Genetic and Molecular Analysis of Carbon Sequestration – Implications for Terrestrial Ecosystems

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Project Goal

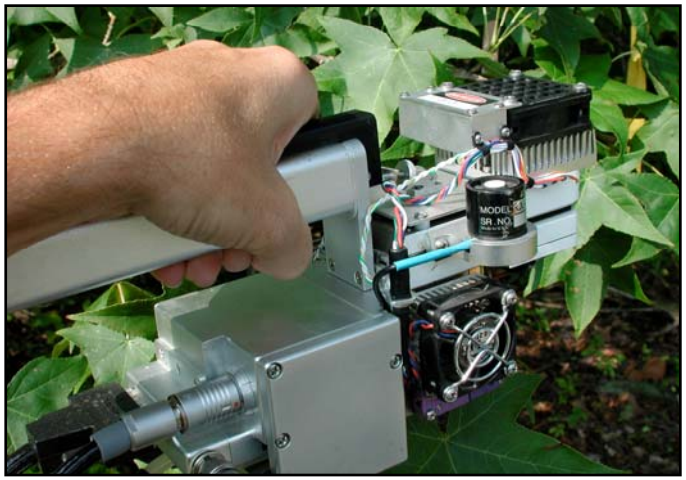
Understand the fundamental genetic and molecular controls on plant-based processes that are important for carbon sequestration in terrestrial ecosystems.

Primarily focus on

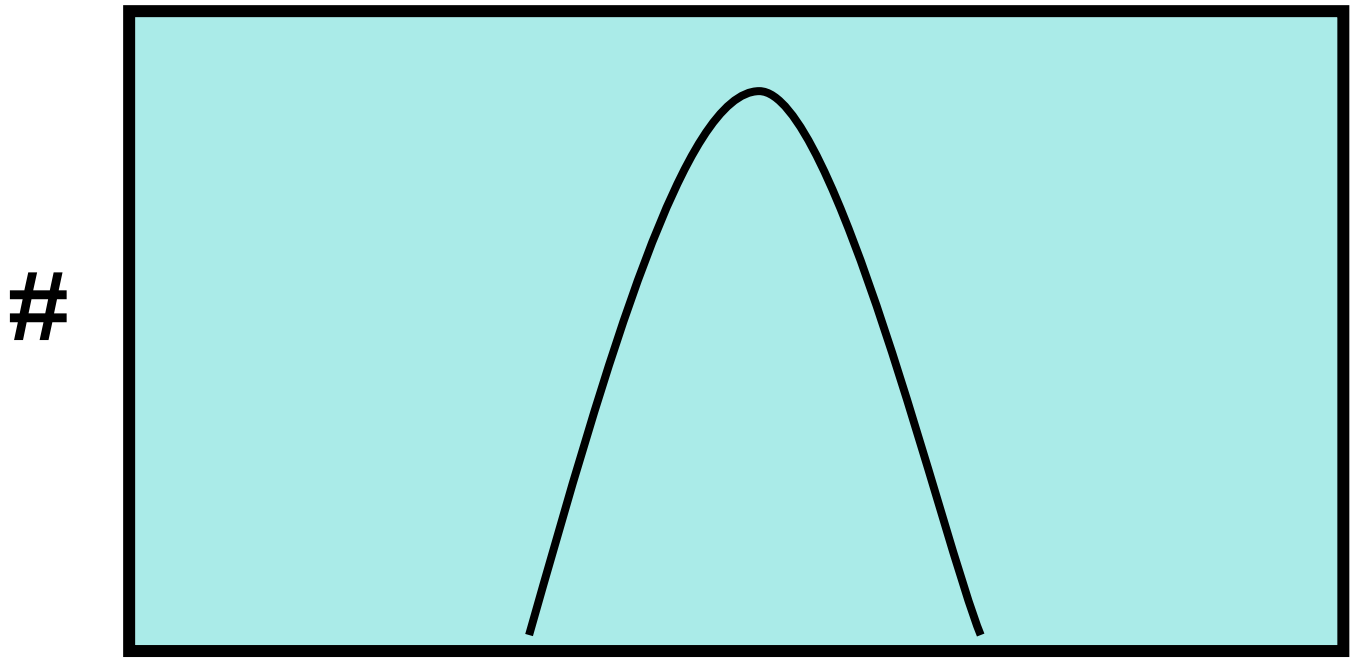
Carbon allocation and chemical quality of litter inputs

