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

Diego Orellana  
Pre-Biology

Jason Johns (Graduate Student)  
Scott Hodges (Principal Investigator)  
EEMB Department

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Dwarfism is a Ubiquitous Alpine Adapted Trait

focal species A. jonesii

dwarfism allows A. jonesii to thrive in harsh environments

study dwarfism in ecological context

corn suffering from lodging

dwarfism prevents lodging

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

Scott Nelson
Agronomist & Arable Farming
USDA Forest Service
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

- F1 (n = 10)
- A. jonesii (n = 5)
- A. coerulea 'Origami' (n = 4)
Recombination Produces a Variety of Phenotypes and Genotypes

Non-Dwarf (A. coerulea ‘Origami’)  X  Dwarf (A. jonesii)

F1 population

F2 Population
n= 97
A Quantitative Trait Locus (QTL) Analysis Gives New Insight Into the Workings of a Plant

*Example QTL Map of flowering trait in *A. sibirica* x *A. ecalcarata*
1. Complete the QTL map for dwarfism
2. Phenotype other alpine-adapted traits
3. Find genetic basis of these alpine traits
Thank You