Basic Tree Pruning

Part 1: Tree Identification and Tree Growth


A four part introduction to care for your trees

This booklet is brought to you by:

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Part 1 Tree Identification and Tree Growth

Tree pruning is the removal of part of a tree in order to:

- Maintain the plant's natural shape
- Increase and maintain the general plant health
- Improve the quality of flowers and fruit
- Maintain the quality of the trunk and branches
- Obtain a bushier plant
- Limit the growth of fast-growing plants
- Achieve practical reasons (too much shade, too close to a house, etc.)

Pruning is easy to do but done the wrong way can destroy a healthy tree and, spread disease. Pruning is more than cutting away parts of a tree. Some trees may have special pruning requirements so it is essential to identify the tree precisely.

Parts 1 to 4 should be read in that order as later topics assume you have read or have knowledge introduced in an earlier topic.

Enjoy learning about how to keep your trees healthy and looking good!

Tree Classifications

In general a **tree** is defined as a woody, perennial plant with one stem at ground level. At maturity its height may be between 0.6 to over 30 meters. Other definitions indicate at tree must have a height of at least 4.5 metres.

In Canada all trees can be classified as either a conifer or deciduous tree.

Conifer trees, sometimes called softwoods, have the following identifiers:

- Needle or scale like leaves that can remain green throughout the year.
- Seeds are enclosed in cones,
- Typically have straight trunks,
- Have horizontal branches, usually branches are longer at the bottom and shorter at the top to form a conical shape.

Deciduous trees, also called broadleaf trees or hardwoods, are identified by:

- Most, but not all, shed their leaves at the end of a growing season, usually the fall or winter.

Although most references follow these classifications, you may see some variations as some trees have characteristics that do not follow the classification definition precisely. For example:

- The term "**evergreen**" is sometimes used to refer to a conifer. But there are “evergreen” deciduous trees that keep their leaves all year, for example Canada's only native broad-leafed "evergreen" tree, the Arbutus.
- Sometimes the term "**deciduous conifer**" is used for conifer trees that do not exactly fit the conifer classification, examples include:
    - The laurel, acacia and eucalyptus have leaves instead of needles and are not cone bearing.
    - The larch drops its needles in the fall each year like a deciduous tree.

Sometimes seen on Vancouver Island is the palm, a tropical tree classification. Palms have one terminal growing point, and don’t grow in diameter as they age

To learn more even more, talk to the tree expert at a nursery, an arborist, or do further research at your library or on the internet to expand your knowledge.

Tree Identification

You should know the name of the tree you are going to prune for two reasons:

- Tree cutting permits require the tree to be properly identified.
- It will aid in finding details important to maintaining the health of the tree. Don't prune then discover the pruning made the tree sick or worse.

A tree may have different names.

- One Latin or "scientific" name used for a specific species of tree.
- An English or "common" name can vary by region for the same tree.

Know the tree by both its Latin and English names. Reference materials and nursery labels may refer to a tree by either or both names. For example the Latin "Arbutus menziesii" may be called by one of its English names; Arbutus, madrone, or strawberry tree. The English name for "Quercus garryana" on Vancouver Island is Garry oak while in Oregon it is called the Oregon white oak.

Knowing details about your trees will help you set up a pruning schedule or help you decide on what trees to purchase. Detailed information about each tree is not included here as it would take hundreds of pages. Many online resources are available; here are some links (valid 4/2011) to help you identify your trees:

- http://www.for.gov.bc.ca/hfd/library/documents/treebook/
  A free PDF version of the Tree Book from the BC Ministry of Forests, Mines and Lands for information on native British Columbia trees.
- http://www.geog.ubc.ca/biodiversity/eflora/E-FloraTreesofBritishColumbia.html E-flora BC; select the menus: Species Groups - Vascular Plants - The Trees of BC
- http://forestry.about.com/od/treeidentification/tp/tree_key_id_start.htm
  A Tree Leaf Key to identify 50 common North American trees.
- http://www.treecanada.ca/site/?page=programs_trees&lang=en
  (or from the treecanada.ca home page click Programs then Trees in Canada) has information about trees by their Latin or English name.
- http://forestry.about.com/od/forestphotogalleries/ig/Dormant-Winter-Tree-Gallery/ for identify a dormant winter tree without its leaves.
- http://www.realtimerendering.com/trees/trees.html
  Identifies about 139 of the 800+ species of trees native to North America
- Use your favourite search engine to find other internet resources.

