

Analyzing the Genetic Basis of Alpine Adaptive Dwarfism using Focal Species *Aquilegia jonesii*



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Dwarfism is a Ubiquitous Alpine Adapted Trait

focal species *A. jonesii*



USDA Forest Service

alpine environment



dwarfism allows
A. jonesii to

thrive in harsh
environments

study dwarfism in
ecological context

corn suffering from lodging



Agronomist & Arable Farming

dwarf corn (right) next to non-dwarf corn (left).



Scott Nelson

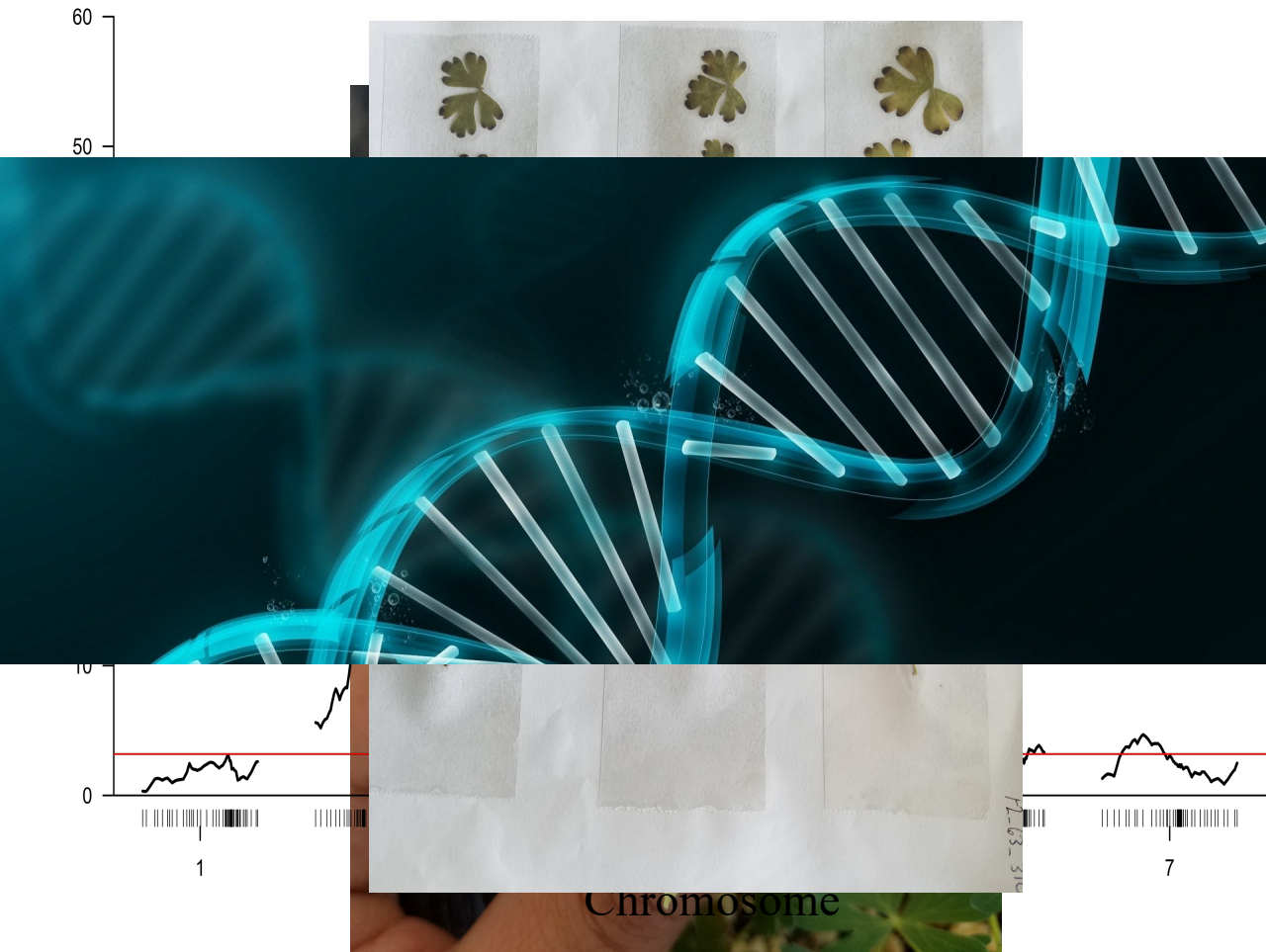
dwarfism

prevents lodging

3 Step Plan to Plant the Seeds for Success to Bear the Fruit of my Labor

Main Goal:

