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# PHASE CHANGE: JUVENILITY, MATURATION, SENESCENCE

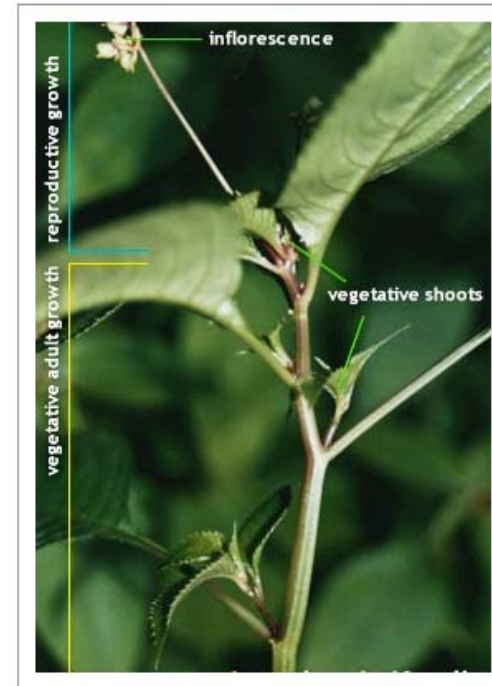
## ■ Phasic development

- ❑ embryonic growth
- ❑ juvenility
- ❑ transition stage
- ❑ maturity
- ❑ senescence
- ❑ Death



- The shoot apical meristem (and therefore plants) undergo three distinct phases:
- Juvenile
- Adult vegetative
- Adult reproductive

Meristems in the juvenile phase have no ability to produce reproductive structures (cones or flowers) so are described as having no **competence**. Adult meristems are competent because they can now produce reproductive structures (ie. will respond to stimuli which trigger this), but the actual production of these will depend on environmental stimuli.



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# PHASE CHANGE: JUVENILITY, MATURATION, SENEESCENCE

- **Juvenility**
    - terminated by flowering and fruiting
    - may be extensive in certain forest species
  - **Maturity**
    - loss or reduction in ability of cuttings to form adventitious roots
  - **Physiologically related**
    - lower part of plant may be oldest chronologically, yet be youngest physiologically (e.g. some woody plants)
    - top part of plant may be youngest in days, yet develop into the part that matures and bears flowers and fruit
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# AGING AND SENESCENCE

- Life spans among plants differ greatly
    - range from few months to thousands of years
      - e.g. bristlecone pine (over 4000 years old)
      - e.g. California redwoods (over 3000 years old)
    - clones should be able to exist indefinitely
  - Senescence
    - a physiological aging process in which tissues in an organism deteriorate and finally die
    - considered to be terminal, irreversible
    - can be postponed by removing flowers before seeds start to form
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# REPRODUCTIVE GROWTH AND DEVELOPMENT

## ■ Phases

- ❑ Flower induction and initiation
  - ❑ Flower differentiation and development
  - ❑ Pollination
  - ❑ Fertilization
  - ❑ Fruit set and seed formation
  - ❑ Growth and maturation of fruit and seed
  - ❑ Fruit senescence
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# REPRODUCTIVE GROWTH AND DEVELOPMENT

- Flower induction and initiation
    - What causes a plant to flower?
      - Daylength (photoperiod)
      - Low temperatures (vernalization)
      - Neither
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# REPRODUCTIVE GROWTH AND DEVELOPMENT

- Photoperiodism
    - Short-day plants (long-night; need darkness)
    - Long-day plants (need sufficient light)
    - Day-neutral plants (flowering unaffected by period)
  - Change from vegetative to reproductive
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# REPRODUCTIVE GROWTH AND DEVELOPMENT

- Low temperature induction
  - Vernalization
    - Any temperature treatment that induces or promotes flowering
    - First observed in winter wheat; many biennials
    - Temperature and exposure varies among species
    - Note difference/relationship to dormancy
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