How do trees grow?

This topic is technical but the information will help you understand that where you cut on the trunk or branch can help or hurt the future growth of a tree.

Tree growth increases the size and number of leaves, stems and roots (vegetative structures). The tree vegetative and reproductive (flowers, fruits, seeds) structures require a supply of sunlight, water, carbon dioxide, and minerals to produce sugars. These sugars are the building blocks of new vegetative and reproductive structures.

Animals, including humans, have growth in most parts of the body. Tree growth occurs only in certain areas that produce new cells. These growth locations are called **meristems**. Meristems are unspecialised cells regardless of where they are on a tree. It is their location that determines what functions they will perform by growing into a new shoot, a leaf, a flower or a root. If pruning removes the meristems the tree can stop growing in that part of the tree.

Tree meristems are found in the trunk, in branches, and in roots:

- In the trunk, l**ateral meristems** are found in a thin layer between the wood and the bark called the **vascular cambium**. The cambium is responsible for the tree trunk and branches to grow in diameter. Cambium cells grow inward to produce wood, and outward to produce bark. Damage the cambium and the tree stops growing in that spot and surrounding tissues form a scar.

  In a tree trunk, new wood cells are called **xylem** (Greek for wood). Xylem carries water and minerals up from the roots to the leaves.

  Old wood in the middle is **heartwood**. Heartwood, while dead, supports the weight of the tree.

  Inner bark cells are called **phloem** (Greek for bark). Phloem carries sugars and other materials to the growth and storage locations of the tree.

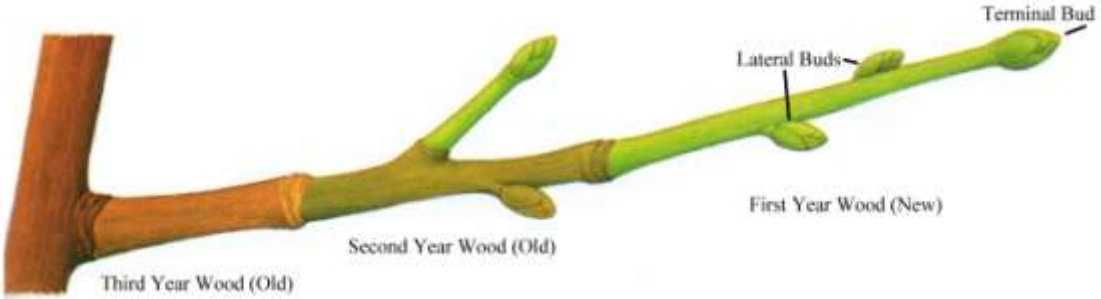
  Tree bark protects a tree from damage. Pruning that removes bark can kill a

tree since it cannot protect itself from high or low temperatures, sun's rays, insects, and bacteria.

- In branch tips are **branch apical meristems** to produce new shoots. Look closely at a branch in the spring to see **buds**. A bud contains meristems that begin to differentiate. They will produce new meristems called primordia. Primordia eventually grow into identifiable parts of a tree; a shoot (bud primordium), a leaf (leaf primordium), a flower (flower primordium), or other bud parts (promeristem).

Branch apical meristems behave in a way called apical dominance. This may be seen in the months or even years after you prune a tree. Apical dominance prevents or inhibits the growth of other meristems. This explains why a conifer tree (less obvious in a deciduous tree) has one main trunk as only the tip of the main trunk has dominant meristems. If the dominant meristem is cut off, one branch tip will assume dominance taking on the appearance of a main trunk. But apical dominance is not perfect as seen by trees that have multiple trunks or bushy growth assuming that this type of growth in not typical of the species of tree.

Apical dominance is a function of the plant hormone auxin. Auxin produced in the apical meristem is transported in the cambium towards the roots. If apical dominance is complete, it stops branches from forming as long as the apical meristem is active. If apical dominance is incomplete, side branches will develop.