Look for candidate gene(s)
responsible for dwarfism in *A. jonesii*



1. Genotype all of our second generation hybrid individuals.



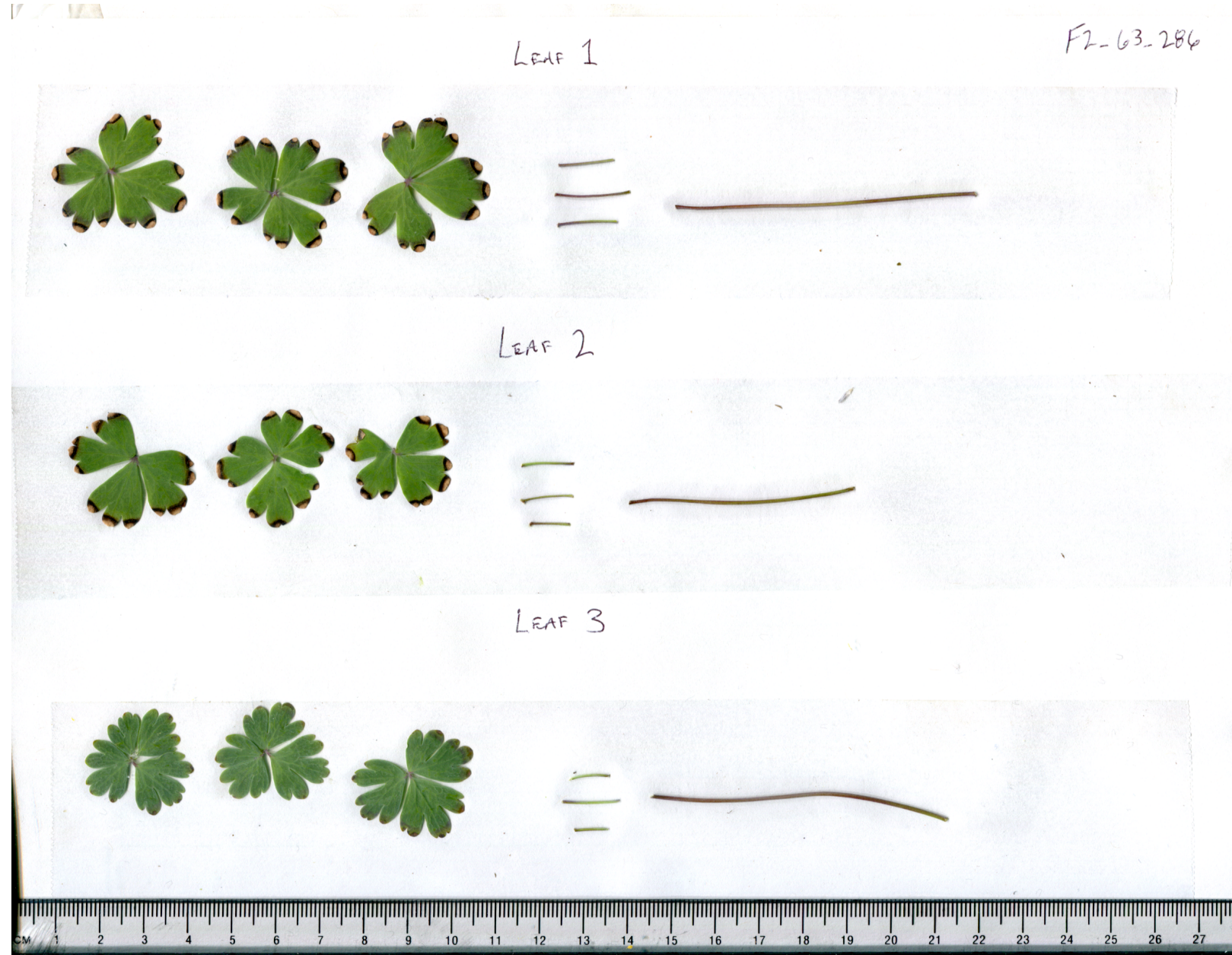
2. Phenotype all of our second generation hybrid individuals for dwarf traits



