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Trees 101

Structure, Function, Identification, Jargon

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Defining a Tree

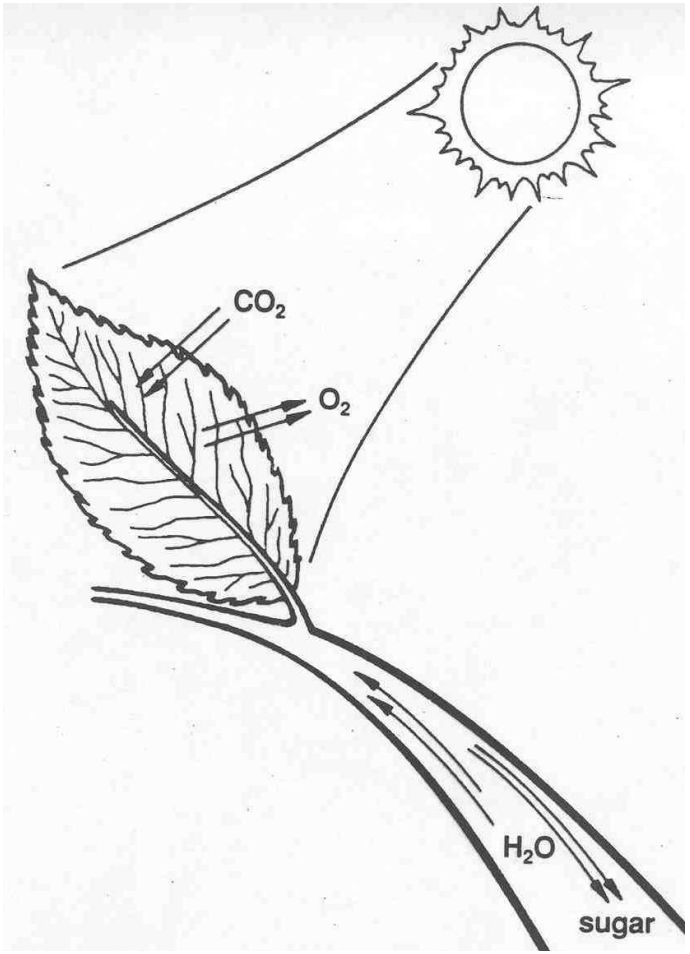
What is a Tree?

- A woody perennial plant, typically having a single stem or trunk growing to a considerable height and bearing lateral branches at some distance from the ground.

What is a Tree?

- A large water pump facilitating moisture exchange for energy conversion and food production.

Photosynthesis



Photosynthesis

- For a tree to be healthy, it must be able to carry out photosynthesis.

- Carbon Dioxide + Water *in the presence of light , yields* Sugar + Oxygen

$$CO_2 + H_2O \xrightarrow{\text{LIGHT}} C_6H_{12}O_6 + O_2$$

Photosynthesis

- So what does a tree need to be able to successfully carry out photosynthesis?

- Carbon Dioxide (Air)
- Water
- Light

Photosynthesis

- Anything that inhibits a tree's ability to carry out photosynthesis…
- *Anything that prevents a tree from pumping water and cycling air…*
- is going to harm the tree!

Forestry is Common Sense Elevated to a Science

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Structure and Function…

Beginners Guide to Tree Anatomy and Physiology

Anatomy & Physiology (Structure & Function)

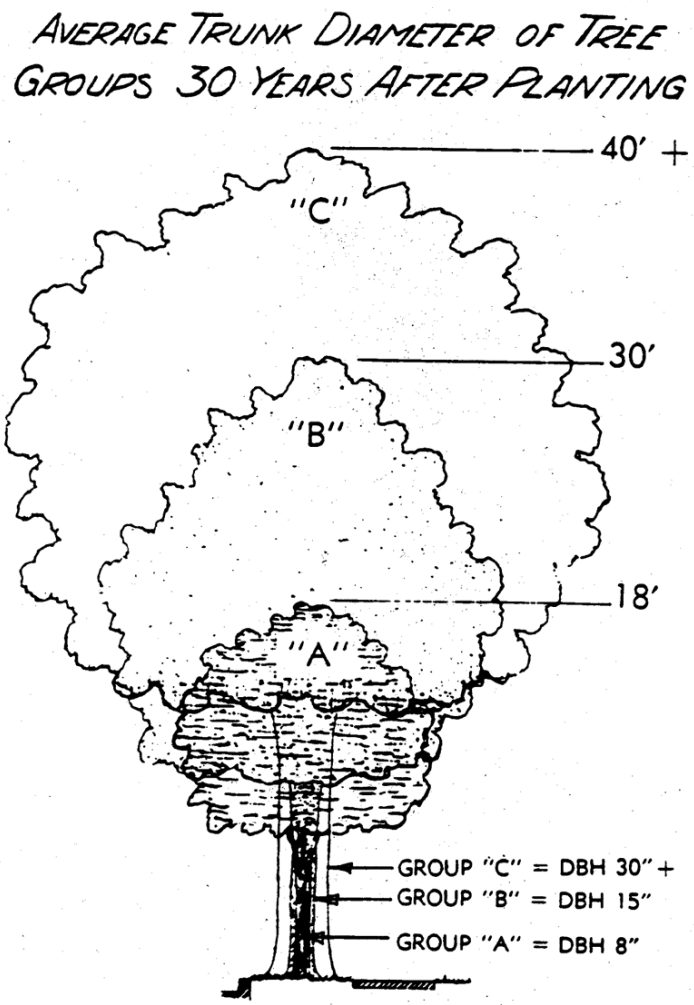
- Tree Anatomy deals with the ***structure*** of trees.
  - What are the parts of a tree?

- Tree Physiology deals with the ***functions*** and activities of these parts.
  - How does a tree grow?

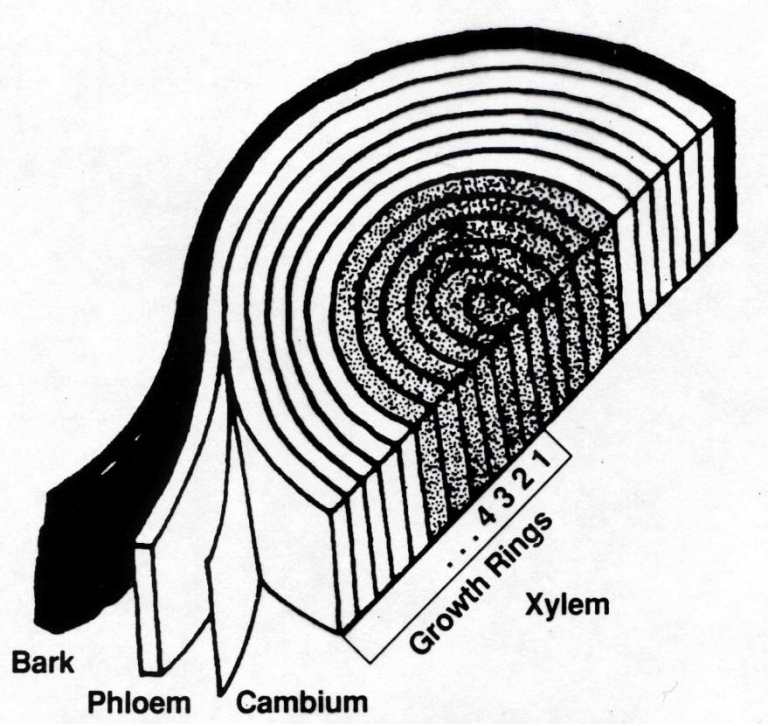
How does a tree grow?

How does a tree grow?

- Trees grow from the outside out and from the top up.

