

*Plants for Landscape Design*  
*HORT 608 Fall 2011*



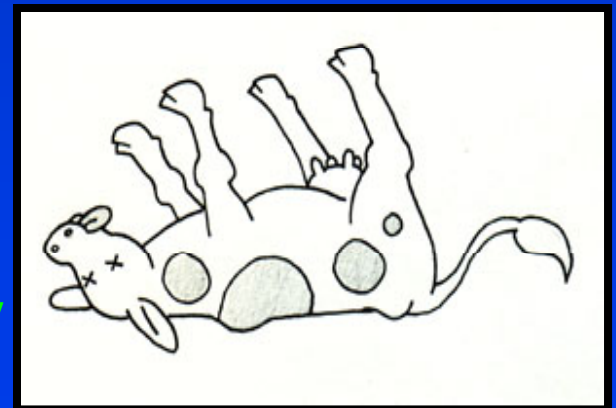
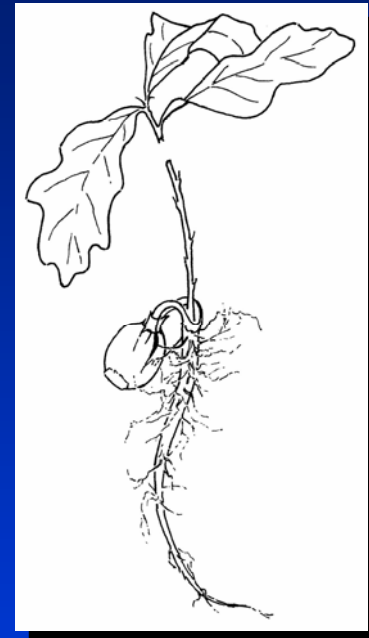
*Plant Development  
& Genetic Variation*

# *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



# *Celosia cristata*

## *Example*



Note the wide variation in growth habit, size, foliage, and flower structures present within *C. cristata*

# Genetic Variation

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



Genetic variation  
in *Picea pungens*



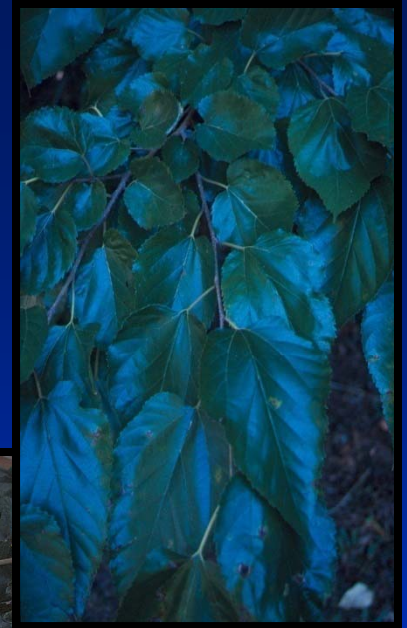
# *Types of Intrinsic Variation*

- **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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