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

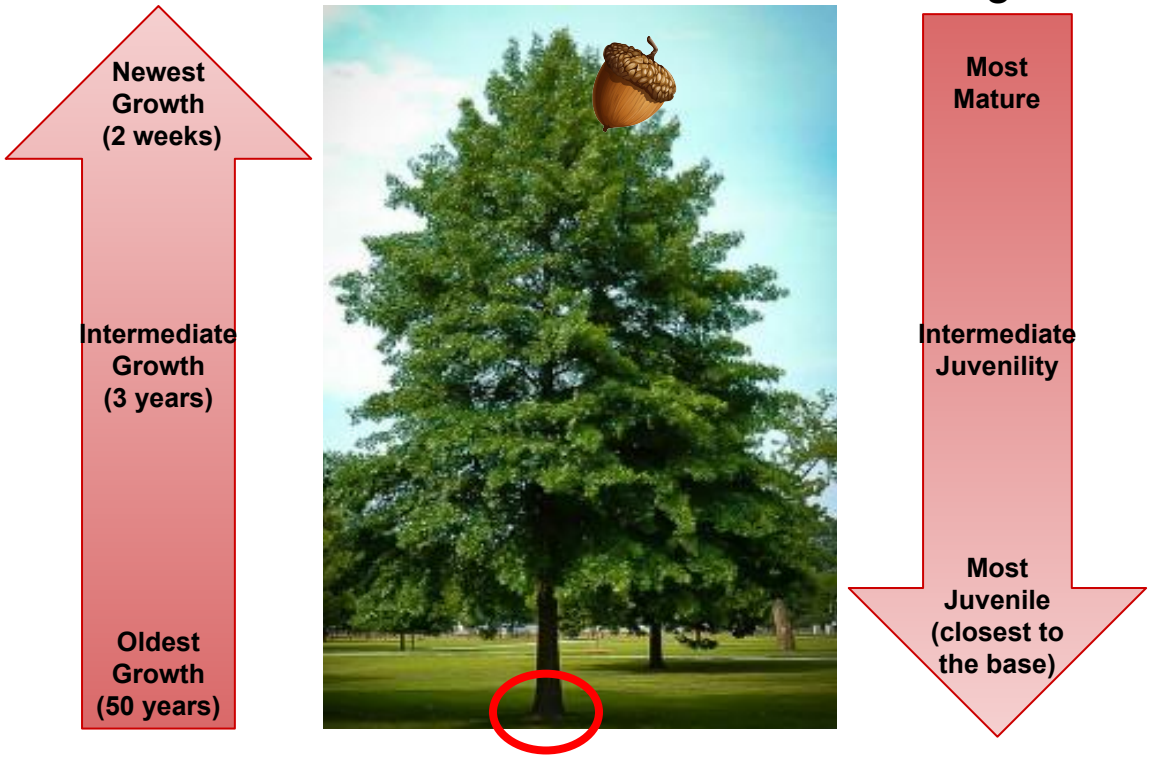
- Chronological Aging
  - Number of years a plant has been growing
- Ontogenetic Aging
  - Phase shifting
  - Embryonic → Juvenile → Intermediate → Mature
  - Hormonal cues response to the environment

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)

Chronologic

Ontogenic

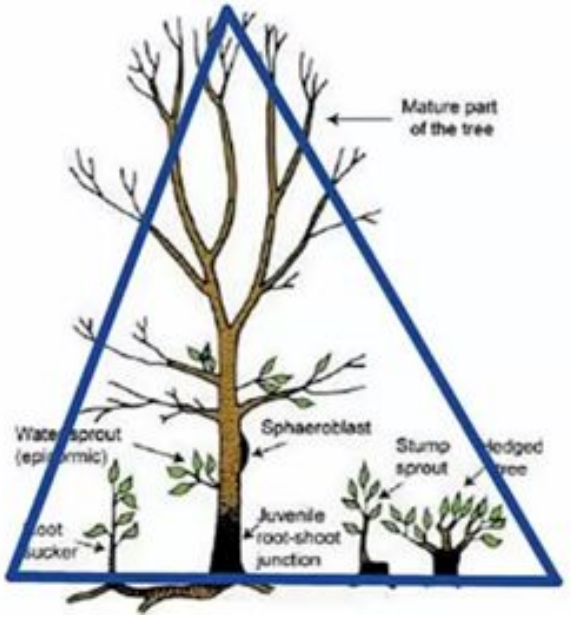


Why is this important to propagators?

- 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.

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Redwood Information:
http://arnoldia.arboretum.harvard.edu/pdf/articles/1999-59-3-redwood-burls-immortality-underground.pdf

More Information of Clonal Propagation:
http://www.cornell.edu/video/history-of-plant-cloning-2-propagation-methods

Image References

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