

# Assessing parentage of American Chestnut



# Taxonomic status (parentage)

## Goals

- confirm the taxonomic status of American chestnut in populations throughout southern Ontario and screen for possible hybrids.
- test the parentage of trees developed in the breeding program and quantify the percentage of American chestnut genome.

# OMNR response to AC Recovery Strategy

## Three priority actions

- I. Conserve and enhance genetic diversity of American chestnut
- II. Investigate the effectiveness of producing a modified American chestnut with genes from blight-resistant or blight-tolerant species
- III. Determine the genetic parentage and geographical source of planted trees across Ontario

## Previous study

Gerrath, J. 2006. Detection of hybrids between *Castanea dentata* and non-native congeners in Ontario. M.Sc. Thesis, University of Guelph

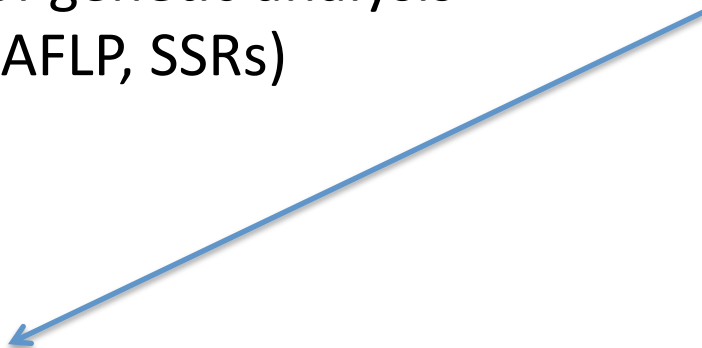
# Objectives



1. Develop a repeatable method of genetic analysis (AFLP, SSRs)



2. Test method on reference samples of *Castanea* species



3. Apply method to trees in CCC breeding program and wild Ontario trees.



4. Identify a shorter, reliable diagnostic tool for distinguishing species.



# Study Species

- *Castanea sativa*
  - European Chestnut
- *Castanea mollissima*
  - Chinese Chestnut
- *Castanea crenata*
  - Japanese Chestnut
- All Present since 1850s
- All hybridize with *C. dentata*
- Used in chestnut breeding program



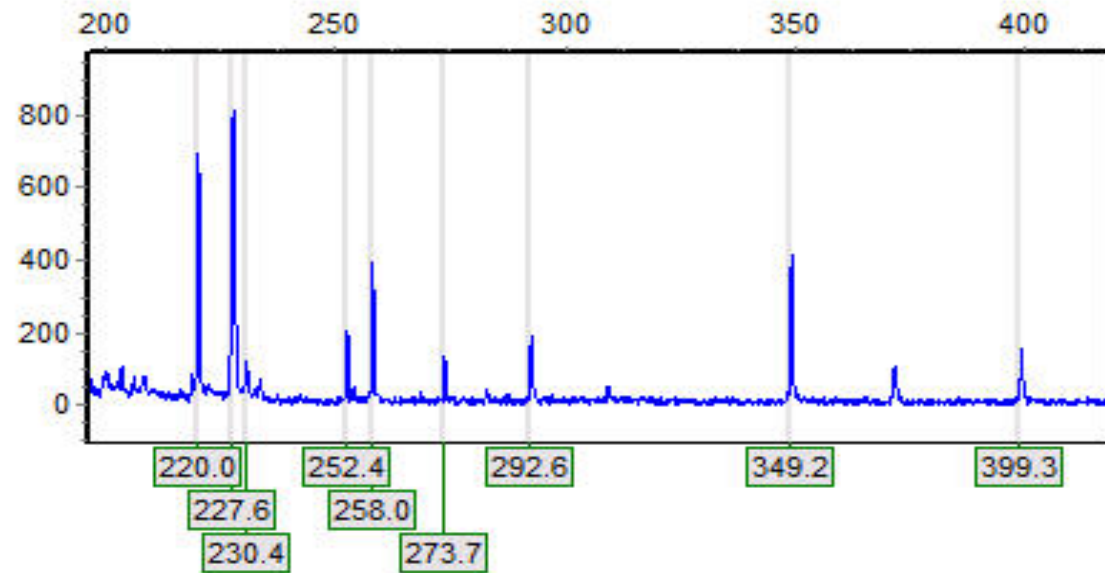
# Reference Collection

- Connecticut Agr. Experiment Station (New Haven)
  - 9 individuals per species
  - 25 F1 hybrids
- 12 leaves per individual
- Leaves were pressed, dried and labeled; DNA extracted



# DNA Markers

- AFLP (amplified fragment length polymorphisms) and / or SSRs (microsatellites)
- Specific regions throughout the genome that can differ in sequence length among individuals and species





