

Project Description

Introduction/Motivation

Gene by environment (G x E) interactions muddle our ability to predict how organisms can persist in a variable environment.

Research Objectives

I propose to study the G x E interactions within balsam poplar.

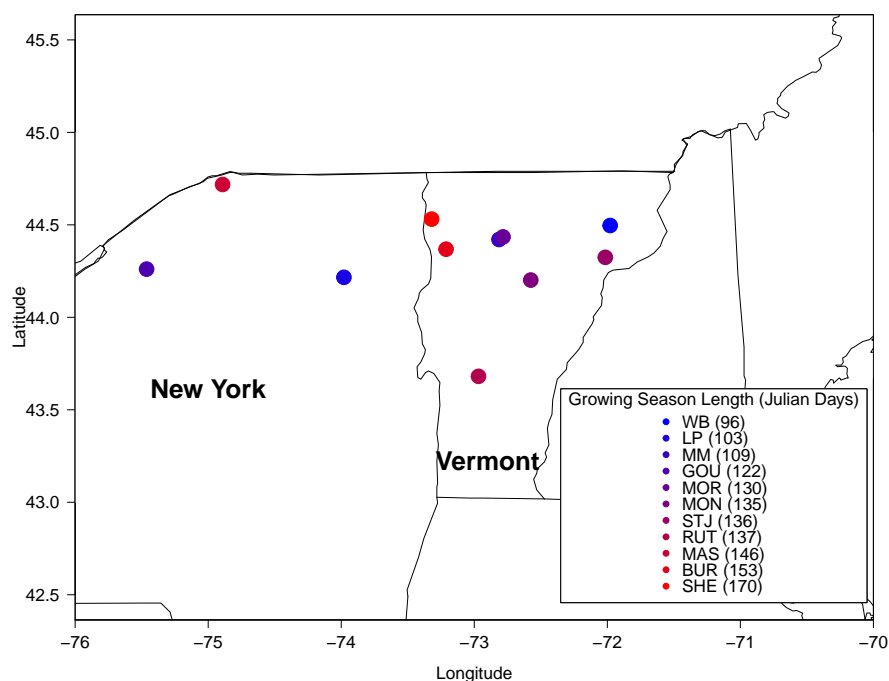


Figure 1. 11 sites vary in their growing season length (Julian Days) with very similar climate in New York and Vermont.

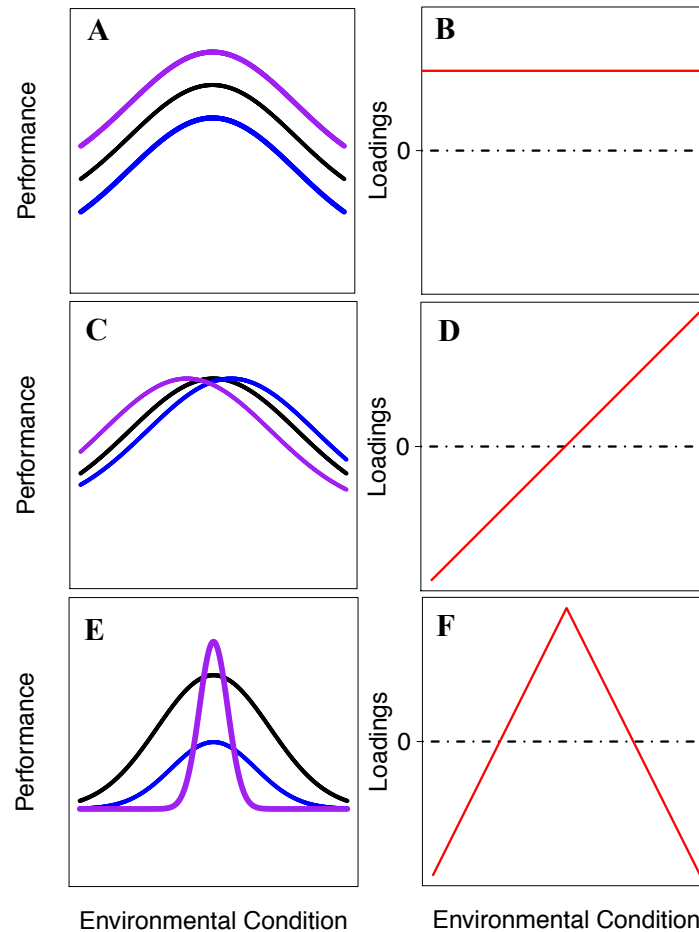


Figure 2. Predictions for the outcome of common garden experiment which vary in growing season length.

Training Objectives

The training objectives I have developed involve **3 general goals**: 1) Apply my current evolutionary physiology background in insects (ants) to plant systems; 2) Acquire more statistical and bioinformatic tools to uncover complex biological patterns associated with genomic and phenotypic datasets; 3) Optimally communicate science to diverse backgrounds.

Goal 1: One of the first steps in applying theory is getting to know your organism. Therefore, a foundation in natural history of balsam poplar will be absolutely critical for how I approach analyzing data. To achieve this goal, I will not only delve into the primary literature (or should I have done this by now?) but also aide in ongoing common gardens in Burlington, Vt and Indian head Canada, which will also involve interacting with experts in the field.

Goal 2: Although I have worked with next-generation genomic data in my dissertation, there is much more to learn, particularly with respect to creating genotype-phenotype maps across varying season lengths. To aide in this goal, I will consult and meet with my post-doctoral advisor on a weekly basis when data are ready to be analyzed.

Goal 3: 1. Learn about the natural history of poplar and plant systems in general 2. Aquire more statistical and bioinformatic tools in analyzing next generation sequence data. 3. Usher in the next wave of scientists 4. Communicate findings at scientific meetings and local poplar farmers

Career Development

Life long goal is to discover and uncover novel trends in biological systems, whether as an academic, consultant, or data scientist.

Choice of Sponsoring Scientists

introduction to a brand new system.

Broader Impacts and Timetable

Table 1: Time table of yearly goals

Tasks and Goals	2017	2018	2019	2020
1) Common Garden/Field	Set up common gardens	Phenotype	Phenotype	Phenotype
2) Genomic Analyses		Initiate QTL mapping of phenotypes		Complete QTL mapping of phenotypes
3) Attend Conferences			Present poster at Evolution and MBE	Present talk at Evolution and MBE
4) Manuscripts		Write methods	Write methods and results	Finish manuscript and submit
5) Mentoring	Develop projects with undergraduates	Implement projects	Write up findings	Submit manuscripts with undergraduate researchers as primary authors
6) Public Outreach	Set up 1 common garden with high school students	Involve high school students in phenotyping	Involve high school students in phenotyping	Involve high school students in phenotyping
7) Data Management	Initiate project and share on Github	Utilize github repository to track progress and back up data		Create interactive Shiny App