Basic Premise

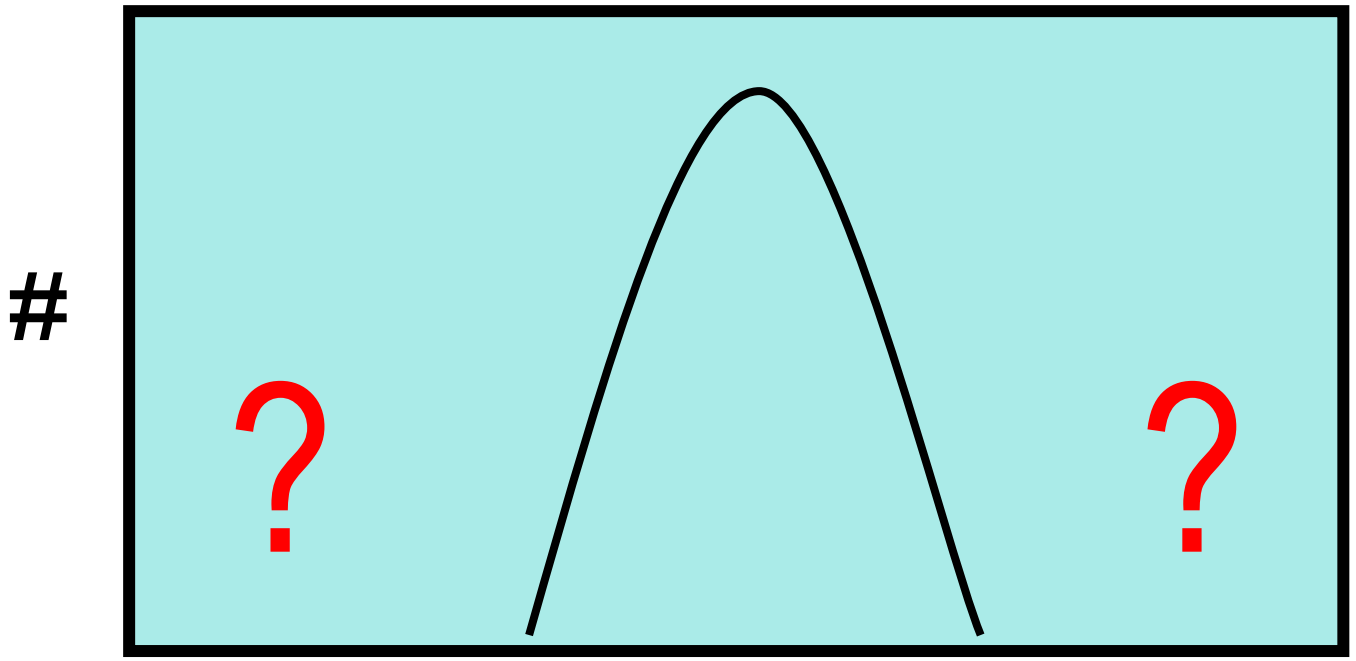
Our perception of a process or trait is shaped by the variation we observe for that process or trait in nature

