Introduction to Clonal Propagation

By Hannah Pilkey and Emily Taff
Thornless Swamp Rose
Best Cherry Tomato You’ve Ever Had
Pest Resistant Lily
Goal

- Reproduce plants with the identical genotype of the parent plant
  - Flower, foliage, fruits, disease/pest resistance, etc.
  - Not possible through seed propagation

- How is clonal propagation done?
  - Cuttings
    - Stem
    - Leaf
    - Grafts
    - Layering/Stooling
    - Tissue Culture
  - Bulbs
  - More on this later!
Origins of Clones

- Seedling selection
- Mutation resulting in “budsport”

VS
Aging in Plants

- **Chronological Aging**
  - Number of years a plant has been growing

- **Ontogenetic Aging**
  - Phase shifting
  - Embryonic $\rightarrow$ Juvenile $\rightarrow$ Intermediate $\rightarrow$ Mature
  - Hormonal cues response to the environment
Here’s where things get weird….

- A “seedling” oak tree can be 50 years old, yet still retain it’s juvenility
- Different sections of the plants persist in different phases
- The tissues that are formed when the tree was a seedling are the most juvenile and these are the areas located at the part of the tree that is closest to the crown (root/shoot interface)
Oldest Growth (50 years)

Intermediate Growth (3 years)

Newest Growth (2 weeks)

Chronologic

Ontogenetic

Most Mature

Intermediate Juvenility

Most Juvenile (closest to the base)
Why is this important to propagators?

- As a plant matures, it becomes increasingly more difficult to induce adventitious roots
- Juvenile parts of the plant will be more likely to produce roots from cuttings
- Why?
  - Not sure
  - Science is still working on it...
Cone of Juvenility

- Growth emerging from the canopy:
  - Ontogenetically/physiologically old
  - Flowering potential
  - Low rooting potential

- Growth emerging from the crown:
  - Ontogenetically/physiologically young
  - High rooting potential
  - Inability to flower
Juvenile Phase Maintenance

- Root sprouts, epicormic shoots, stool beds, etc.
Phase Change Management

- **Reversion from mature to juvenile**
  - Cutting back the plant
  - Serial grafting
  - Aseptic culture of meristem

- **Reversion from juvenile to mature**
  - Enhancing growth rate by avoiding dormancy
  - Inducing stress
  - Budding/grafting mature wood onto juvenile root stock
Sources for clonal propagation

- Commercial plantings
- Stock blocks
- Production materials within nursery
- Stock plant grower
- Repositories, botanical gardens, and private collections
- Collection from native stands
Collecting Materials from the C.O.J.
References


Technicians (Tyler Desmarais & Linda McGuigan) of the SUNY ESF American Chestnut Research & Restoration Team


Redwood Information:  

More Information of Clonal Propagation:  
Image References

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