3. Run a Quantitative Trait Locus Analysis

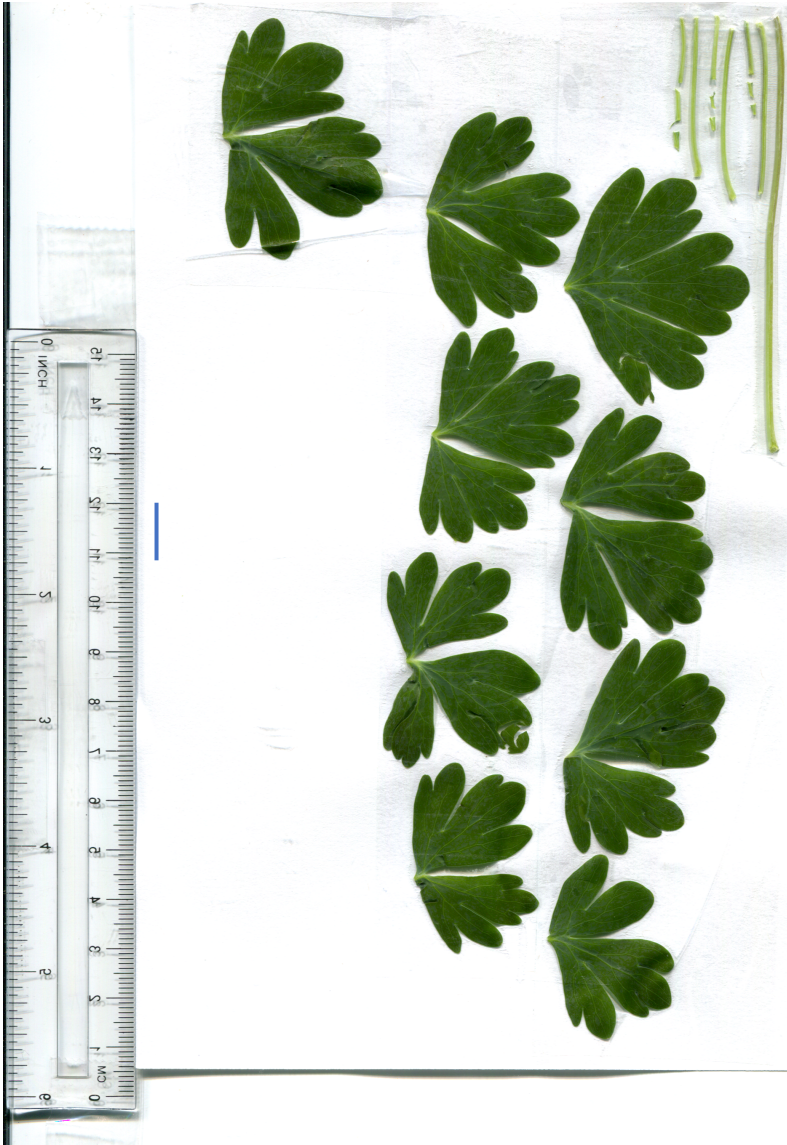
How do we Quantify Dwarfism?