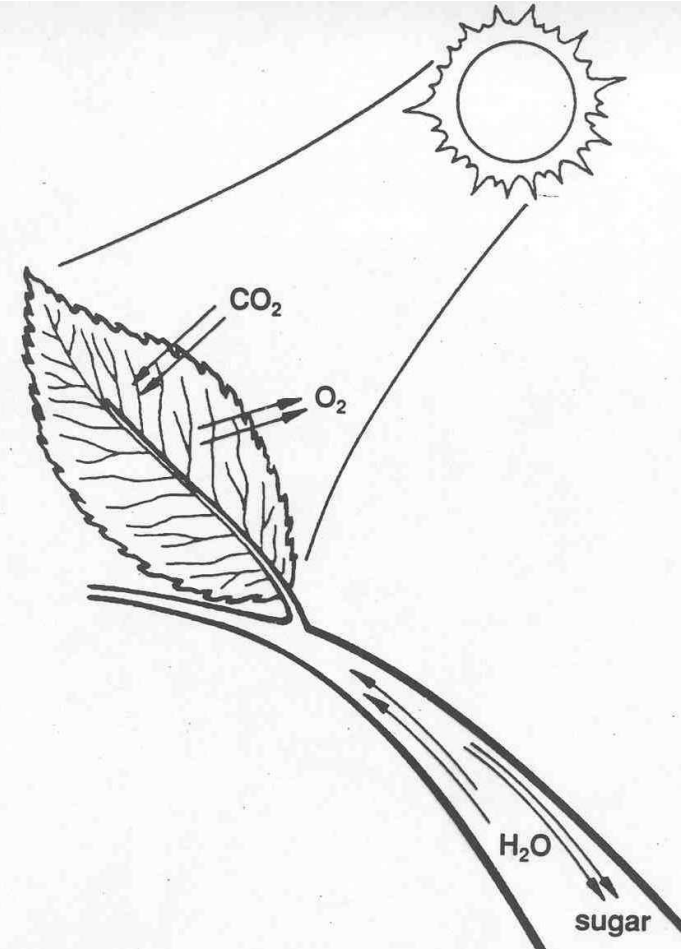


How does a tree grow?



- The cambium is the ***living*** layer of actively dividing cells located just inside the bark that produces a new growth ring each year.
- Phloem is formed to the outside and eventually becomes bark.
- Xylem is formed to the inside and eventually becomes wood.

How does a tree grow?



- Phloem cells carry the sugar produced by photosynthesis from the leaves down to the rest of the tree for use (growth) and storage.
- Xylem cells carry water from the soil to the leaves for use in photosynthesis.

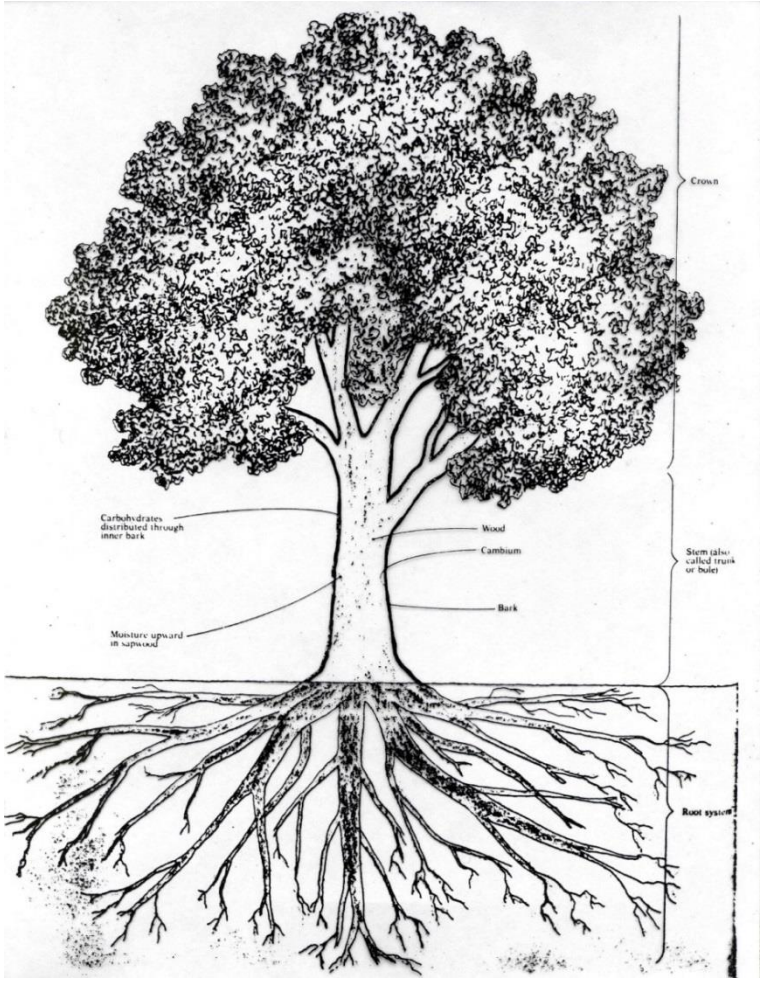
How does a tree grow?

- In the spring, growth is fast and the cambium produces large cells that appear light in color.
- In the summer, growth slows down, and the cambium produces smaller cells that appear darker.

Counting the rings will tell you the age of the tree!

Tree Terminology (Anatomy)

- Crown
- Branches
- Trunk
- Roots

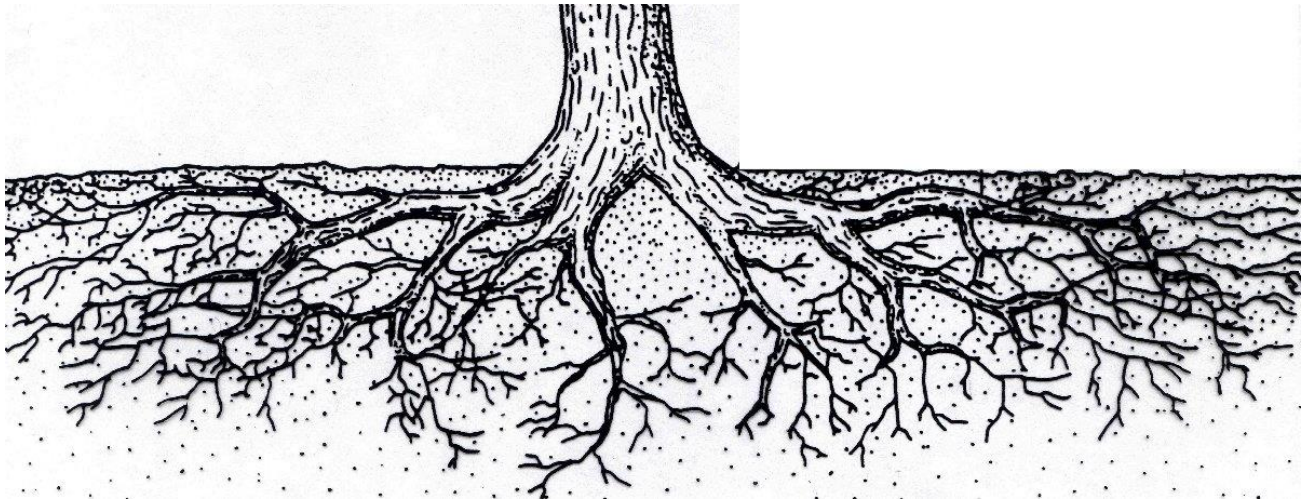


Tree Terminology

- Many crowns together make a canopy.
- Large branches give way to small twigs.
- The trunk, sometimes called the bole, should end in a flare (trunk flare/root flare), not go straight into the ground.
- The root system can potentially extend to 2-4 times the height of the tree.

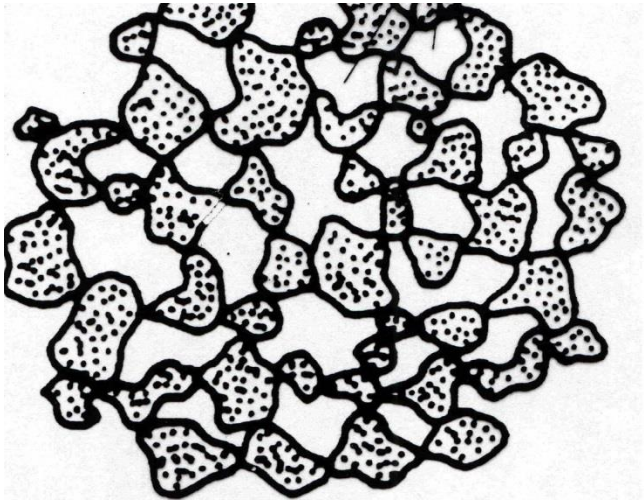
Tree Terminology

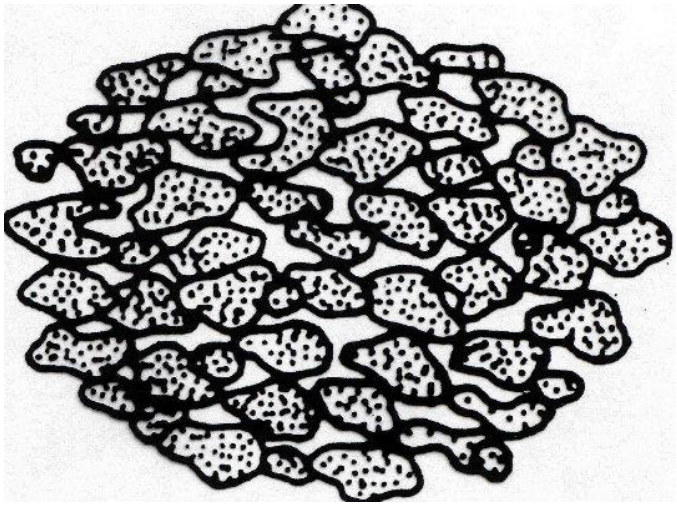
- The majority of tree roots are found in the upper 18 inches of soil.
- The root system consists of large woody roots, long ropelike lateral roots, fine absorptive roots, and a zone of root hairs.
- Roots will grow where they can find water.



