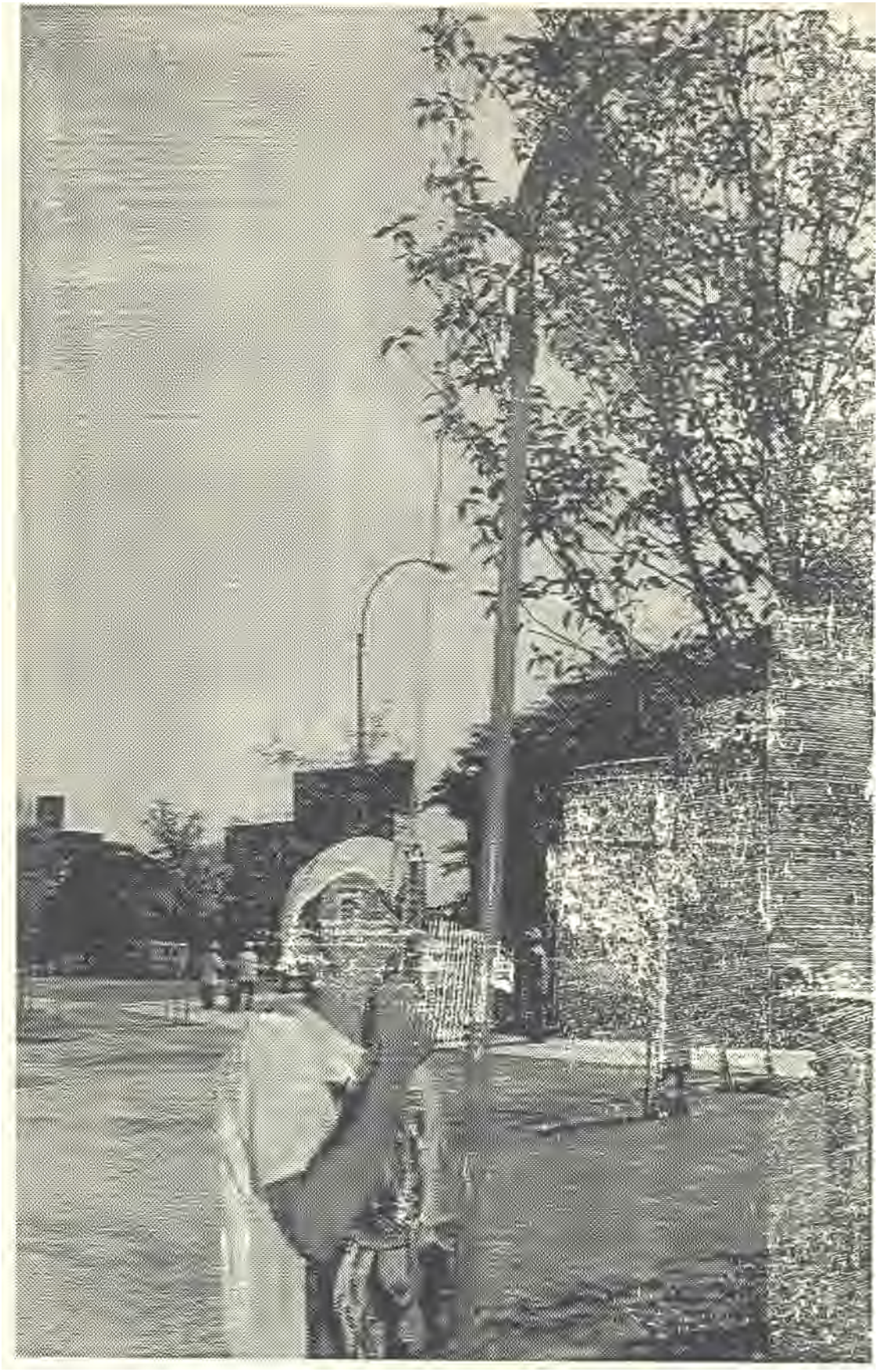

# Street Tree Care Manual

# TREES NEW YORK
# Young Citizen Pruner

# TREES NEW YORK

# YOUNG CITIZEN PRUNER

# STREET TREE CARE MANUAL


***TREES NEW YORK***

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# THE PURPOSE OF THIS COURSE

Street trees enhance the quality of urban life by improving our environment, both physically and aesthetically. Moreover, a street tree is the only representative of nature to many city dwellers, and thus helps them identify with such issues as habitat loss, destruction of the world's rain forests, and the greenhouse effect.

