

## Landscape Plant Materials HORT 308 Spring 2012



### 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 Manipulation in the Landscape?



## Genetic Variation

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



Genetic variation in *Picea pungens*



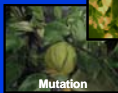
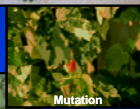
## Types of Intrinsic Variation

- **Ecophenic or Non-genetic**
  - **Phenotypic plasticity**
    - Response to environment not under genetic control
    - Sun versus shade leaves
    - Smaller fruit on dry site
  - **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 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)



## Genetic Variation

- **Reproductive variation**
  - **Outcrossing = xenogamy**
    - Monoecious versus dioecious
  - **Inbreeding = autogamy**
  - **Apomixis**
    - Vegetative apomixis = vegetative reproduction
    - Agamospermy = asexual seed formation



## Genetic Variation

- **Extrinsic Variation**
  - **Intergeneric and Intrageneric hybrids**
    - F<sub>1</sub> generation intermediate
    - F<sub>2</sub> resegregates on 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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