Plants for Landscape Design
HORT 608 Fall 2018

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
Example: *Sequoia sempervivens*

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

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**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

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**Genetic Variation**

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

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**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)

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*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
  - 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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