Unfortunately, having to exist on New York City's streets greatly diminishes the life span of a tree. The first few years of a street tree's life, after planting, are the most critical and will go a long way towards determining its longevity. With a modest amount of care most of these trees will not only get through this tough period but will actually thrive. In this course, you will learn:

- Why street trees are important, and the stresses placed on them.
- What are the basic structures and functions of a tree.
- How to identify the different kinds of trees commonly grown on the streets of New York City.
- What are the many problems facing street trees and how to spot these problems.
- What you can do to correct these problems when caring for a street tree.

By learning these things, you will be able to pass the certification exam and become a Citizen Pruner. As a Citizen Pruner, you will be well equipped to help protect our City's street trees. By protecting our City's street trees, you will provide a great service to our community. And so, on behalf of the community, we thank you.

# Session One
# STREET TREE BASICS

## WHY STREET TREES ARE ESSENTIAL

Trees are an essential part of making life in the city more tolerable. Some of the benefits attributed to trees include:

- Trees add beauty and character to any city.
- They soften the harshness and angular look of city streets.
- Trees, like all green plants, use carbon dioxide and convert and release life-giving oxygen. This consumption of carbon dioxide helps reduce global warming caused by the "Greenhouse Effect". The carbon is used to create wood and other plant tissues, thereby sequestering carbon for long periods.
- Trees help clean the air by trapping dirt, grit, and dust, and by absorbing other pollutants.
- Trees act as sound barriers when planted on mounds, thereby reducing irritating and harmful noise.
- Trees can screen unpleasant views.
- Carefully located deciduous trees can save energy by cooling buildings in the summer and allowing solar heating in the winter. A home on a tree-lined street can save $15 a month on air conditioning costs.
- Trees can increase the attractiveness of a home and increase property values by up to 20%.
- Trees increase pride in the local community.
- Trees are the only representative of nature to many city dwellers.

## TREES AS LIVING PARTNERS IN THE CITY

Examine your attitude toward the trees in your neighborhood. Do you consider them street furniture or living things which, like you, deserve to live and thrive?

Like you, street trees are city dwellers that have to cope with the stresses of the urban environment day in and day out, year after year. Trees are true survivors of city life.

And consider this: Trees are not "primitive" life forms. In many ways they are as "advanced" as you or I. Consider the tree's ability to create food from light, water and simple nutrients. Some of the tree's structures and functions are still objects of intense scientific investigation to unlock their mysteries.

## WHAT MAKES LIFE DIFFICULT FOR URBAN TREES

Unlike their forest counterparts, street trees must contend with any number of the many damaging or life threatening conditions that are specific to the urban environment (Figure 1.1). These can include:

- Air pollutants, such as dust, smoke, ozone, sulfurous and nitrous oxides.
- Extremely limited rooting space, caused by buried rubble, underground pipes and utilities, bad soil conditions outside of the tree pit. A small volume of soil stores little water to support a tree during drought.
- Paved surfaces, which reduce the movement of water and air into the root zone.
- Poor soil conditions bearing little or no resemblance to those found in nature, such as:
  - Soil compaction, which limits air and water needed by roots.
  - Lack of organic matter and low fertility.
  - Disrupted soil structure, which can adversely affect water drainage through the soil.
- High alkalinity (high pH) from buried mortar and rubble - in alkaline soils, essential nutrients like iron, manganese, and zinc are "locked up" by the soil, making it harder for plant roots to extract them.