- plant height
- plant width
- using leaf area as proxy for dwarfism

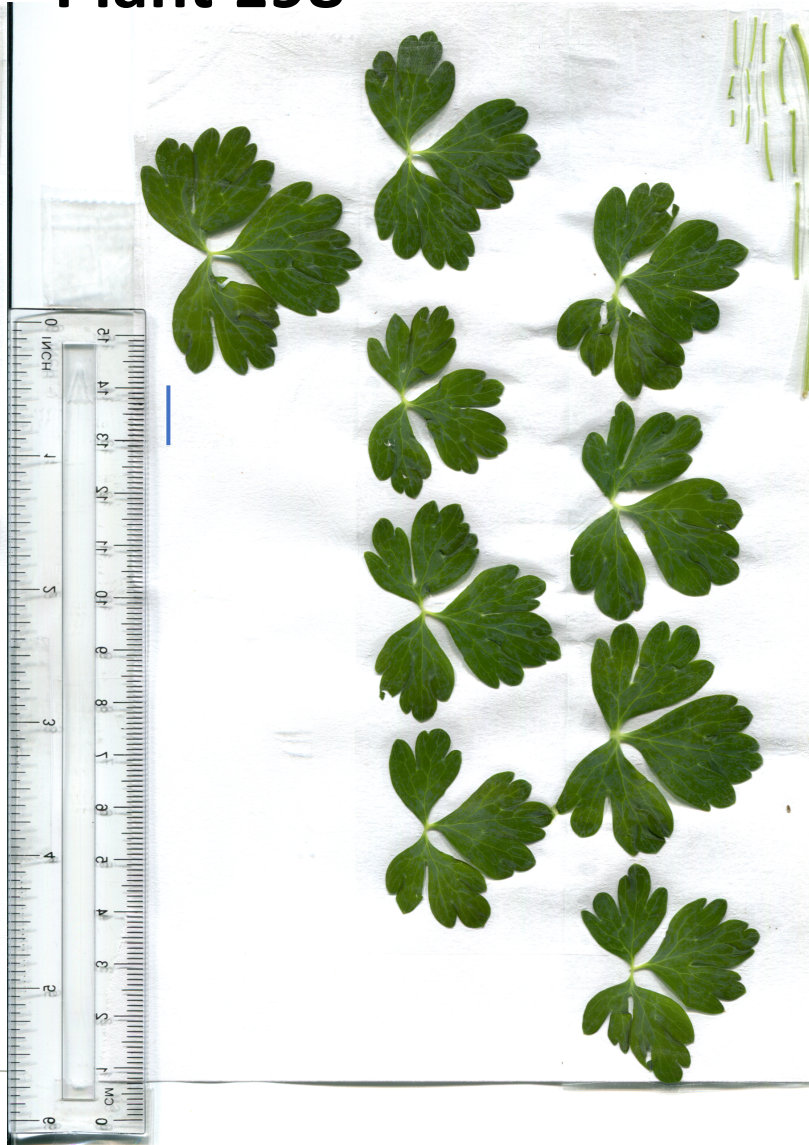


Variations Among the Population