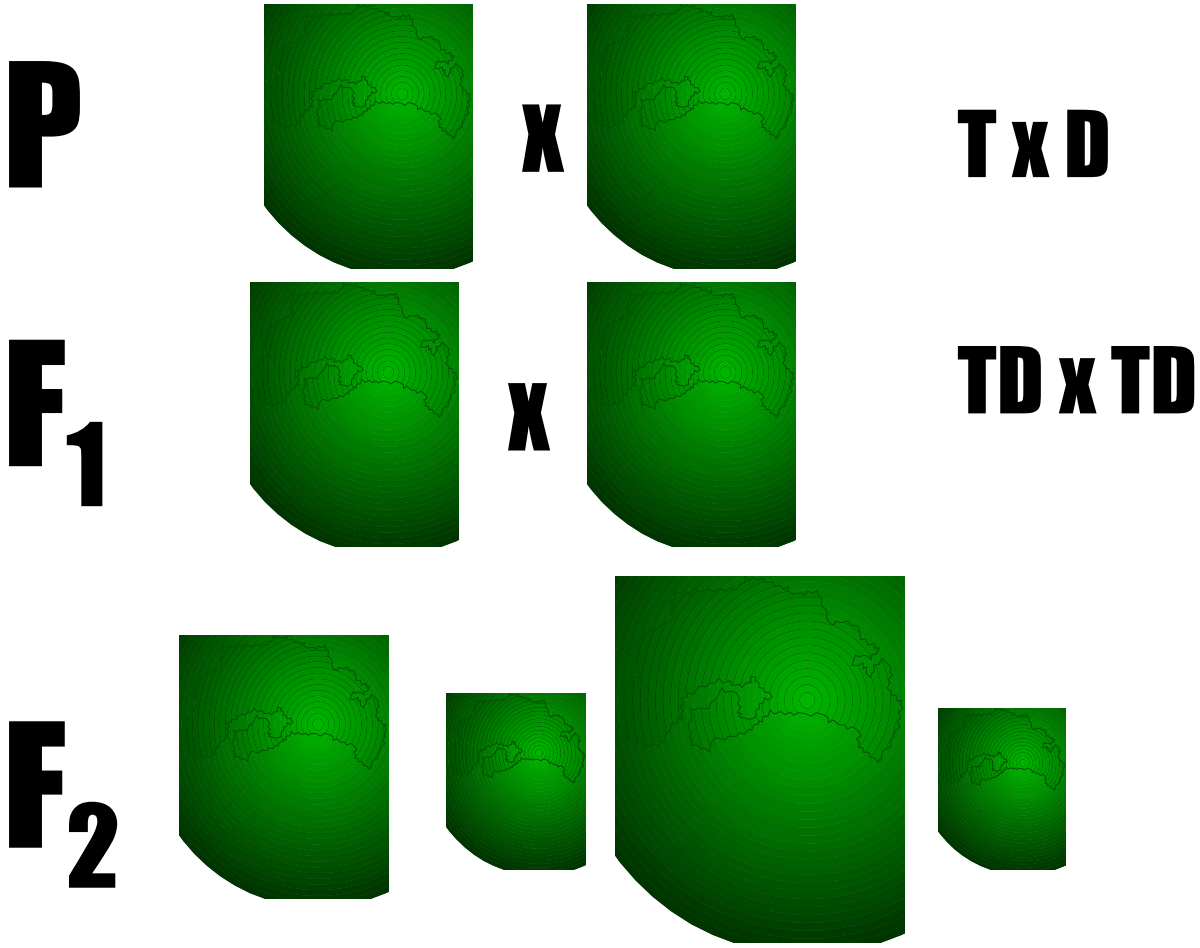


Observed Variation in a Process or Trait

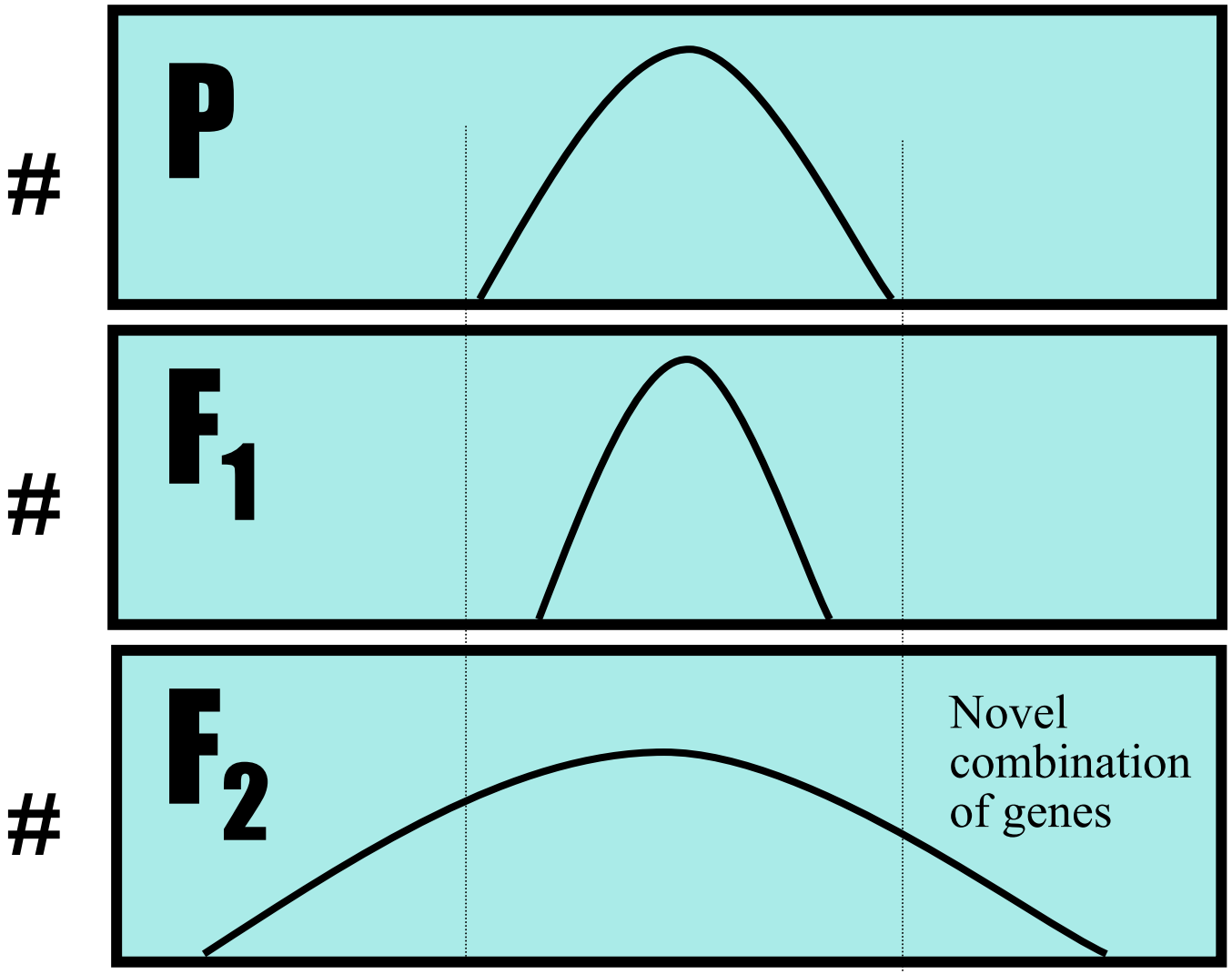


Examine Process or Trait Outside "Normal" Expectations





Segregating Population


#
P
#
F1
#
F2
Novel
combination
of genes
Process/Trait of Interest

Measures of Interest to Carbon Sequestration Research

Carbon Allocation

- **The distribution of biomass to various plant tissues, i.e., roots, branches, stems and leaves.**

Carbon Chemistry

- **The chemical fractionation of carbon into cell walls, i.e., cellulose, hemicellulose and lignin.**