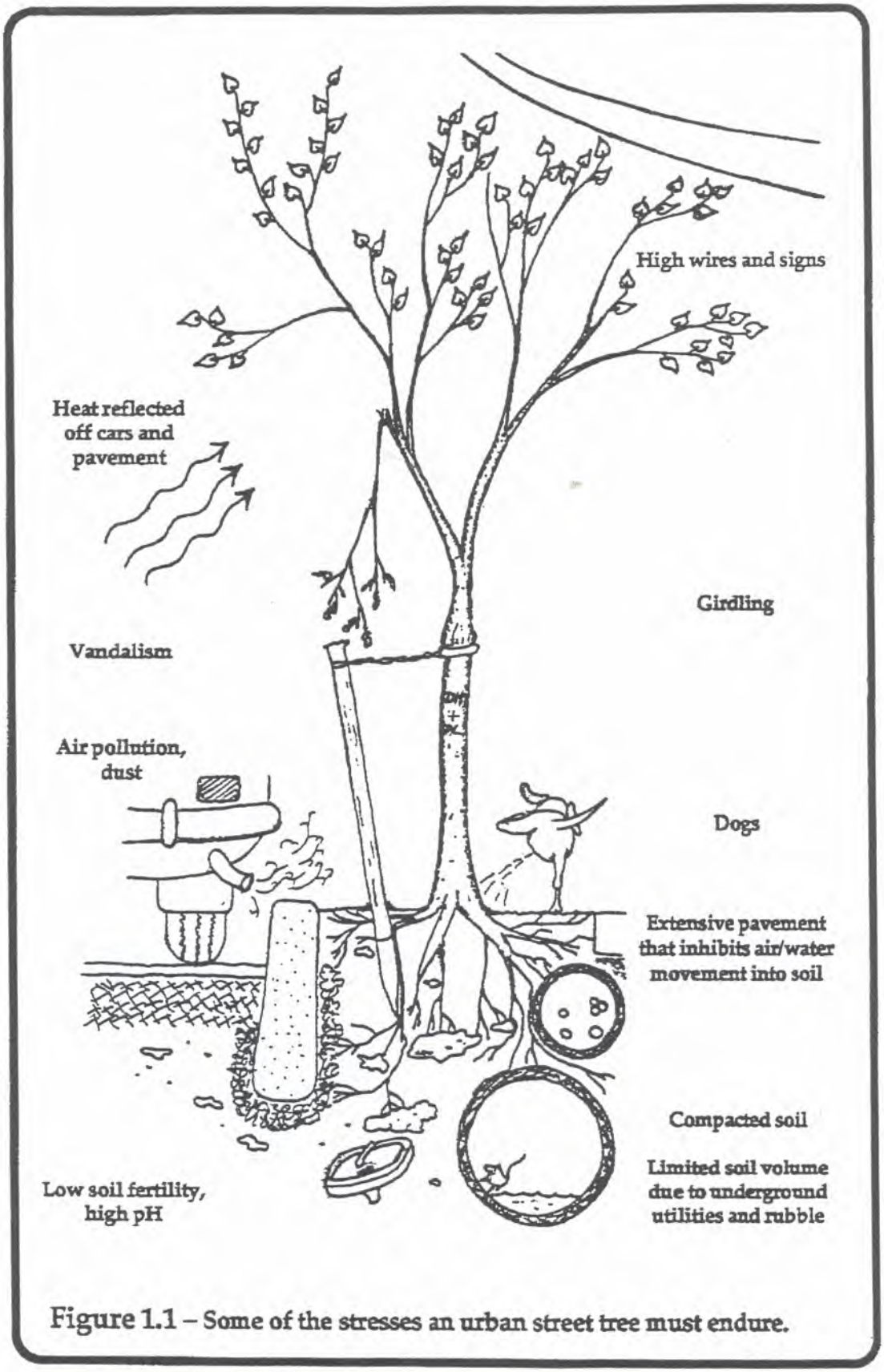



**Figure 1.1** – Some of the stresses an urban street tree must endure.

- Soil contamination from:

  Salt and other deicing chemicals which can kill both by the direct toxic effect of the salt as well as by the indirect effect of causing water stress within the plant tissues themselves.

  Waste petroleum products, such as oil and gasoline, in runoff from streets and parking lots, are very toxic to trees.

  Dog waste is toxic because it is too concentrated and excessive and therefore is not a good fertilizer.

  Bleach, ammonia, and other cleansers coming from store owners who clean their sidewalks, is very damaging.

  Other substances routinely disposed of in tree pits by unknowing or uncaring citizens.

- Frequent drought.

- Poor drainage, which prevents oxygen from getting down to the roots.

- Physical damage from:

  Vandalism.

  Car doors and bumpers.

  Trucks and buses.

  Girdling from:
  Christmas lights left wrapped around trunk and branches.
  Lawnmowers bashing into the trunk.

  Intentional girdling by people who do not like trees.

  Construction.

  Improper pruning practices.

Unlike forest trees, street trees do not enjoy the protection trees in a forest stand afford one another. This makes the street tree more susceptible to:

- Heat reflected off sidewalks, buildings, and cars - this exacerbates drought and can cause sun scald of the bark and leaves.
- Harsh winter conditions (cold, drying winds, excessive ice and snow loads).
- Storm damage.

If this were not enough, urban trees must also contend with the conventional insect and disease pests. In fact, the stresses of the urban environment may weaken street trees to the point where they are more susceptible to insects and diseases.