Soil

- Available pore space between soil particles is critical in root establishment and growth.
- Ideal soil is about 50% pore space, which may be filled with air or water. Compaction reduces soil pore space; below 12%, root growth is inhibited.

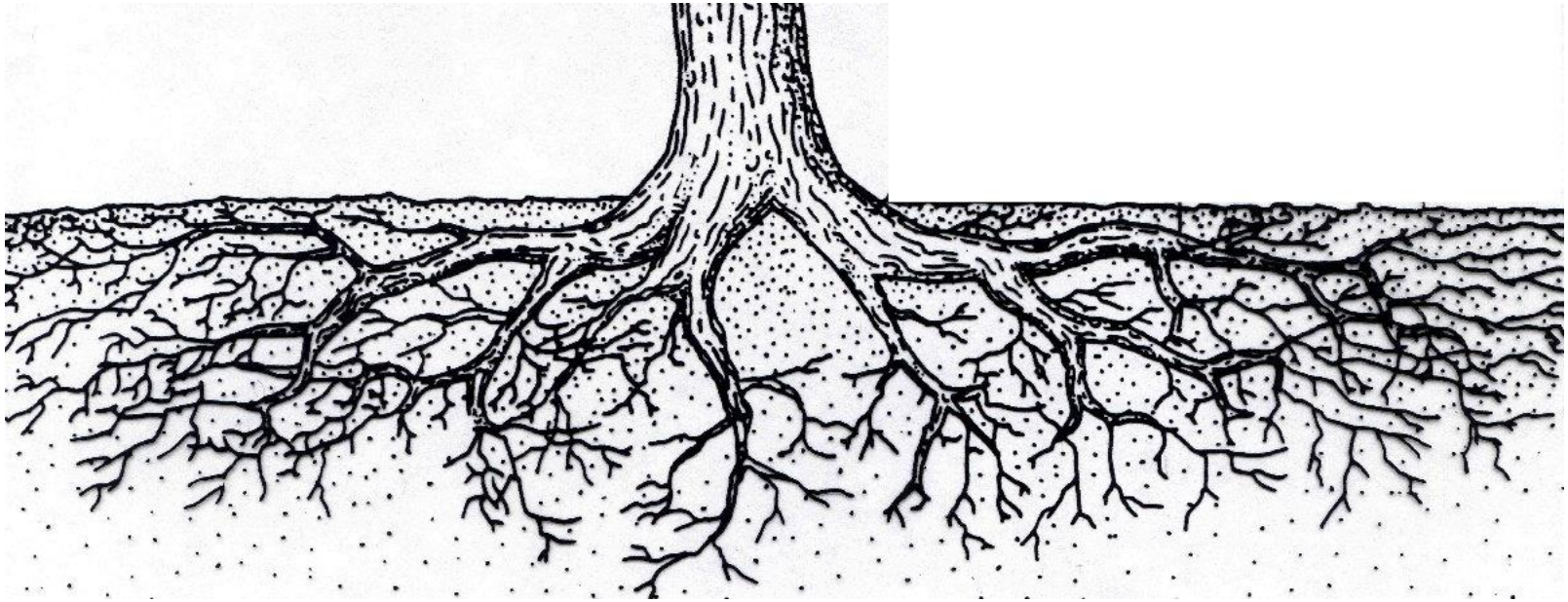




Tree Terminology

- Root Collar
- Branch Collar
- Branch Bark Ridge
- Cambium

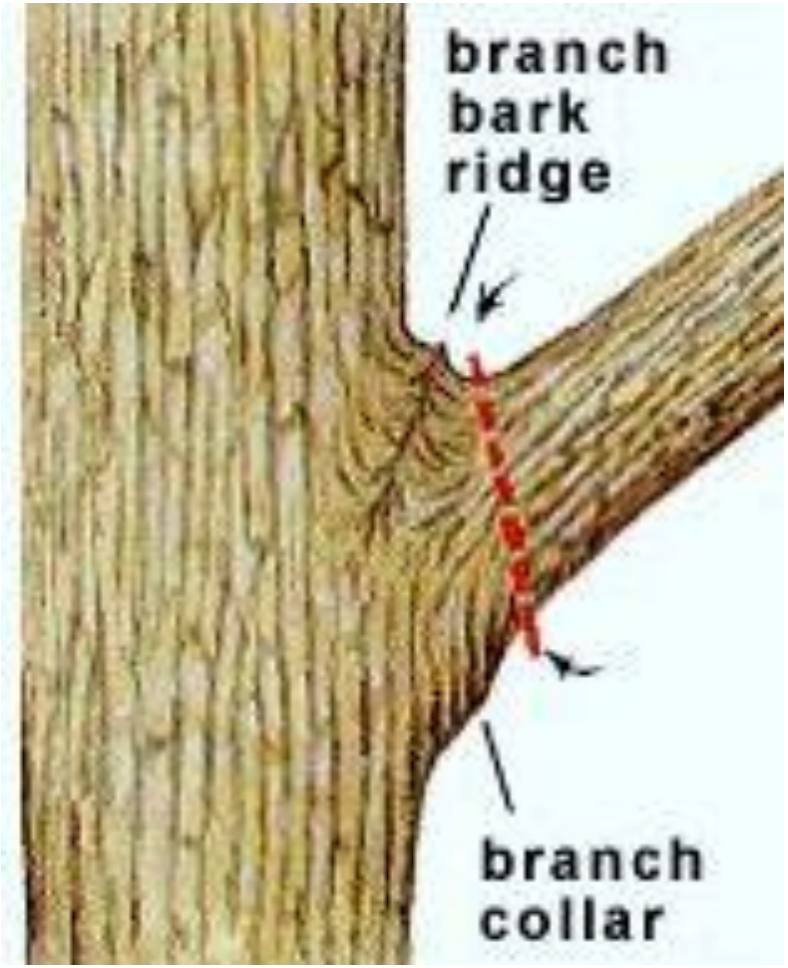
Tree Terminology



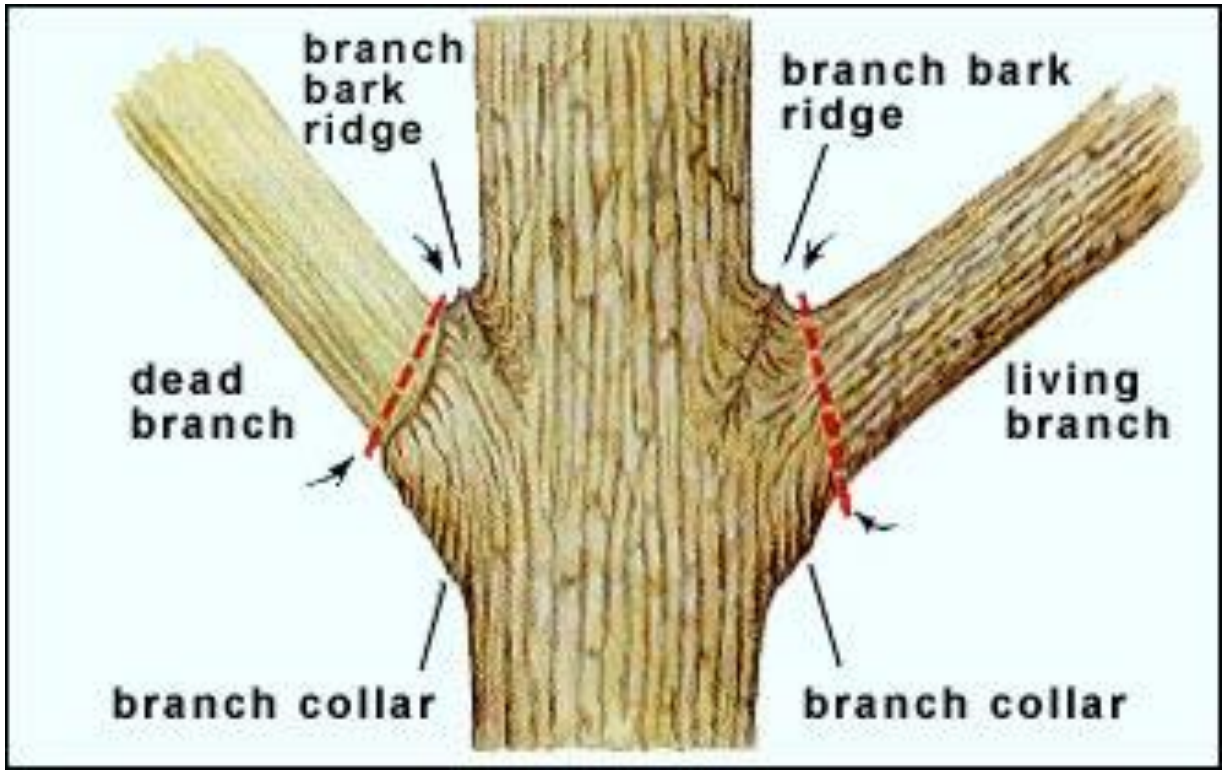
A tree's root collar is the area where the roots join the main stem or trunk. There should be a visible flare leading from the trunk to the major roots.