Plant 20



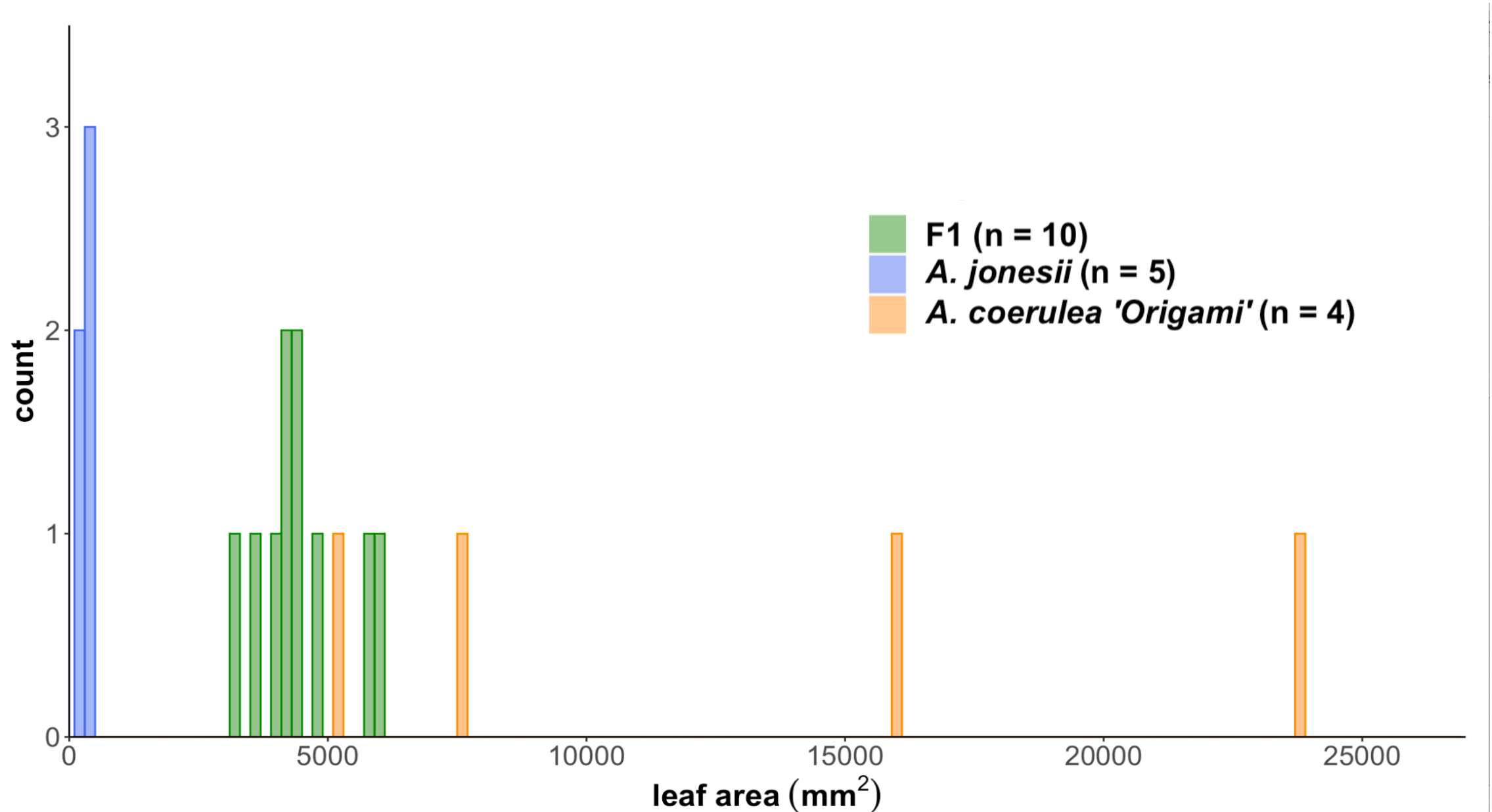
Plant 198



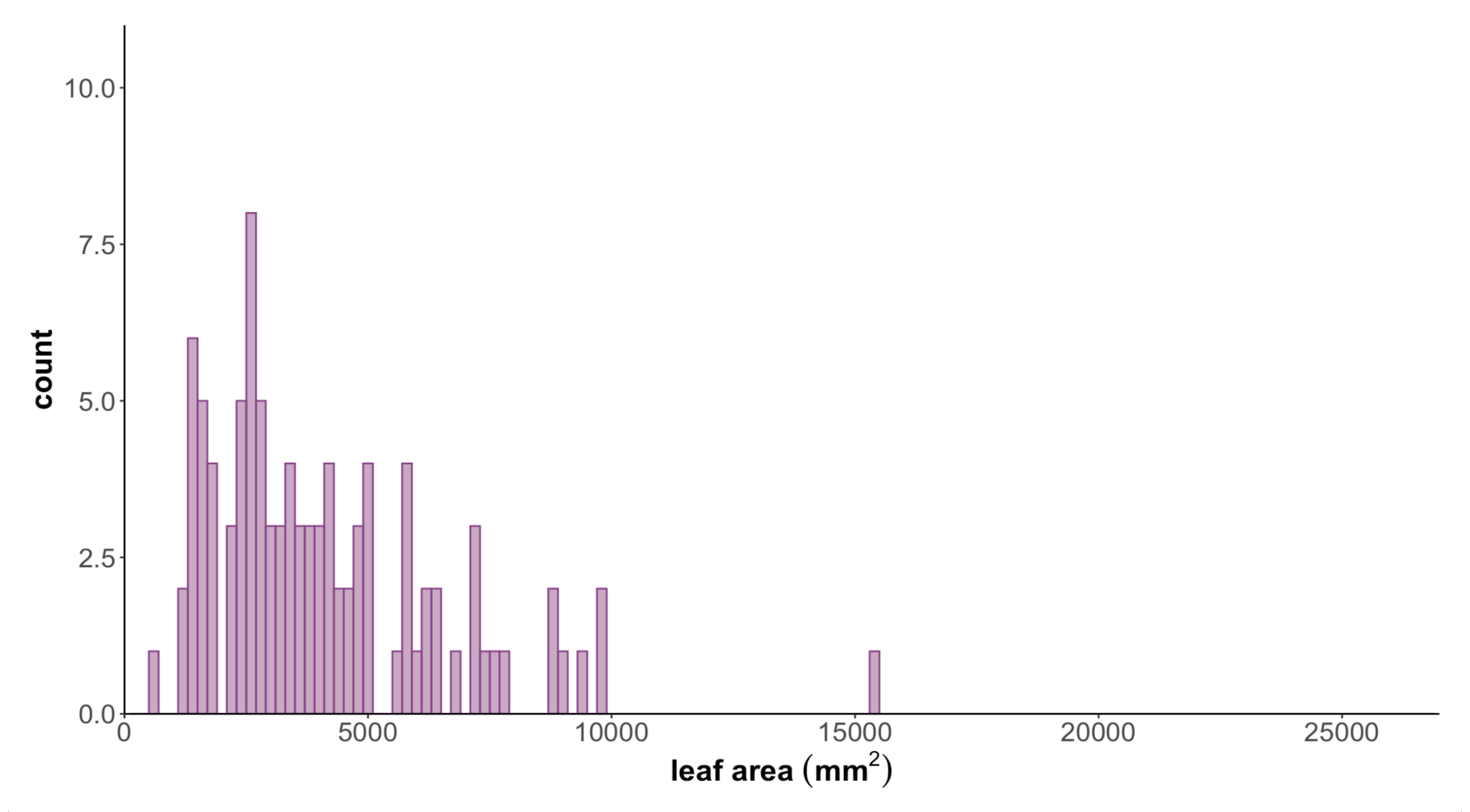
Plant 212