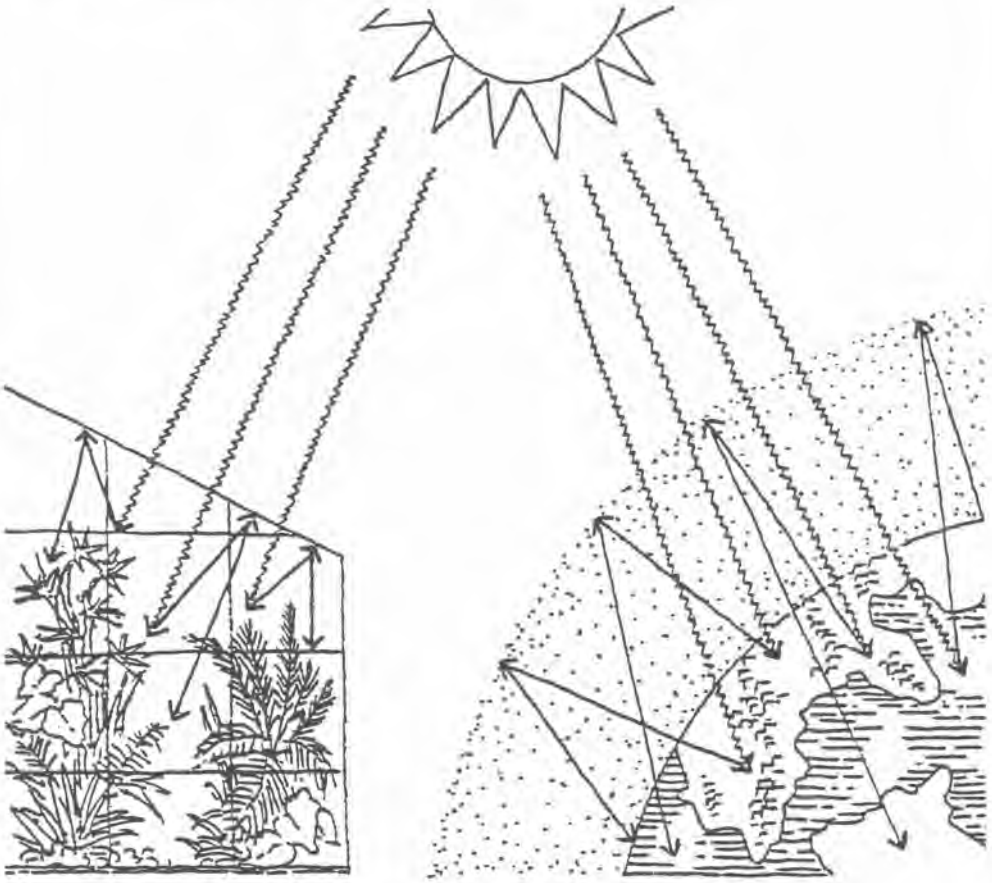
## THE NEED FOR CITIZEN PRUNERS

It has been said that it takes five years to plant a tree - one hour to actually plant the tree and the remainder to ensure that the tree establishes itself properly. The NYC Department of Parks and Recreation is responsible for the preservation, protection, and maintenance of all the city's street trees, but harsh economic realities have severely limited the Department's ability to provide such attention to young trees.It is the young and especially the newly-planted street trees that have the highest mortality rates by far. As a result, street trees desperately need help. The need for well-trained Citizen Pruners is therefore immense. In many cases, committed volunteers are a tree's only hope for survival.

A little attention can make a huge difference. Pruning dead or broken branches, watering during dry periods, cultivating the soil, and fertilizing are simple activities anyone can do. By addressing these most basic needs during the early years of a new tree's life, the odds that a tree will survive and thrive are greatly increased.

Of course, not all tree problems can be addressed by citizen pruners. Large trees that are damaged or dead and require professional care should be reported to the appropriate borough forestry office (the telephone numbers are listed in the beginning of the sixth session). Reports should be made by telephone and followed up in writing.

## SPECIAL TOPIC - The Greenhouse Effect



**The Greenhouse Effect** is the phenomenon where the earth's climate is gradually warming due to the trapping of solar radiation by excess amounts of carbon dioxide and other gases produced by burning fossil fuels like gasoline, coal, and natural gas. Molecules of carbon dioxide absorb light energy and convert it into heat energy. Global warming can have disastrous effects. Regional climatic changes will occur such as the desertification of the United States' Great Plains, a major food-producing region of the world. Furthermore, the raising of the earth average temperature by just a few degrees will lead to the partial melting of the polar ice caps thereby raising the sea level. Permanant flooding of the earth's low-lying coastal areas, such as Florida, and numerous cities (including New York City) will result. By burning less fossil fuels and planting more trees to help "scrub out" carbon dioxide from the atmosphere, we can reduce global warming. Urban trees curb global warming not only by absorbing carbon dioxide but also by moderating the temperature around buildings, thereby reducing the amount of fossil fuel-produced energy used for heating and air conditioning.