Tree Terminology

- the branch collar is the swollen area at the base of a branch where it meets the trunk.
- The branch bark ridge is the raised strip of bark at the top of a branch union, where the growth and expansion of both the trunk and the adjoining branch push the bark into a ridge.

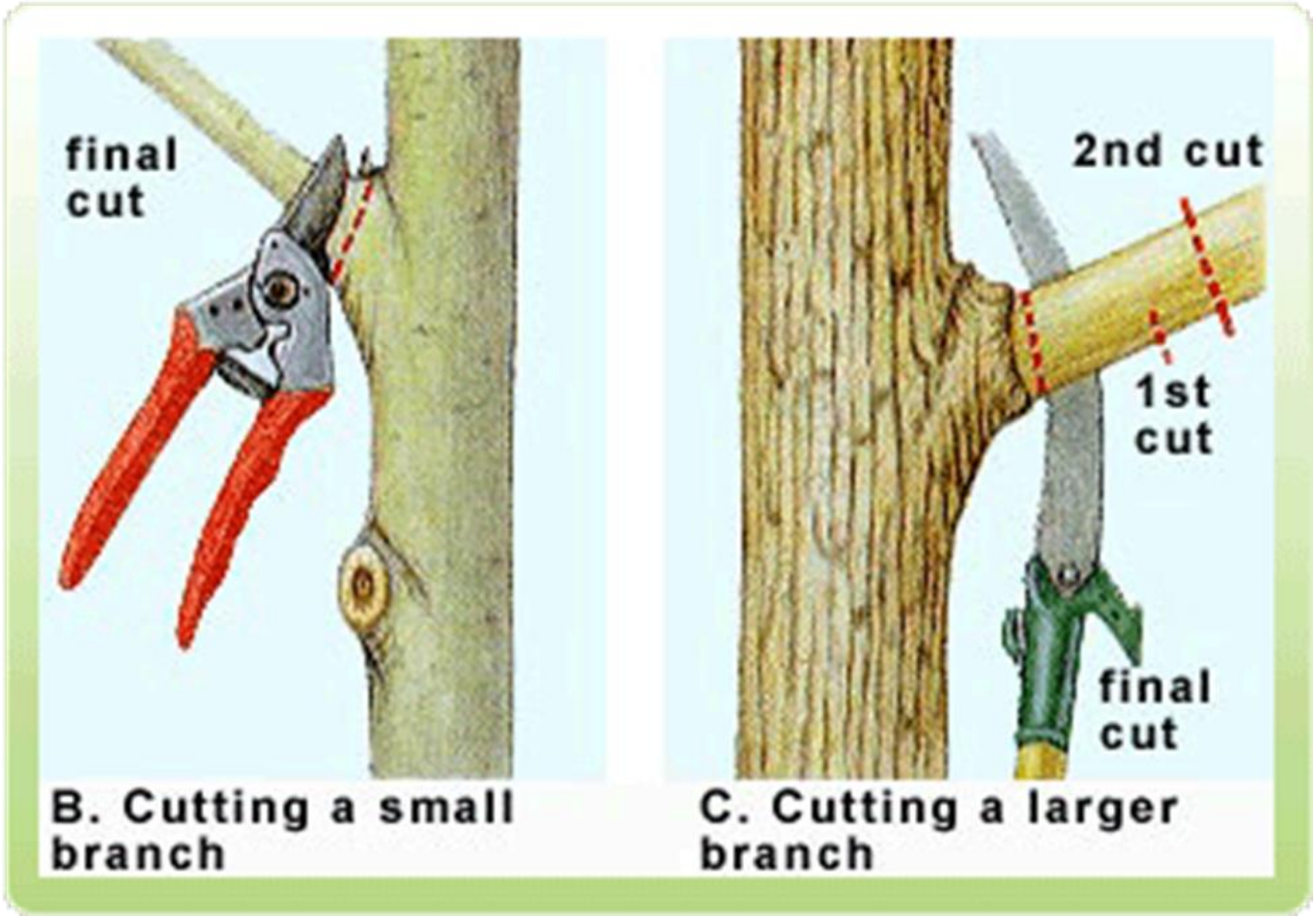


Tree Terminology

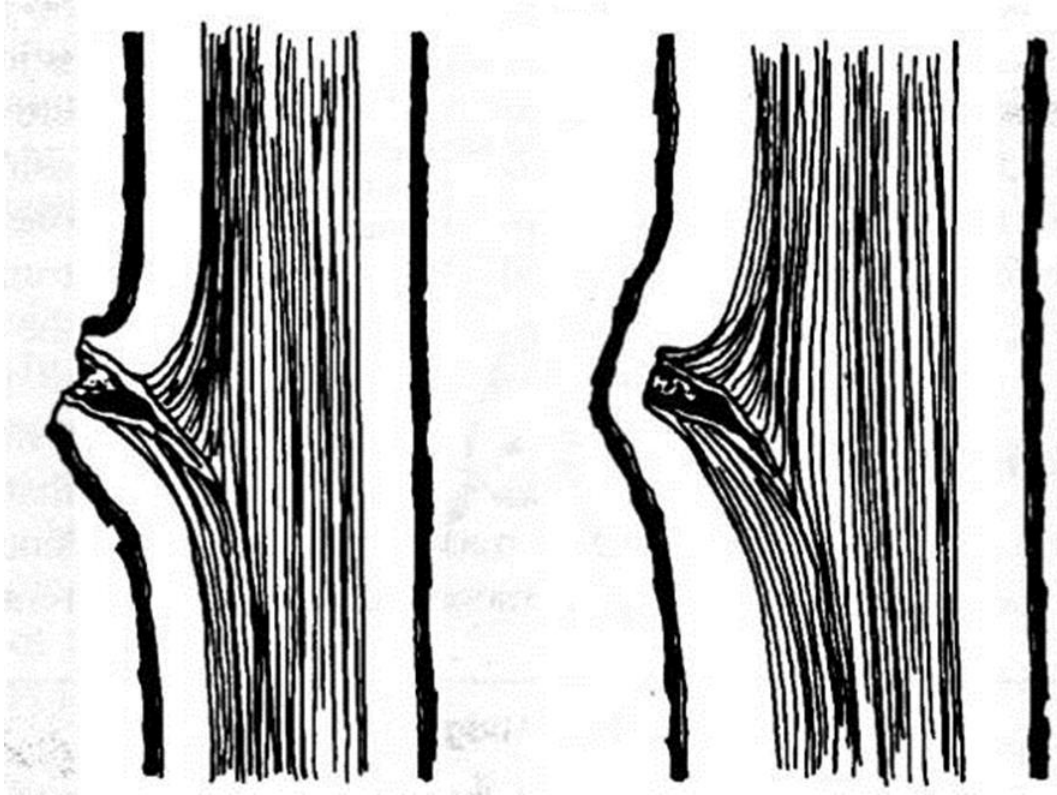


The branch collar and branch bark ridge help determine the proper placement of pruning cuts.