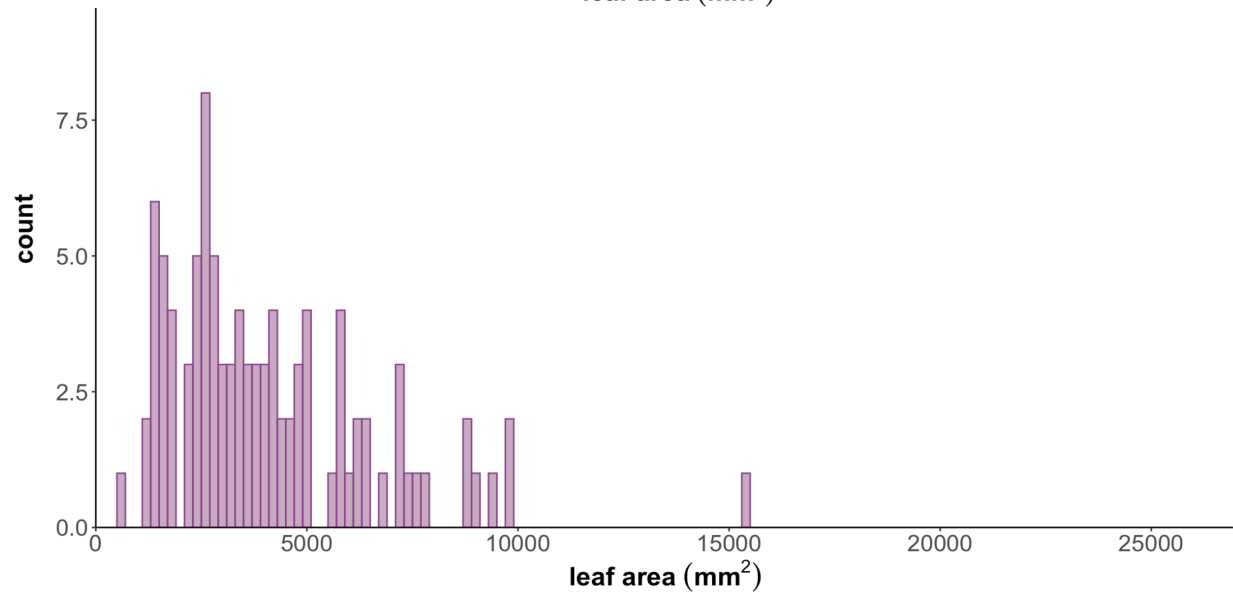
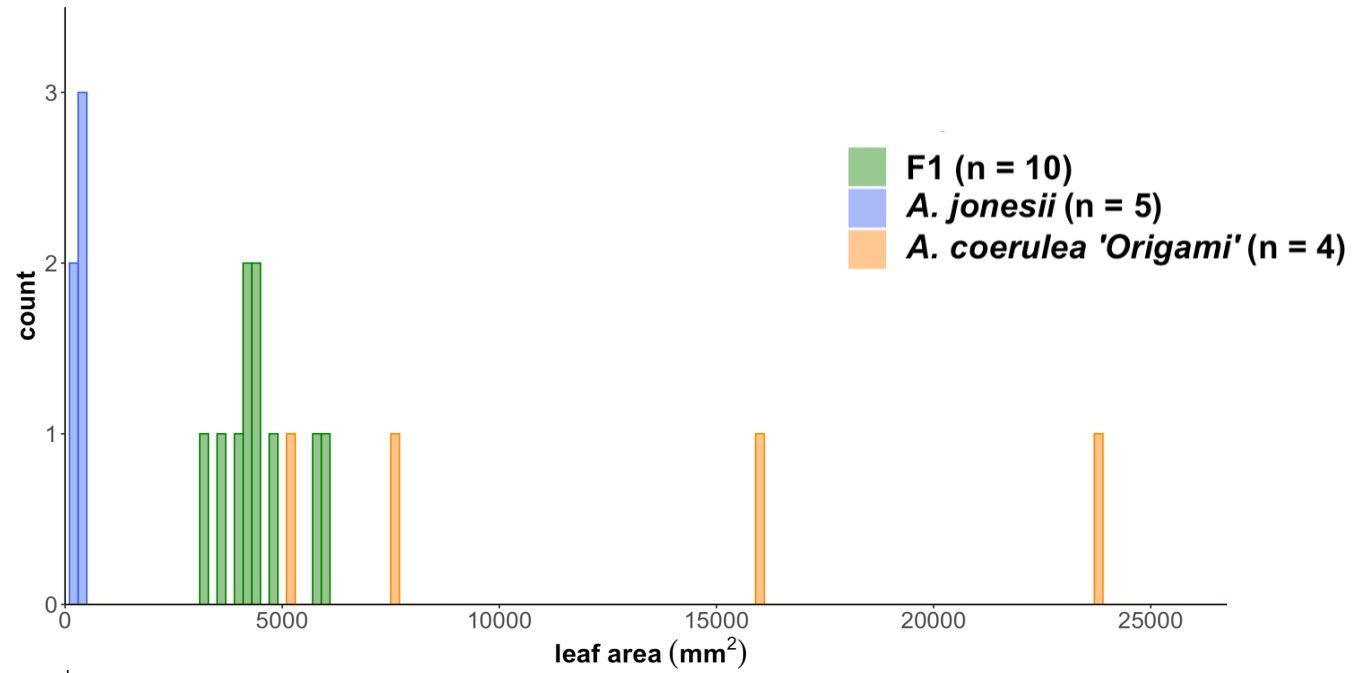
Leaf area variation of *A. origami*, *A. jonesii*, and F1