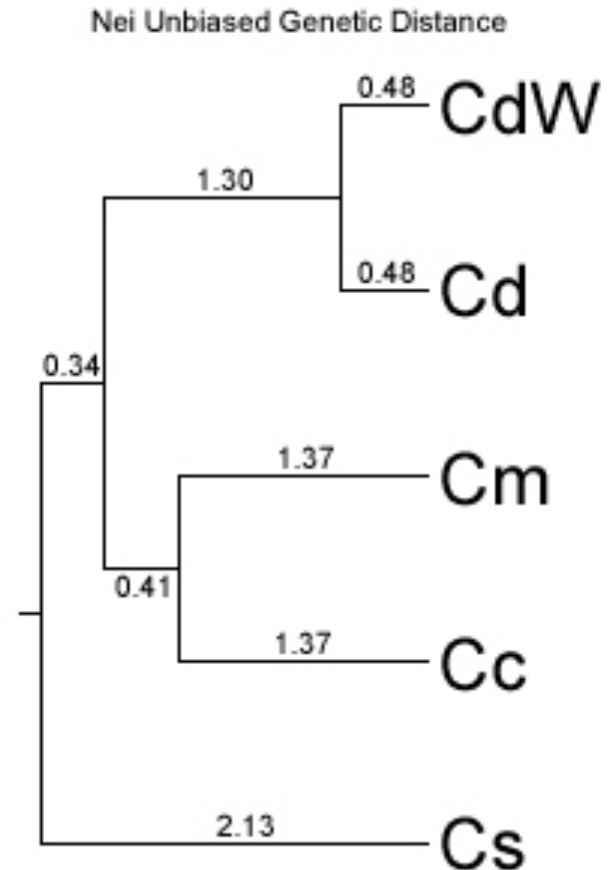
# Genetic Information

For each targeted region in the genome,  
sequence length may be:

- Invariable and similar across species
- Variable and similar proportions across species
- Variable, at different proportions among species
- Fixed differences between species (diagnostic)

# Genetic Similarity

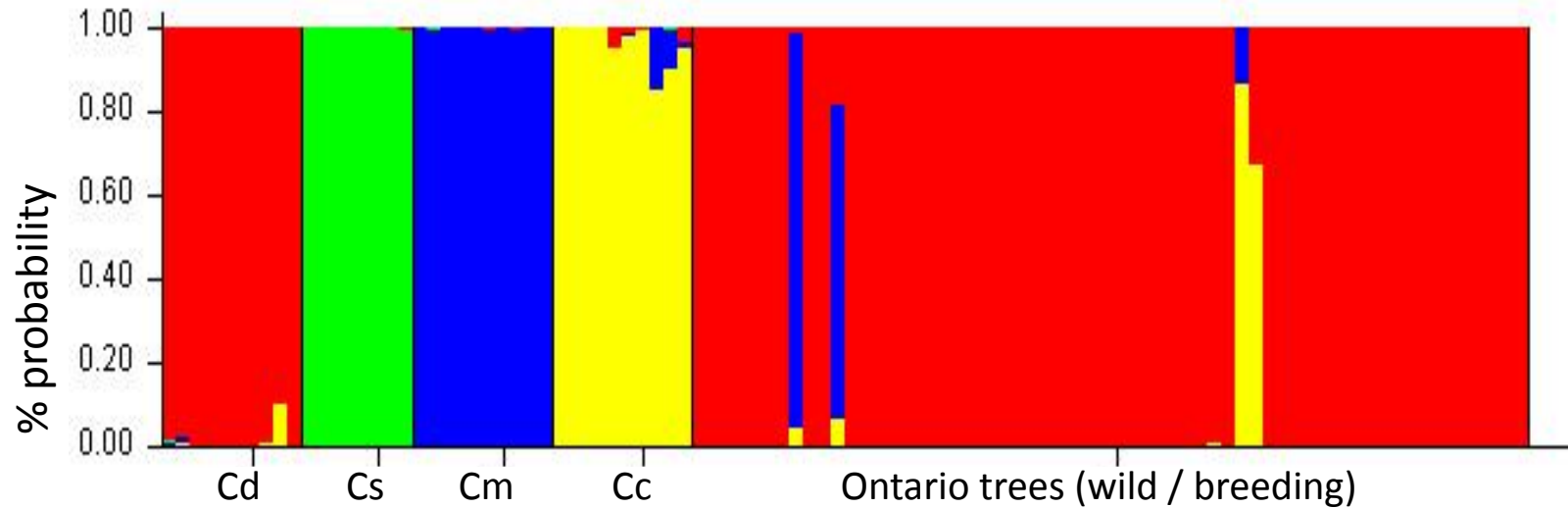
Assess the genetic  
resemblance between  
different chestnut species



Gerrath 2006

# Analysis of Parentage

- characterize the genotypes of reference material
- evaluate the most likely parentage for each Ontario sample



# Summary

- A contemporary genetic diagnostic tool is needed to assess taxonomic status and hybrid parentage of American chestnut in the CCC breeding program and wild populations in southern Ontario.
- Survey I and II will provide the necessary leaf material.
- Funds will be essential to fund personnel to complete this work at University of Guelph