Good Pruning



Good Pruning



Trees don’t heal, they seal

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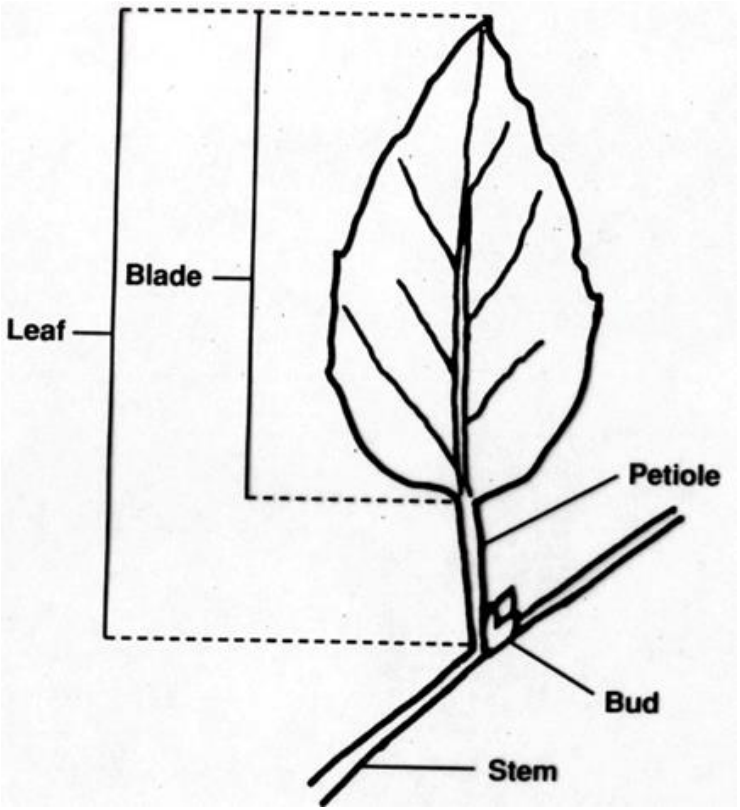
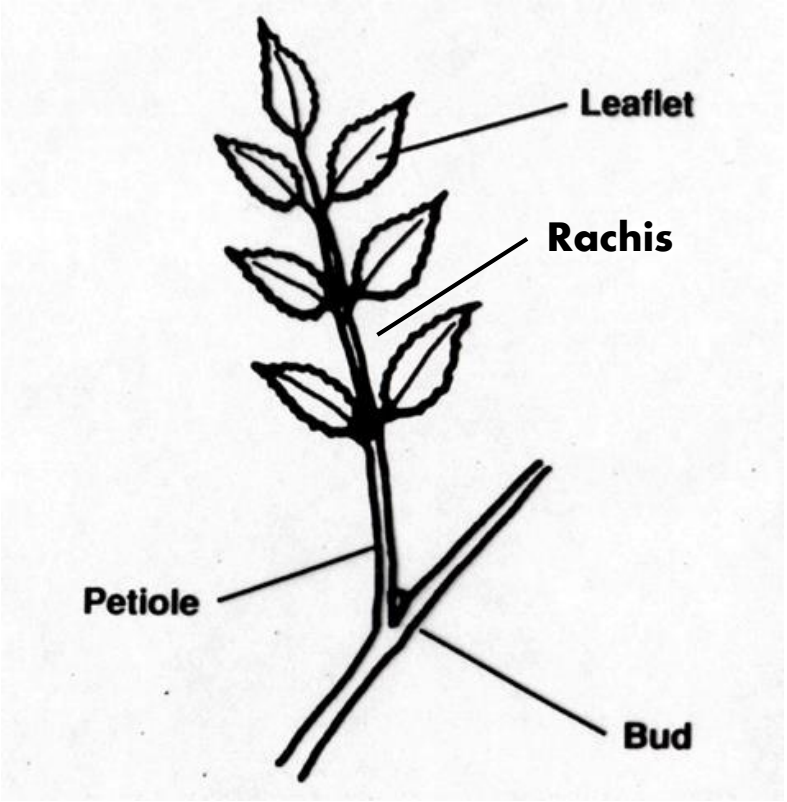
Tree Identification