Leaf area variation in F2 Population



Leaf area variation



Recombination Produces a Variety of Phenotypes and Genotypes



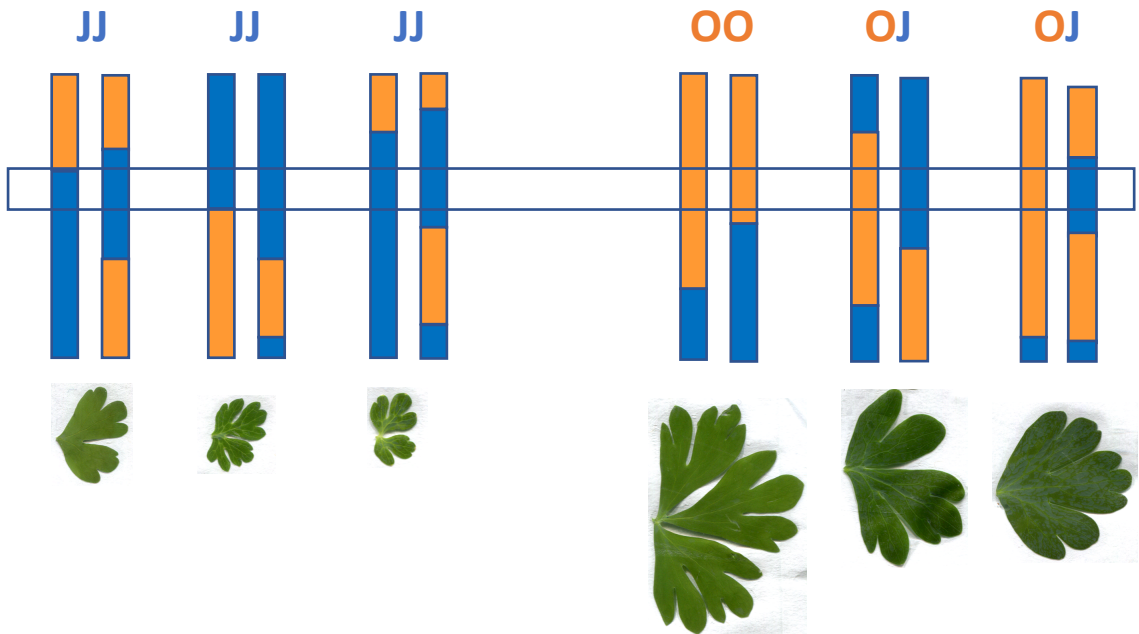
Non-Dwarf
(*A. coerulea* 'Origami')
OO

X

Dwarf
(*A. jonesii*)
JJ

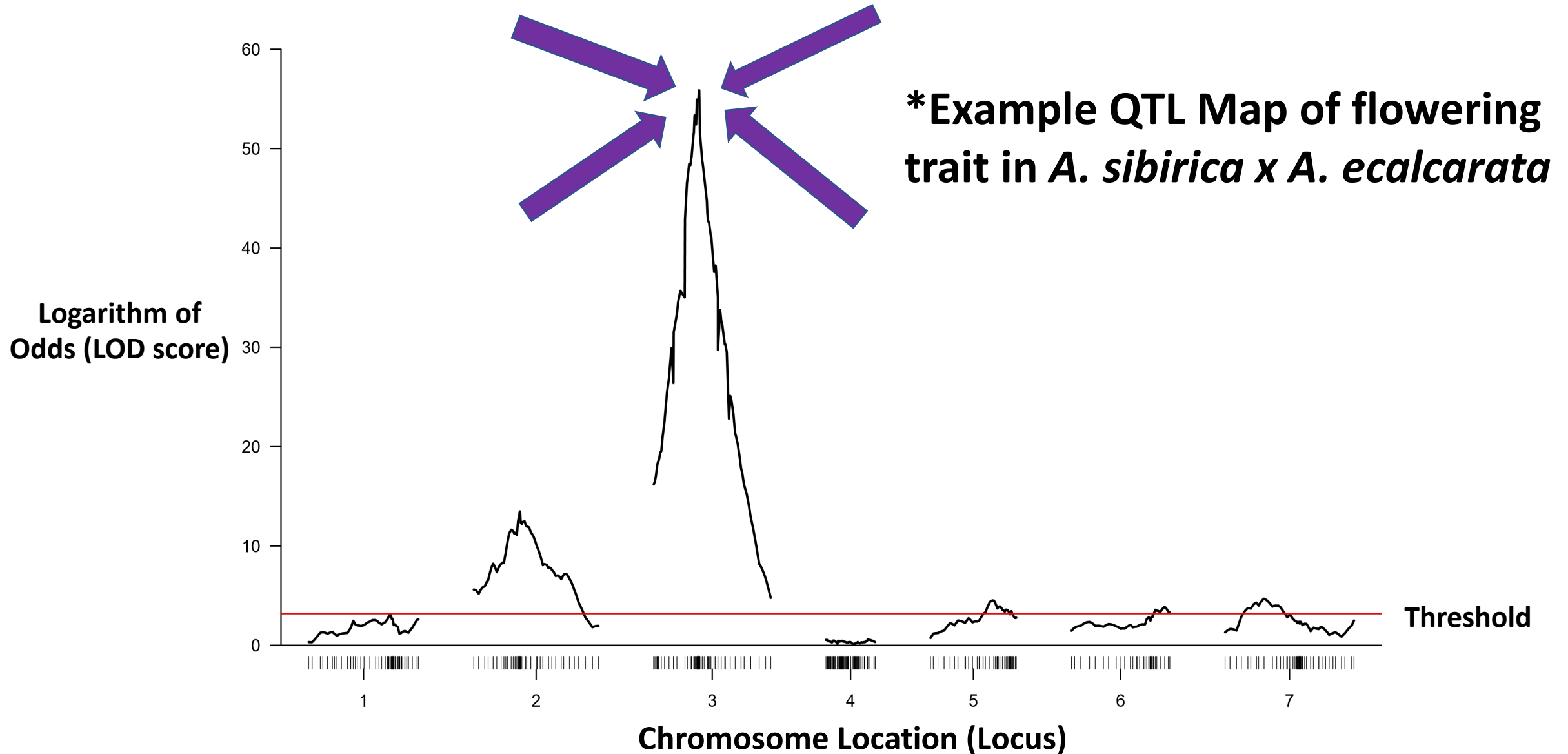


F1 population
JO



F2 Population
n= 97