Planting and Harvest

FY2000

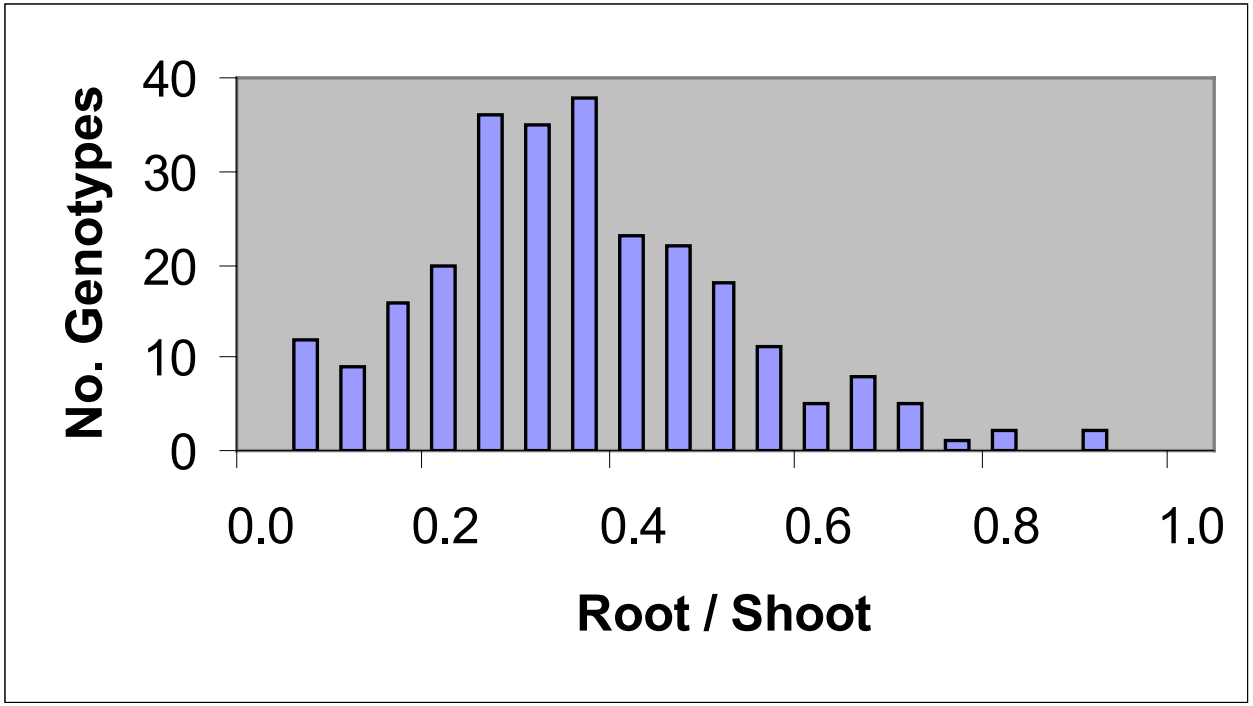
Family 331

FY2001

Family 13

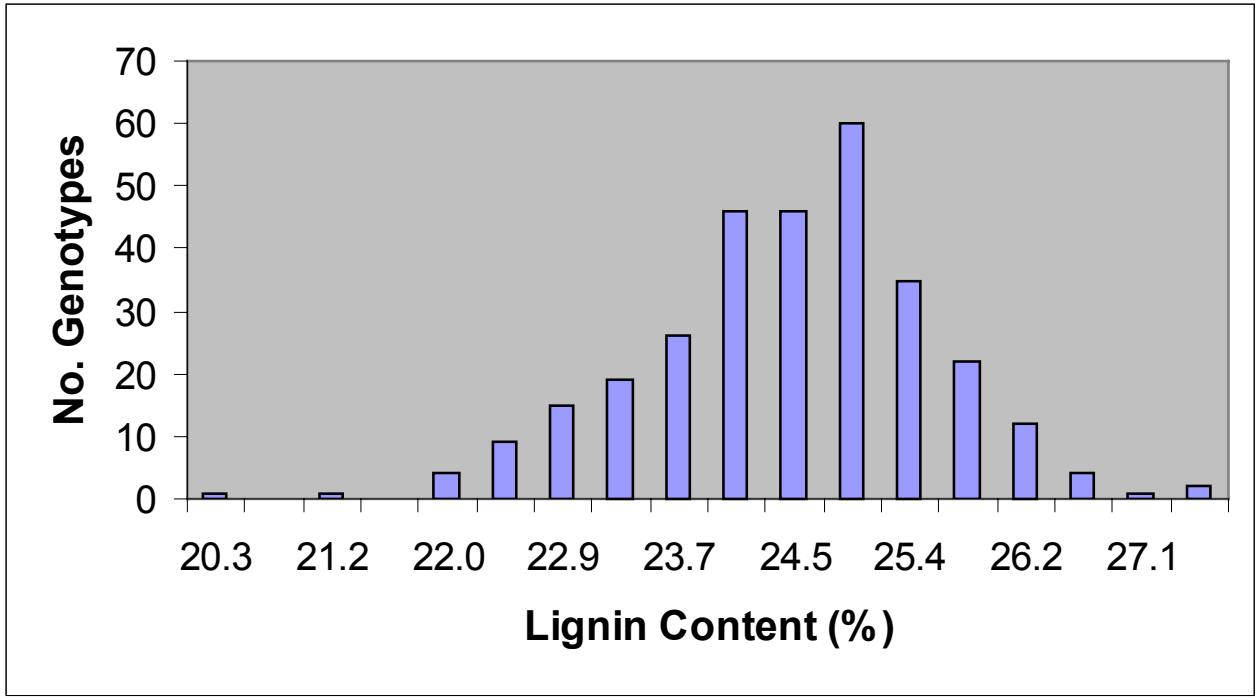
730 plants harvested to date

Observations - Allocation



Distribution of above- and below-ground biomass varies widely among individuals.

Observations - Chemistry



Stem lignin also varies and we hypothesize that similar variation will be observed in leaves and fine roots.

Future Plans

Complete analyses of allocation and chemical composition of leaves and fine roots.

Identify phenotypes of potential importance to sequestration and subject to QTL analysis.

Select extreme phenotypes for field planting and long-term examination of carbon sequestration potential.