## REFERENCE BOOKS ON TREES

There are many books written about trees regarding identification, culture, pests and diseases, etc. There is a list of recommended books in Appendix I. Take a look at these books in your public library when you get a chance

## ADDITIONAL DEFINITIONS

**Arboriculture.** The scientific cultivation and maintenance of trees and shrubs. From the Latin "arbor" meaning tree and "coitus" meaning care or cultivation.

**Horticulture.** The art and science of growing trees, shrubs, flowers, fruits, and vegetables. From Latin "hortus" meaning garden and 'coitus" meaning care.

**Pruning.** The removal of living or dead parts of a plant, especially branches, to reduce size, maintain shape or health, induce flowering or regulate growth.

**Street tree.** A tree planted within NYC's right-of-way usually within 6-10 feet of the curb. This does not include trees planted in front lawns, parks, or other green-spaces. The environment of a true street tree is considerably harsher than that of a lawn tree.

**Tree.** A woddy, perennial plant that is usually tall (at least 15 feet), single-stemmed, and long-lived. A shrub is similar to a tree, except that it is ususally multi stemmed and less than 15 feet tall.

## SELF-HELP QUIZ 1

This will not be graded. It is a self help device. Mark the correct answers and bring it to the next class - we will review it at that time.

1. "Arboriculture" means:

   a. The training of vines to grow on an arbor.
   b. Different things in different languages.
   c. Plant Care.
   d. Tree Care.

2. According to one source, the average newly planted street tree lives:

a. 7years.
b. 17 years.
c. 70 years.
d. 700 years

3. Which of the following is *not* one of the primary causes of damage to street trees?

a. Heat reflected from nearby sidewalks and buildings.
b. Frequent drought conditions.
c. Vibrations from underground subways.
d. Soil compaction.

4. "Dog products" are beneficial to trees since they are good fertilizer.

a. True.
b. False.

5. Trees can be distinguished from shrubs in what way?

a. Shrubs flower but trees do not.
b. Shrubs are usually smaller than trees and usually lack a single upright stem.
c. Shrubs are annuals; trees are perennials.
d. In the western hemisphere "shrubs" are called "trees".

6. Which is *not* a reason why we prune trees?

a. To maintain shape and health.
b. To reduce size.
c. To regulate growth.
d. To provide an endless supply of firewood.

7. What city agency is responsible for preserving, protecting, and maintaining New York's street trees.?

a. The Department of Transportation.
b. The Department of Environmental Protection.
c. The Department of Parks and Recreation.
d. The Ministry of Street Vegetation.

8. Using Appendix I, which book could you use to find out more about pruning a tree?

   a. The Joy of Cooking.
   b. Trees for American Gardens.
   c. Manual of Woody Landscape Plants.
   d. Tree Maintainance.

9. Citizen Pruners are:

   a. Empowered by the New York City Department of Parks and Recreation to prune and care for the City's street trees.
   b. The only hope for many of the City's street trees.
   c. Needed more than ever.
   d. All of the above.

**Fill in the Blank.**

10. Name five things that street trees do for us.

   **a.**
   **b.**
   **c.**
   d.
   e.

11. The Greenhouse Effect is:

# Session Two
# BASIC TREE BIOLOGY

To fully understand how to care for a tree, one needs a fundamental understanding of the basic biology of a tree. **Biology** is the study of living things and in this session, we will learn about a tree's basic requirements for life as well as it's structure and function.

Like all plants, trees have basic requirements which allow them to live and grow. They are:

- **Light**, the energy harvested by the photosynthetic process to make food.
- **Air**, or more specifically, carbon dioxide (used as a building block to make food) and oxygen (used by the plant to metabolize food reserves).
- **Water**, essential in photosynthesis, all metabolic processes, intraplant movement of food and nutrients, and for cooling.
- **Basic nutrients** required by the plant to conduct its metabolic activities. Such nutrients include nitrogen, phosphorus, potassium, calcium, sulfur, magnesium, manganese, copper, iron, zinc, and others.
- **A nominal temperature** to allow its metabolic processes to occur.

A plant not only must be supplied with all these things but must be supplied with them in the right amounts for growth.

A tree consists of three main parts: the roots, the trunk and branches, and the leaves (Figure 2.1). Each is an indispensible link in the health and survival of a tree - damaging any one can seriously weaken or even kill a tree!

