Plant Development & Genetic Variation

Reading Assignments

Pages 35 and 58 - 62 in
Landscape Plants For Texas And Environs, 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
- **Maturity**
  - Emphasis on seed production, more spreading habit, slower growth rate, few to thousands of years
- **Senescence**
  - Dieback, declining vigor, few to many years
- **Death**
  - Ceasing of life functions, collapse and decay

Genetic Variation

- **Genotype × environment interaction**
  - Genotype sets potential for traits, environment modifies expression
  - Test by removing genotype from its ecological community
  - Relative competitiveness of given genotype may change with different environment
- **Sources of genetic variation**
  - Mutations, genetic segregation, & recombination
  - With environmental selection get evolution
  - Intervention by people results in cultivars
- **Intrinsic Variation** = within the species
- **Extrinsic Variation** = outside the species
Intrinsic Variation With A Species

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

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)

Example: Sequoia sempervivens

Note the wide variation in growth habit, size, and foliage characteristics present within S. sempervirens

Genetic Variation

- Heteroblastic Change
  - Epigenetic changes
  - 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

Pinus taeda

Acer rubrum

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

- Extrinsic Variation
  - Intergeneric and intrageneric hybrids
    - F1 generation intermediate
    - F2 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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