A Quantitative Trait Locus (QTL) Analysis Gives New Insight Into the Workings of a Plant

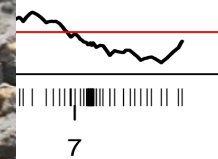
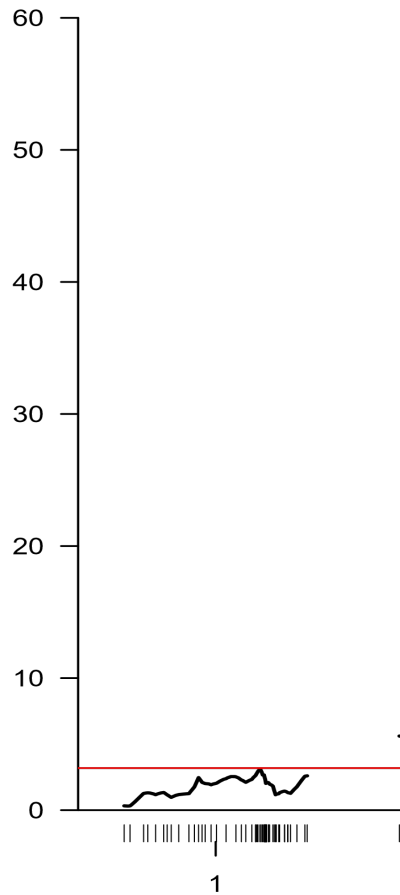


Looking to the Future

1. Complete the QTL map for dwarfism

2. Phenotype other alpine-adapted traits

3. Find genetic basis of these alpine traits



Acknowledgements

Thank You