Plants for Sustainable Landscapes
HORT 308 Spring 2019

Plant Development & Genetic Variation
Reading Assignments

Pages 35 and 58 - 62 in
Landscape Plants For Texas And Environ, Third Edition
Life Cycle of Woody Plants

- **Seedling**
  - Exponential growth rate, emphasis on root establishment and competition for sunlight

- **Youth**
  - Rapid growth, little flowering, immature morphology, few years to decades; strongly resilient to environmental stresses

- **Maturity**
  - Emphasis on seed production, more spreading habit, slower growth rate, few to thousands of years; recover from damage more slowly

- **Senescence**
  - Dieback, declining vigor, few to many years

- **Death**
  - Ceasing of life functions, collapse and decay
Is Genetic Manipulation in the Landscape Important?
Genetic Variation

- **Genotype × environment interaction**
  - Genotype sets potential for traits, environment modifies expression
  - Removing genotype from ecological community

- **Basic sources of genetic variation**
  - Mutations (alteration in the code), genetic segregation (swapping genes), & recombination (rearranging)
  - With environmental selection get evolution
  - Intervention by people results in cultivars

- **Intrinsic variation** = within the species
- **Extrinsic variation** = outside the species
Types of Intrinsic Variation

- Ecophenic or Non-genetic
  - Phenotypic plasticity
    - Response to environment not under genetic control
    - Sun versus shade leaves
    - Smaller fruit on dry sites
  - Not heritable
  - Reciprocal transplant studies
    - Is trait stable in different environments?
    - Ecotype versus Ecophene
Genetic Variation

- Heteroblastic Change
  - Juvenile to mature phase change
  - Seasonal heteromorphism
- Mutations
  - Alterations in genetic code
- Chromosomal Variations
  - Haploid, aneuploidy, polyploidy
- Non-adaptive Variation
  - Not associated with environmental factor
Genetic Variation

• Ecotypic (adaptive) variation
  – Ecological Race
    • In response to environment, often discontinuous (Lost Pines)
  – Cline
    • Like ecotypic, but environmental gradient response (Red Maple)
  – Speciation
    • Result of ecotypic variation and/or isolation over time (Escarpment Live Oak)

Quercus virginiana var. fusiformis or Quercus fusiformis?
Genetic Variation

• Reproductive variation
  – Outcrossing = xenogamy
    • Monoecious versus dioecious
  – Inbreeding = autogamy
  – Apomixis
    • Vegetative apomixis = vegetative reproduction
      ← Example: *Populus nigra* ‘Italica’
    • Agamospermy = asexual seed formation
Genetic Variation

- Extrinsic Variation
  - Intergeneric and intrageneric hybrids
    - $F_1$ generation intermediate
    - $F_2$ segregates on wide continuum
  - Introgression
    - Repeated back-crossing to parental species
    - Hybrid swarms - gradient of characters
    - Transfers genes among species
- Gene transfer (genetic engineering)
Questions / Comments?

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Dr. Michael A. Arnold
Dept. of Horticultural Sciences
Texas A&M University
College Station, TX 77843-2133
email ma-arnold@tamu.edu