## ROOTS

The part of the tree that anchors the tree into the ground, absorbs water and nutrients from the soil, and stores food reserves. Roots have both xylem and phloem tissues (as defined on the following page).

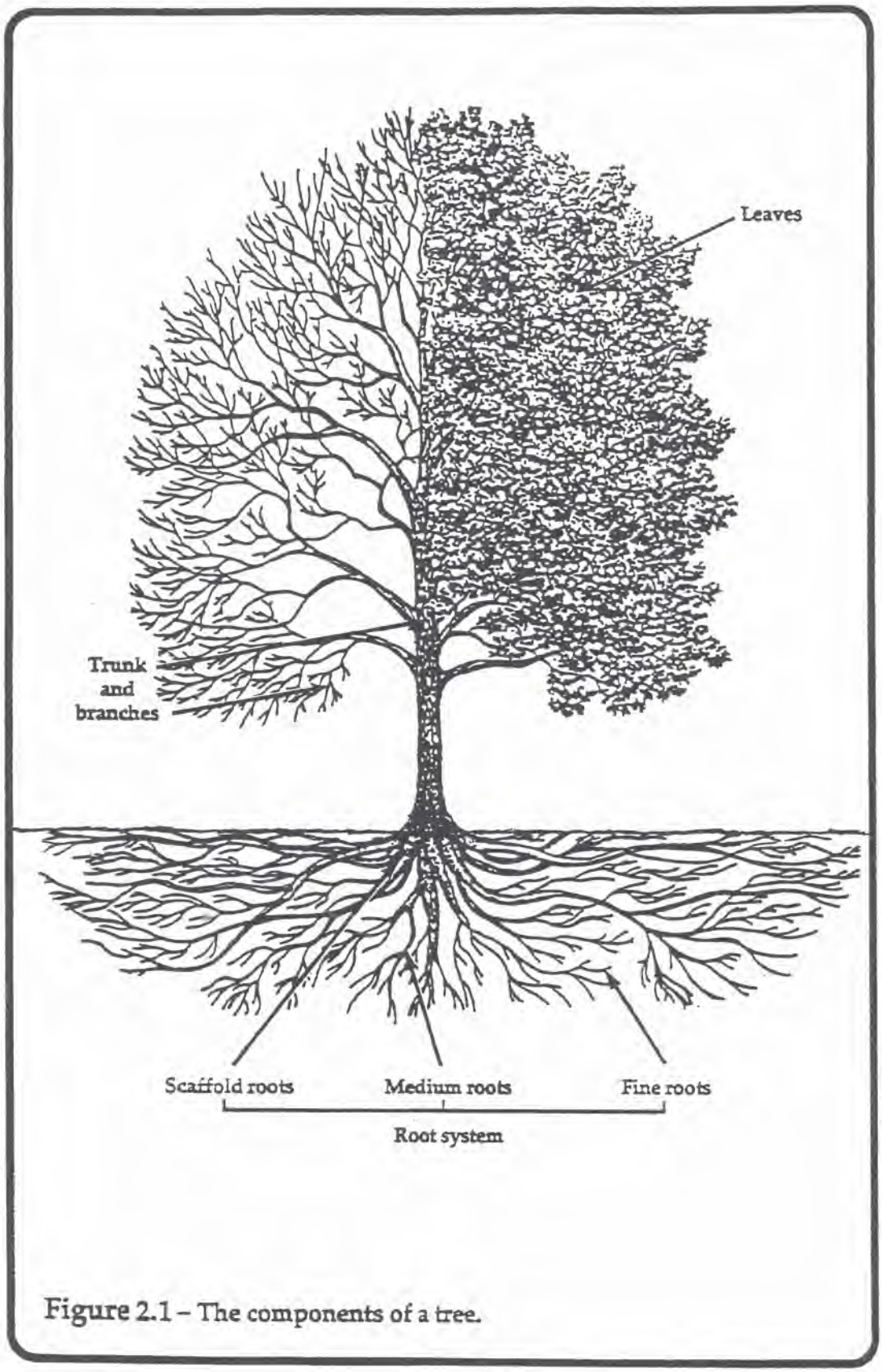



Figure 2.1 – The components of a tree.