…and related jargon

Tree Terminology

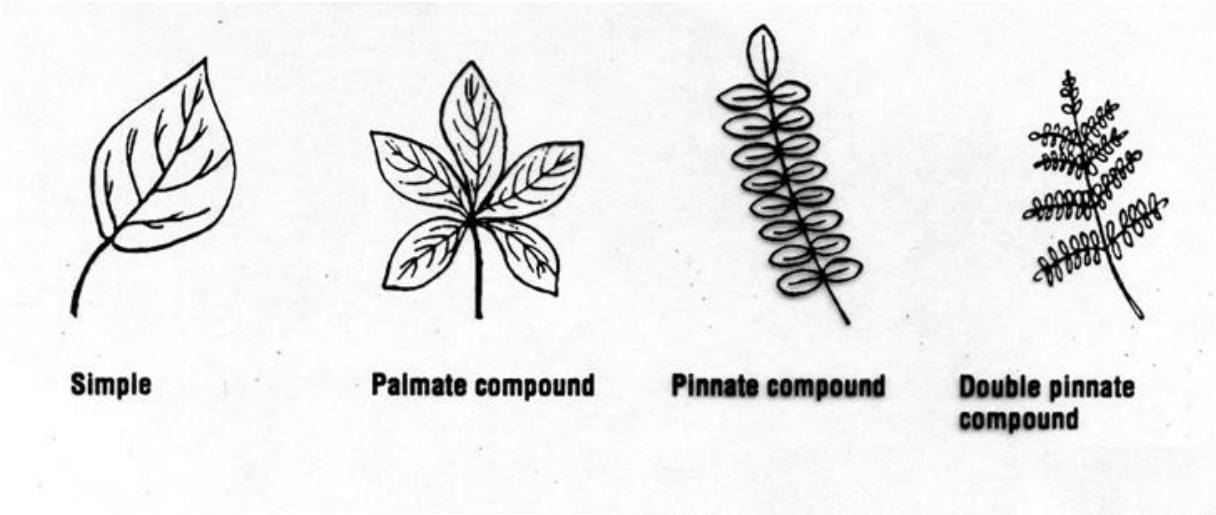


Simple Leaf



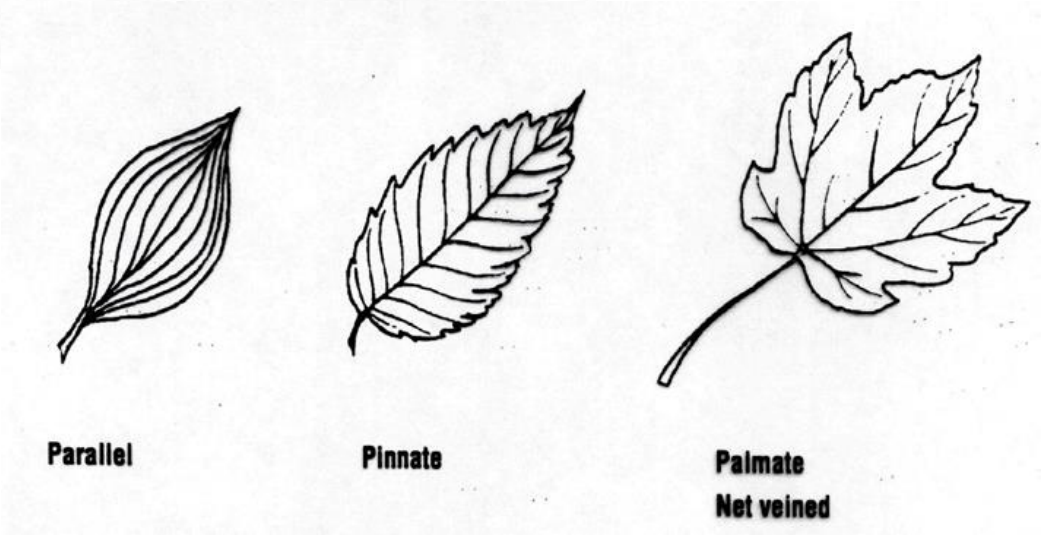
Compound Leaf

Tree Terminology

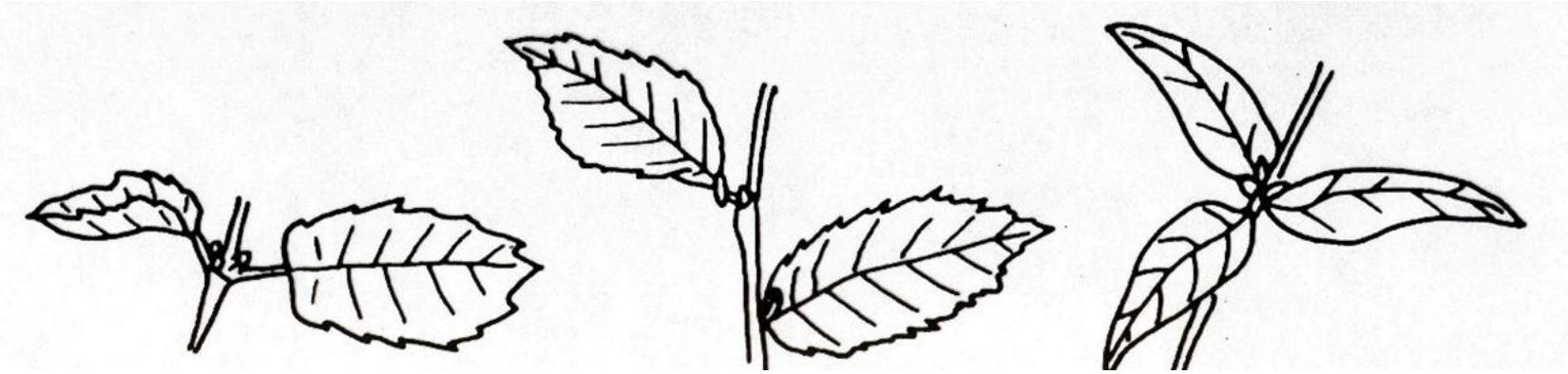


Leaves

Veins



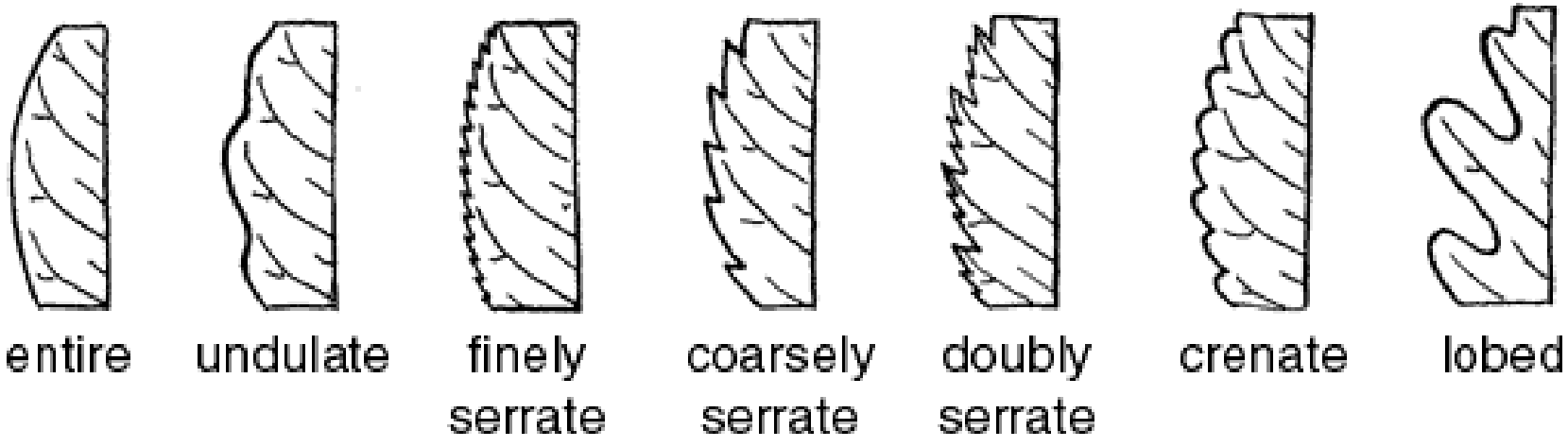
Tree Terminology



opposite alternate whorled

Tree Terminology

- The edge of the leaf blade is called the margin.

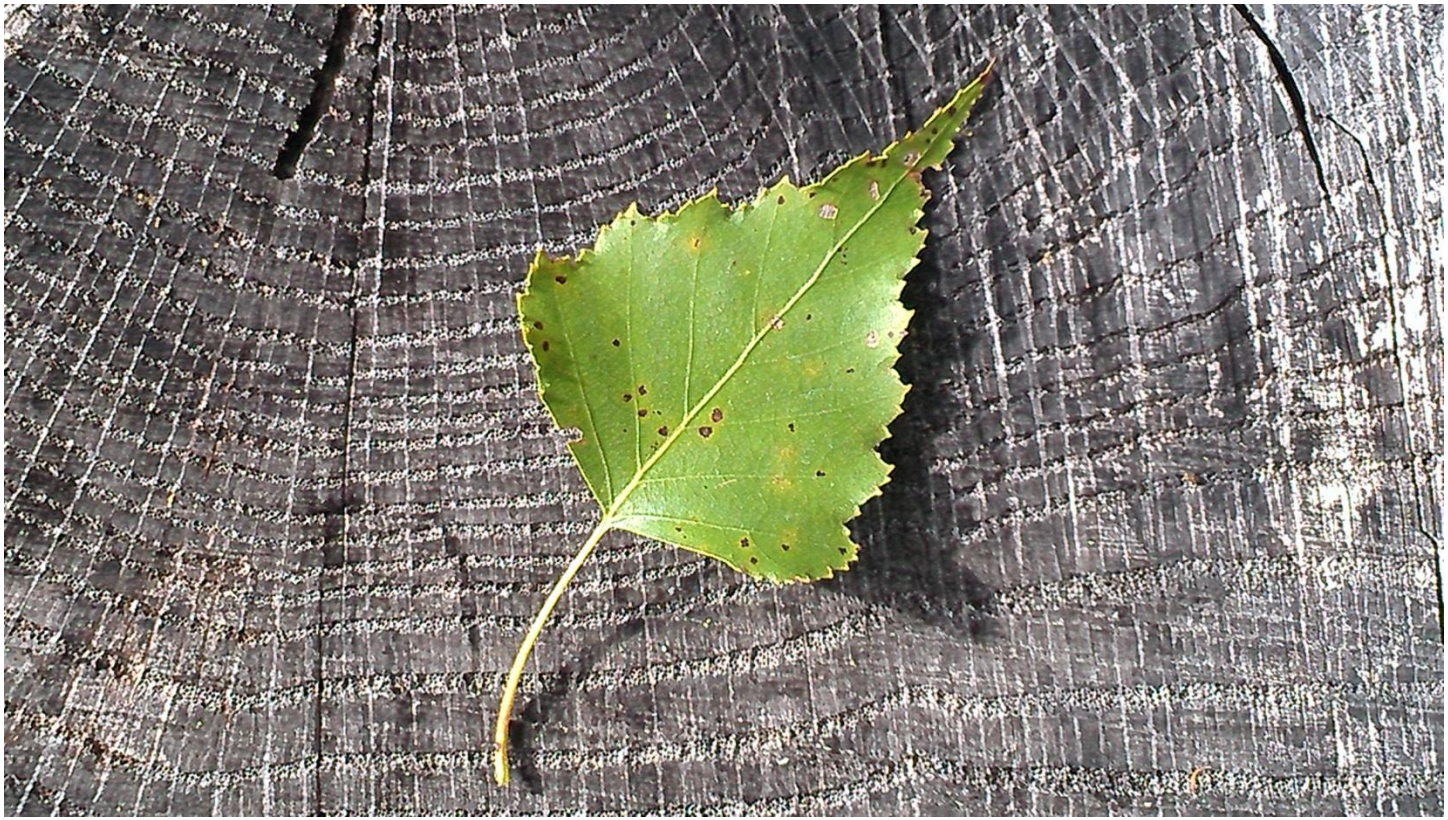


- Describe the margin:

  serrate

- Describe the margin:

  doubly serrate



- Describe the margin:

  entire

- Describe the leaf:

  simple, lobed, palmate

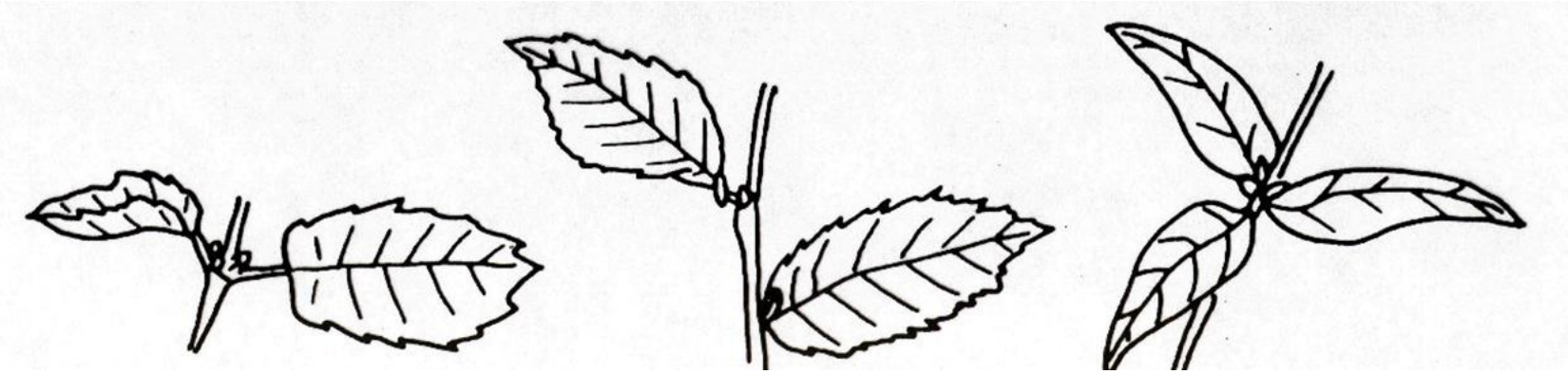
- Describe the leaf:

