

PRUNING TREES

INTRODUCTION:

Keeping trees healthy in an urban setting is not always an easy task.

An urban setting usually presents many more **stressors** than a natural setting.

The right tree in the right place plays an important role in maintaining and ensuring a tree's health.

Proper **selection** (match plant/site requirements) and **planting procedures** are important factors at the beginning of a tree's existence and survival in an urban setting.

Throughout a tree's life, **proper pruning practices** aimed at minimizing this particular kind of stressor, can play an important role in helping a tree not only survive, but thrive, in an urban setting. This is especially important in the early years of growth, when good pruning will ensure proper and strong branch structure and attachment, thus contributing to a strong and healthy mature tree.

I would like to share with you some invaluable information on proper pruning of trees; information that has revolutionized how we prune (or should prune) trees.

Many changes have occurred in the practice of pruning trees over the last decade.

Studies by **Dr. Alex Shigo**, USDA Forest Service plant pathologist; extensive work on pruning trees and reaction to pruning;

According to Shigo, **pruning brings together science, art, and common sense**;

- science** gives us **knowledge** and **information** about trees.

- art** is the **skill** or **ability** to apply the science and bring about desired results.

- common sense** is needed in the use of good judgement and remembering the results so we can repeat the good things and avoid the bad ones.

Questions about pruning: how, how much, what, when, and how often.

First learn how trees are structured and how they function - their **physiology**.

Then we can learn how they **react to pruning or defend** themselves in the face of an injury, of which pruning is one.

PHYSIOLOGY AND STRUCTURE:

Branch structure; strongly attached vs. weakly attached branches

- **branch bark ridge; included bark**

- **branch collar**

- protection zone**

REACTION TO PRUNING (WOUNDING):

Pruning is an injury, and trees can't run away from attacks, they have to stand their ground and cope as best they can.

They have evolved by responding to injury by **isolating** the damage. Trees do not "heal" as humans do. They isolate the injury by a process called "**compartmentalization**".

If branches are pruned properly, and the tree is healthy and vigorous, pathogens will seldom spread into the tree; if branches are pruned improperly, no dressing will keep pathogens out.

When wounded, a tree **activates living cells** in the vicinity of the wound; the cells store oils, starches, and other materials that are converted into compounds that coalesce around the wound, forming boundaries that restrict the spread of invading organisms. The isolated wound then dies. It is never regenerated; **therefore it doesn't heal**.

WHAT TO PRUNE AND HOW TO PRUNE:

Do not prune back branches of newly-planted trees; the belief that trees should be pruned when planted to compensate for root loss is misguided; pruning at this time should be limited to corrective pruning, i.e. removal of torn or broken branches.

Do not prune too much, especially in older trees; pruning causes a reaction in the roots; some roots die as a result of pruning branches; if large branches are removed, large sections of the root system die off, which could start a decline in the tree's health because of root rot;

Do not tip or top branches and trees; this results in growth spurts with the formation of lots of sprouts that are weakly attached; could also result in root problems.

Establish a strong **scaffold structure** of branches when a tree is young (tree framework); this will avoid future problems;

Goal of pruning young trees: establish a strong trunk with sturdy, well-spaced branches.

Good pruning techniques **remove structurally weak branches** while maintaining the natural form of the tree.

Trunk development: strong, tapered trunk - leave small lateral branches;

Co-dominant stems can lead to structural weaknesses; beware of included bark in co-dominant stems;

Branch selection along trunk for permanent branches, i.e. height of branches;

How to cut a branch:

- respect the branch collar
- branch bark ridge
- natural target pruning
- included bark

Do not scribe* a wound or pruned branch; let the tree select its own boundaries, then cut away or remove dead material.

Reaction after pruning: properly cut branch vs. improperly cut; proper formation of wound wood all around the pruning cut.

Wound dressings: avoid them; not necessary; may even contribute to proliferation of disease organisms; the tree's own natural defence mechanism closes and protects pruning cuts more effectively than any wound dressing.

WHEN TO PRUNE:

To understand when to prune trees, we have to look at **tree phenology** - the **five stages of growth** that occur during the year.

1. Onset of growth: non-woody roots and **mycorrhizae** begin absorbing water and elements from the soil. This is very early, often when there is still snow on the ground. It is **driven by reserve energy** produced the year before.

2. The formation of leaves and needles: generated by reserve energy from the previous year. Here energy reserves begin to drop as the tree uses them up.

3. The formation of wood and inner bark: branch wood forms first once leaves have opened and trunk wood forms after the branch wood. The xylem and phloem are **formed by photosynthates produced by leaves that have just formed.** Energy reserves begin building up again.

4. Storage of energy: as the growth period nears its end, starch and fats are being stored in living cells in the sapwood. Non-woody roots begin shedding at the end of this period.

5. Dormancy: leaves are shed as well as non-woody roots at the beginning. New non-woody roots are formed simultaneously as old ones are shed. Growth of non-woody roots slows or stops in the middle of this period depending on how cold the weather is. Roots resume growth at the end of this period. **Growth is driven by energy reserves.**

Reserves begin declining at the onset of growth and are at their lowest until the leaves have formed and begin photosynthesizing and storing energy again.

The **best time to prune** is when energy reserves are high because pruning requires energy to **isolate** and **compartmentalize** and **mobilize compounds** to prevent infections. Therefore prune during dormancy or after the leaves have formed. For some species that form many suckers or watersprouts as a reaction to dormant season pruning, i.e., crabapples, it is better to prune after the leaves have formed, before they store too much energy for next year's growth;

***Scribing** was done in the past to give a trunk wound a uniform "form", i.e., by stripping away bark and tissue with a knife to give it a shape like a vertical eye. It was believed this helped the wound to close better and faster; however, this has been disproven and now it is recommended to simply leave the tissue alone and the tree will "heal" itself.

Avoid pruning when energy reserves are low, typically when reserves are dwindling as they fuel new growth; pruning at this time would take energy away from growth; pruning is best done before growth begins, or at the very most, when leaves are just coming out and still relatively small; **avoid fall pruning** (even though energy reserves are typically high after storage from the growing season) because of the **increased risks of infections** by pathogens due to ideal weather conditions for germination of disease spores, etc.; pruning can be done during mid to late summer, when energy reserves have accumulated from photosynthesis.

NOTE: late winter to early spring pruning is usually considered the best time as it allows more time for the tree to react to the pruning wound, i.e. isolate and close off the wound, and form callus or woundwood, before dormancy sets in. Fall pruning only provides for a short period of time to form woundwood.

Do not prune during periods of stress - i.e., drought or severe insect attack. Wait a year or two for tree to regain energies.

Young trees vs. old trees: young trees are generally more vigorous than old trees and recover more quickly from pruning.