Roots require not only water but also oxygen, which diffuses from the atmosphere into the soil. It is for this reason that for most species, most of a tree's roots occur within the top three feet of the soil and most of these occur within the top several inches. In compacted soils, extremely little water and oxygen can move into the soil to sustain the roots. Flooded soils contain no oxygen for the roots. This can cause root death, leading to decline or, if severe, death of the entire tree. Moreover, in compacted soil roots have a much more difficult time growing through and extracting water from the soil. The combination of compacted soil, a restricted volume of soil for the root system, and extensive pavement placed on top of a tree's root system can create drought-like conditions for the tree *even when there is plenty of rainfall.*

The root system is composed of three kinds of roots (Figure 2.1):

A. Scaffold Roots: These are woody roots that are larger than 1 inch in diameter which support the tree's weight. Some young trees have a large central root straight down called a taproot.

B. Medium Roots: These are woody and are thinner than 1 inch but thicker than a pencil in diameter.

C. Fine Mats: These are thinner than a pencil in thickness and may or may not be woody.

Both the scaffold roots and the medium roots support and anchor the tree. They do not absorb water from the soil, but they do conduct water from the fine roots to the trunk. Absorption of water and nutrients takes place **only** at the non-woody tips of fine roots through microscopic filaments called root hairs.

Basic nutrients are absorbed from the soil and transported to the leaves to help in the manufacture of food by photosynthesis. This food is needed by the roots to live and must be transported down the stem via the phloem to the roots.

## TRUNK AND BRANCHES

The support and superstructure of a tree, the trunk and branches also serve to transport water, nutrients, photosynthetic products (food), and other materials throughout the tree. Viewed in cross section, it can be seen that a tree trunk consists of several sections (Figure 2.2):

A. Bark: The outer protective covering., consisting of several layers of waterproof cork cells. Bark thickness and appearance varies depending on the tree species and can serve as a method of tree identification. The bark serves to protect the tree from invading insect and disease pests, physical injury, and the loss of water from living tissues underneath. The cork cells originate from a single layer of cells called the cork cambium.