  simple, lobed, pinnate

- Describe the leaf:

  compound, pinnate

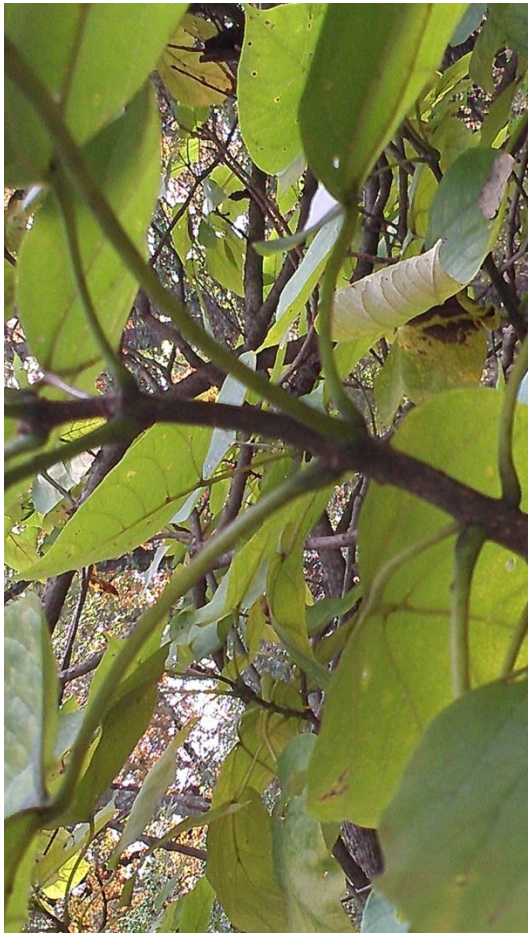
Tree Terminology



opposite alternate whorled

opposite

alternate



whorled

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Other Important Stuff

Understanding Trees & Forestry…

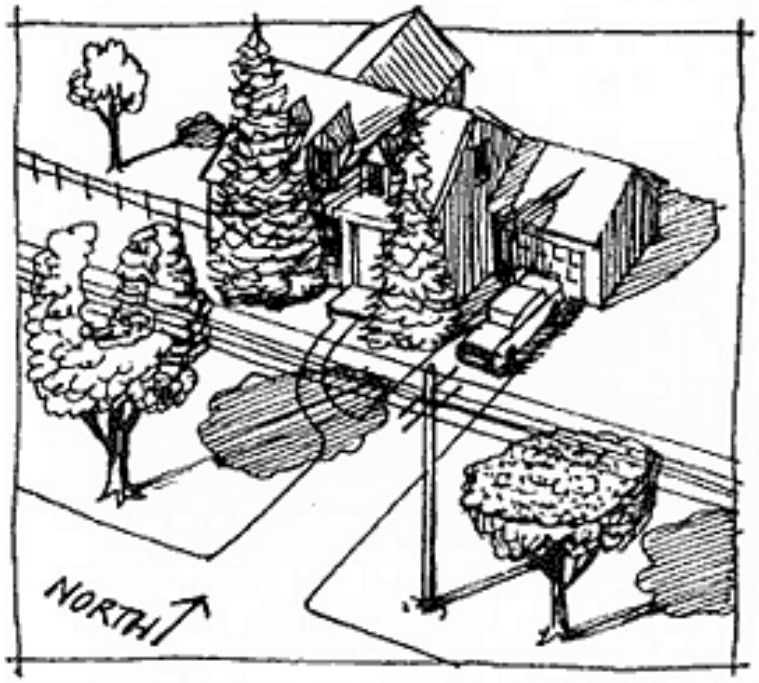
- For example, Tree Identification / Dendrology
- When and why is it important to use the botanical (Latin) names for trees?

- There can be many common names for any tree.
- Many pests are genus specific.

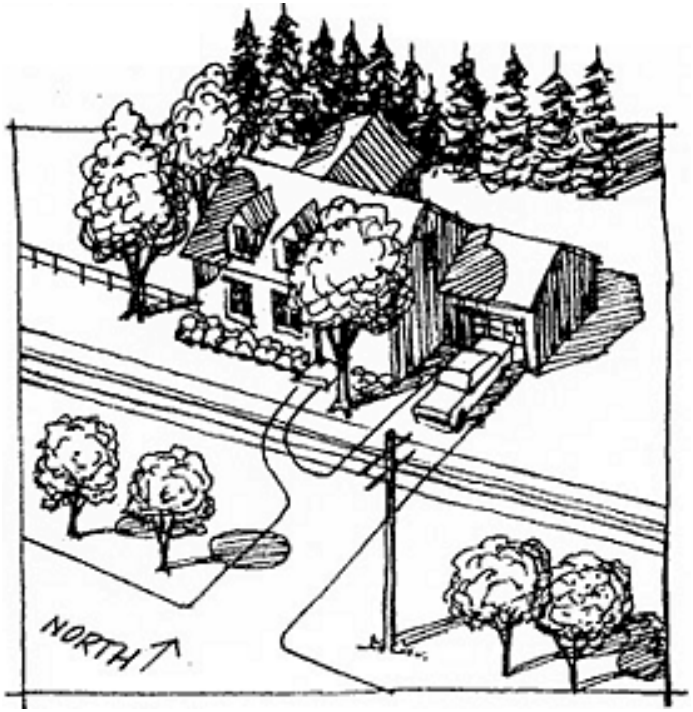
- Genus: maple (*Acer*)
- Species: red maple (*Acer rubrum*)
- Cultivar: October Glory red maple (*Acer rubrum* 'October Glory')

- red maple is the common name (or swamp maple…)
- *Acer rubrum* is the botanical name (always!)