Prune to leave a lateral bud close to the end of a cut. This allows those meristems to continue the branch growing in length. Cut off the lateral bud

or if cut off too far away from the end can result in no further growth.

- The tips of tree roots have **root apical meristems**. At the tip of a root is the root cap. The cap protects the root as the root pushes through the soil. The meristems behind the root cap provide the cells to both replace the root cap and for root elongation.

  Root meristems divide and elongate into new lateral roots that branch off the parent root to give a fine web of roots to anchor the tree and search for water and nutrients.

  Root and branch shoots have some differences.
  - Root growth is irregular in diameter and more oval in cross section compared to shoot growth.
  - Roots have more variation in diameter with age than shoot growth.
  - Horizontal growing roots show greater diameter variations when compared to vertical roots.

Tree growth and pruning

Many factors can make the results of pruning somewhat unpredictable, such as:

A tree trunk continually grows in diameter. The trunk will get thicker but a specific point on the trunk will not move higher as seen by a fence wire that has grown into a tree or initials carved into a tree that remain at the same height many years later. If you prune a tree to sculpt it, it may keep that shape but you will also see the trunk continue to become bigger over the years.

Tree height only occurs from apical meristems in the **terminal buds** at the branch tips and not the entire branch. Terminal bud meristem divide, elongate and differentiate to produce new shoots through visible phases that include:
a) the bud opens, b) the leaves emerge and enlarge, and c) the area between the leaves expands (i.e. the stem grows).

In phase b and c above, as leaves develop, a new **bud primordium,** called an **auxiliary** bud or **lateral** bud or **side** bud, forms at the base of each leaf stem. This auxiliary bud can become a branch, but maybe not immediately. It is not dead, it is just dormant. **Dormant buds** in time are buried in the bark. At some point if a branch is cut or broken off, the tree is pruned, or the tree is cut down a new sprout can grow from the dormant buds.

Sometimes buds appear in unexpected places. These are called **adventitious buds** and do not follow the usual tree growth rules very well. Adventitious buds are often the tree's response to an injury, or other changes such as exposure to sunlight when a nearby tree is cut down.

Many nursery grown trees are grafted to root stock having desirable features such as fast growth, few branches, and disease resistance. Thus a tree top and bottom can have different genetics to influence growth and response to pruning.

After pruning, the root system still supplies water and nutrients that can exceed what is required by the pruned tree. Pruning tree roots is difficult unless the tree is a container or bonsai specimen. But most trees eventually make adjustments to this imbalance but that may take several growing seasons. For some trees this can result in an unusual growth spurt, while others run into difficulties as with fewer leaves after pruning it cannot process the excess nutrients the root can deliver.

Tree aging and lifespan

Tree species lifespan cover a wide range. An undisturbed forest lifespan may be: Peach 30 years, Oak 200 years, Cypress 1,600 years, Bristle cone pine 5,000 years. In urban areas lifespan may be reduced to 1/10 as long due to pollution, buildings and concrete that affect its natural source of sun, water and other nutrients.

As a tree ages or is in poor health:

- Growth slows down.
- Becomes more susceptible to diseases and insects.
- Tree tops are more likely to die back.
- Wounds heal more slowly.
- Have fewer leaves relative to its size.
- Have an increased number of dead branches.

How old is that tree or branch? Most tree growth in our northern climate occurs in four seasons. Greatest height and diameter growth is in the spring and summer. Colder seasons have some growth, but much less than in the warmer seasons.

Count the growth rings added each year between the bark and the previous year's wood. Weather patterns influence the size and thickness of growth rings. Spring wood has larger cells with thinner walls so they appear as light-colour rings. Late wood after the spring growth has smaller higher density cells and appear as darker colour rings. For an approximate age either count every ring and divide by 2 or just count every other ring. Age is not exact as:

- Some rings are hard to see; earliest center growths are very small rings and the newest growth can blend in with the bark.
- Injuries may show as distorted rings. External influences such as another tree blocking off sunlight or leaning against the tree will alter the growth ring pattern.

Weather conditions are not typical resulting in growth rings that do not follow the expected light-dark alternating pattern, e.g. a very dry spring and summer show as a thin dark ring blending in with fall/winter growth ring.