentiation
 - CBG South has highest genetic diversity & highest amount of inbreeding
- Further research: Comparing genetic diversity between *P. hirsutus* in natural populations and in restored populations

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