Understanding Trees & Forestry…



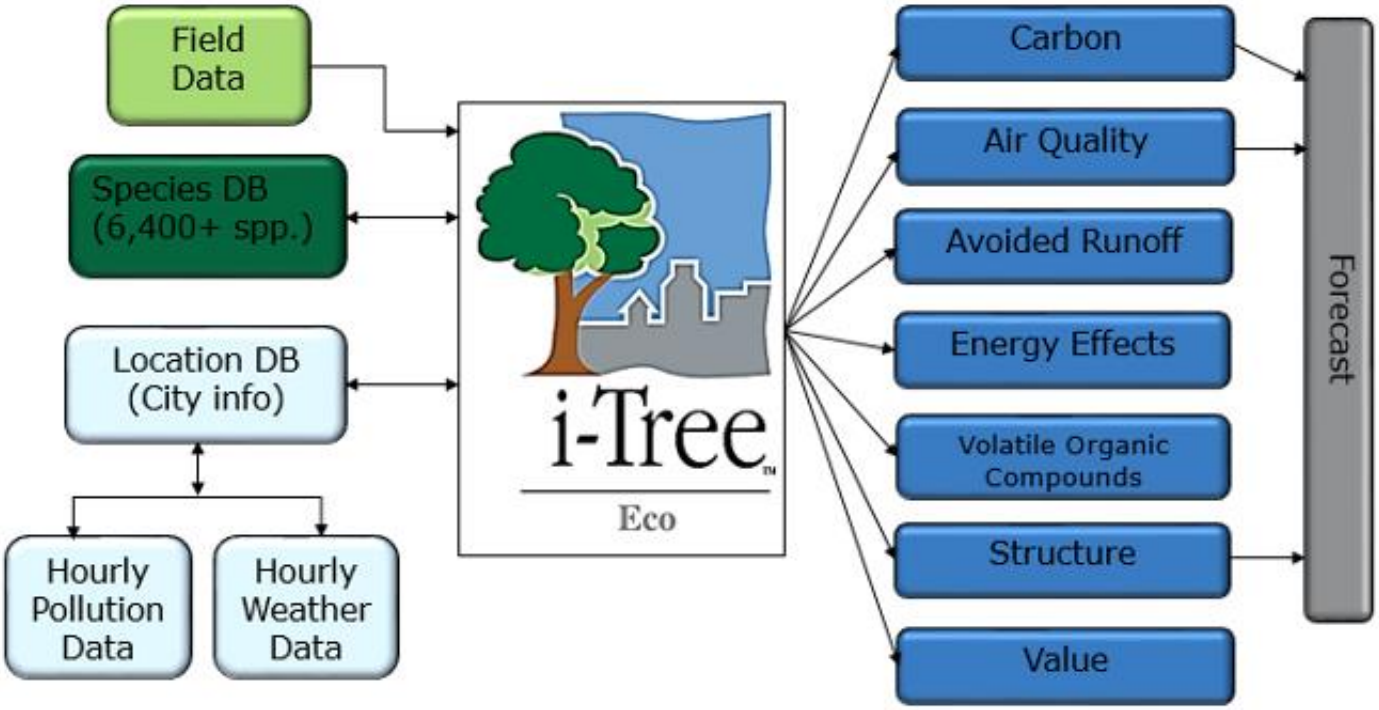
Wrong tree, Wrong place



Right tree, Right place

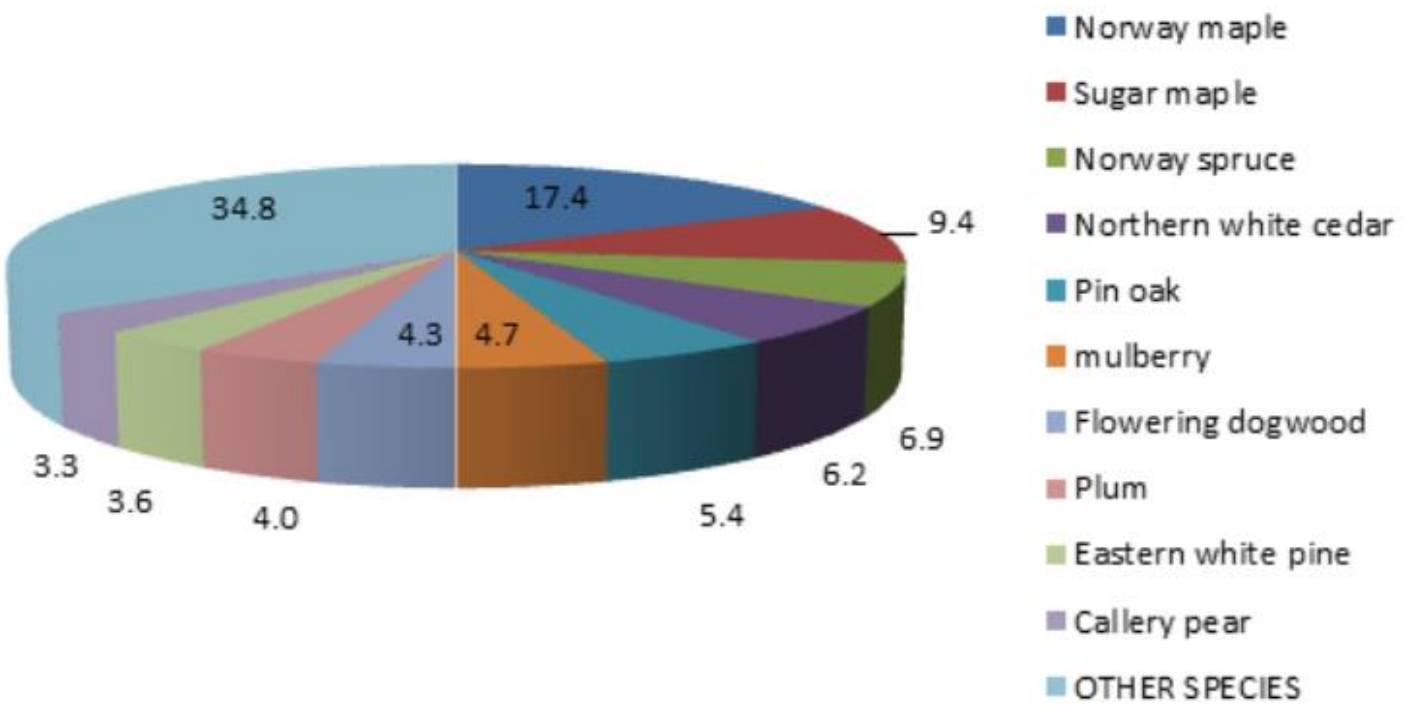
Understanding Trees & Forestry…

- Ecosystem Services of Trees! (www.itreetools.org)



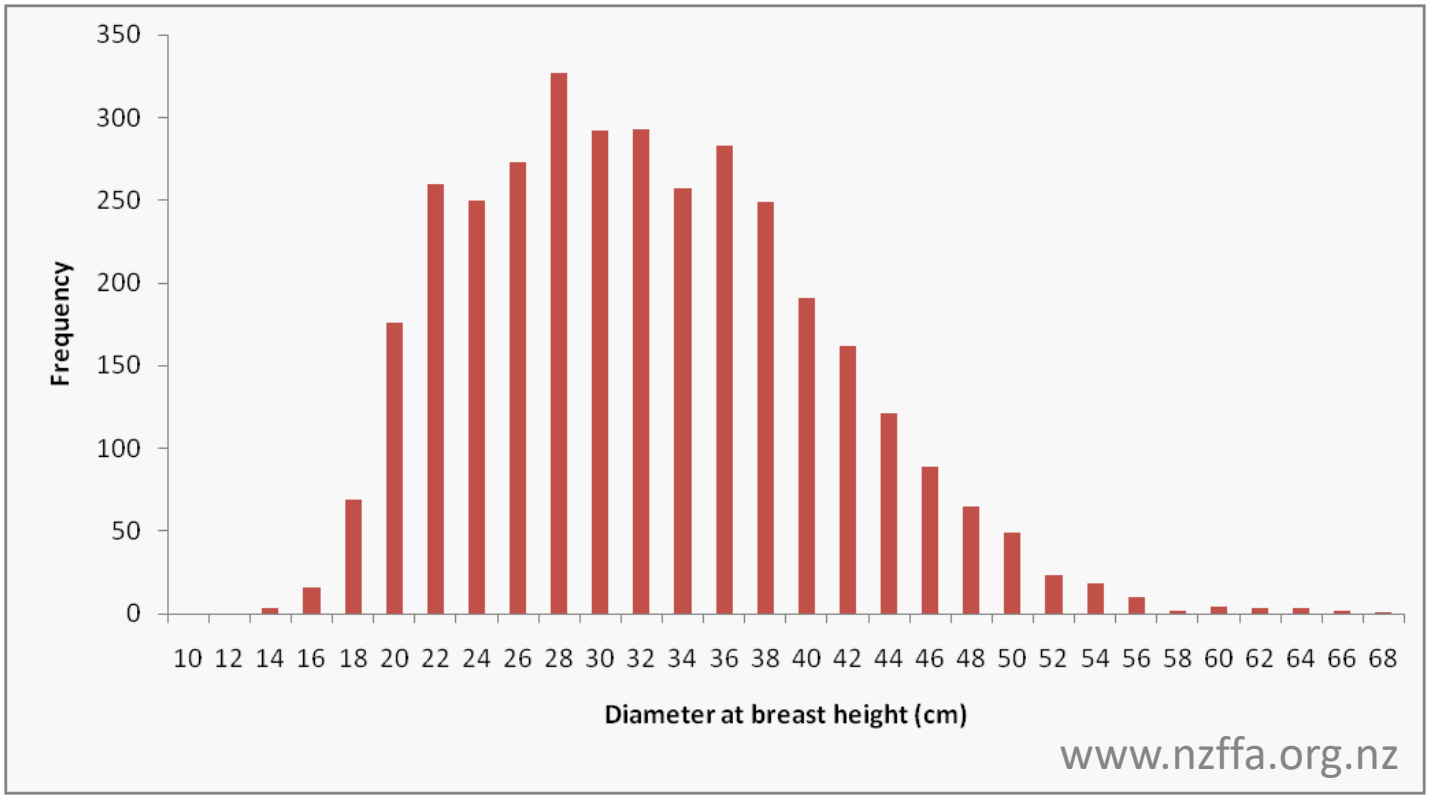
Inventory & Analysis…

- Species Composition
  - 10/20/30 rule (5/10/15)



Inventory & Analysis…

- Relative Age Distribution
  - To enable consistent management…



Young Trees (Planting & Establishment)…

- ABC's Method for Young and Small Tree Pruning
  (Dr. Chris Luley and Andrew Pleninger)
  - A - Assess the Tree
  - A - Apical Dominance
  - B - Bad Branches
  - C - Competing Branches
  - C - Clearance
  - D – Dose
  - E – Every pruning cut for a reason!

Mature Trees (Maintenance & Risk Management)…

Tree Program Management…

Continuing Education Categories…

- Understanding Trees & Forestry
- Inventory & Analysis
- Young Trees (Planting & Establishment)
- Mature Trees (Maintenance & Risk Management)
- Tree Program Management

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What have we learned, and how can we use it…

Thank you!

- Any questions?

Core training provided through a USDA Forest Service grant in partnership with