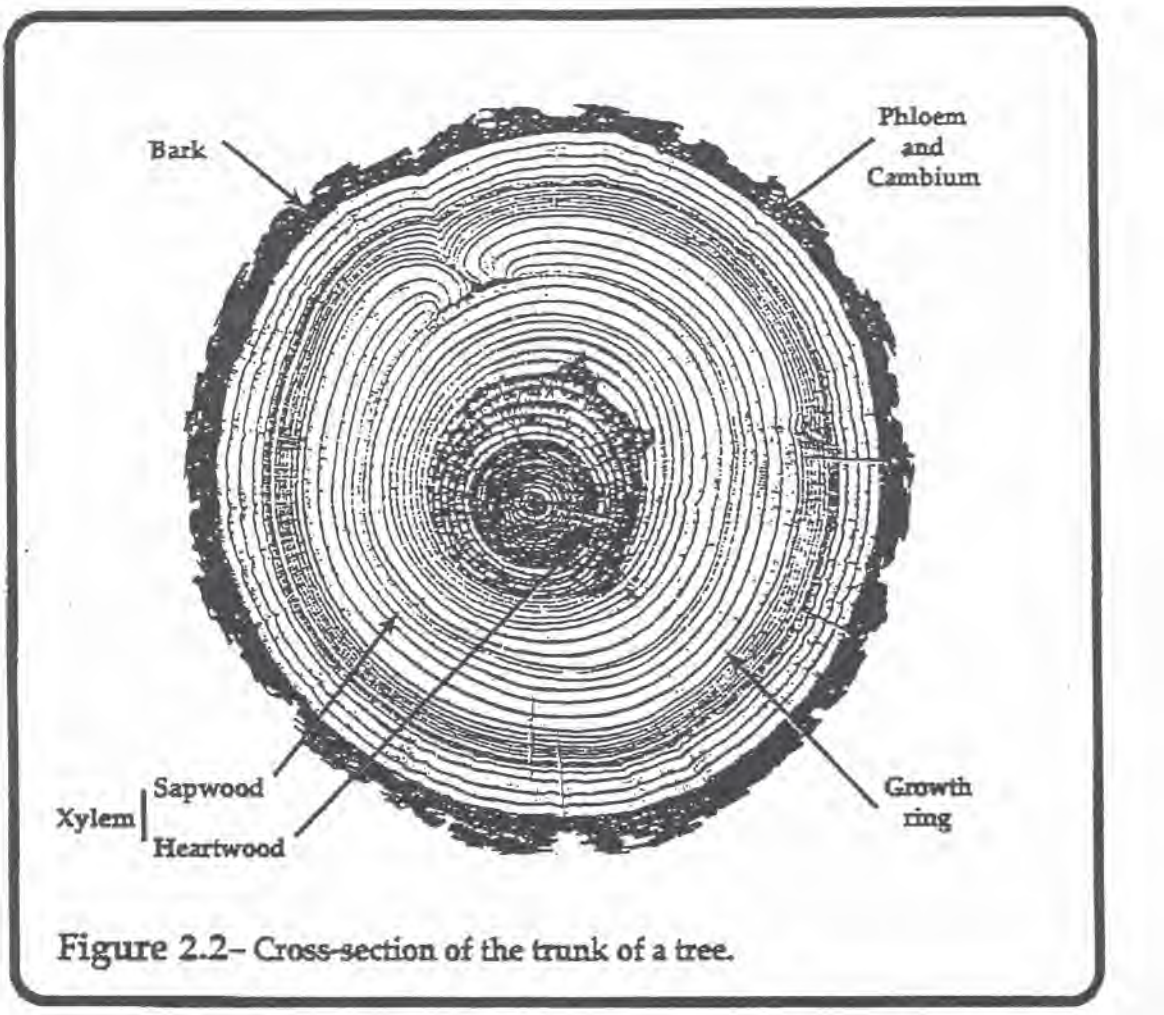



Figure 2.2– Cross-section of the trunk of a tree.

B. Phloem: A thin layer of living, loosely packed cells that transports food from the leaves to the rest of the tree.

C. Cambium: A single layer of cells that divide and differentiate, forming the phloem to the outside and xylem to the inside. It is the cambium that is responsible for a tree's annual increase in the diameter of its trunk. If the cambium is killed, the tree cannot make more xylem and phloem and will eventually die. In addition, the cambium and the cork cambium are responsible for creating tissue that forms a callus over a wound.

D. Xylem: Making up most of the tree trunk, the xylem serves both to support the tree's canopy of leaves and to conduct water and basic nutrients upward. Sapwood is the outer portion containing both living and dead cells. It transports water and nutrients upwards from the roots and acts as storage for food. The inner portion, or heartwood, does not conduct water and nutrients. Heartwood is usually darker than sapwood and consists only of dead cells. Both sapwood and heartwood provide mechanical support and possess de-

fence mechanisms against diseases. The proportion of sapwood to heartwood varies, with some tree species exhibiting little or no heartwood. With close examination, it becomes evident that wood is composed of many growth increments. These increments are apparent because xylem cells formed in the spring are larger in size and lighter in color than those formed in the summer. Thick-walled cells form late in the yearly growing cycle thus marking the growth rate for the entire year and giving a "ring" appearance. Because one growth increment is produced each year, the exact age of the tree can be determined by counting the increments in the wood of its trunk. The tree whose trunk is pictured in Figure 2.2 is about 60 years old.

## LEAVES

A tree's food factory, the leaf is where photosynthesis, transpiration, and the exchange of gases take place. Leaves have veins that contain both xylem and phloem to transport water, basic nutrients, and food to and from the leaf.

The leaf is one of the most variable organs from species to species, ranging in shape from needles and scales to feather-like structures and varying in size from less than 1/8 of an inch to more than 10 feet long.

A leaf is composed of a flat blade and a leafstalk (petiole) that is attached to the twig. The leaves of most tree species are in one piece and are therefore defined as dimple. Compound leaves have blades that are divided into two or more leaflets. The point at which the petiole (leafstalk) is attached to the twig is called the node. To determine whether the leaf is simple or compound, go down to the node, i.e. follow the leaf from it's tip toward the tree until you come to a woody stem. There will be a bud at the node, in the fork (axil) where the base of the petiole is joined to the twig. Leaves have buds in their arils, whereas leaflets never do. (For a brief period in late spring, immediately after the leaf has expanded, the bud will not be apparent.) Also, if you break off a leaf at the node, a distinct scar will be evident on the twig, but a clear mark will not be left if you pull a leaflet off it's stalk (rachis).

Photosynthesis is the process by which a tree utilizes the energy from sunlight to create sugars from carbon dioxide, water, and nutrients. Chlorophyll, the green pigment in leaves, is the catalyst making it possible for this reaction to occur. A by-product of this photosynthetic process is oxygen which is essential to animal life (including us) on this planet.

Each leaf has numerous pores, or stomates, located on a leaf's underside surface. It is through these pores that the exchange of gases takes place as well as the process of transpiration. During this gas exchange, carbon dioxide is absorbed into the plant through these pores and oxygen is released back into the atmosphere (Figure 2.3).

Transpiration is the process by which free water in a tree is released as vapor into the atmosphere. It is this movement of water from the leaves that literally pulls a chain

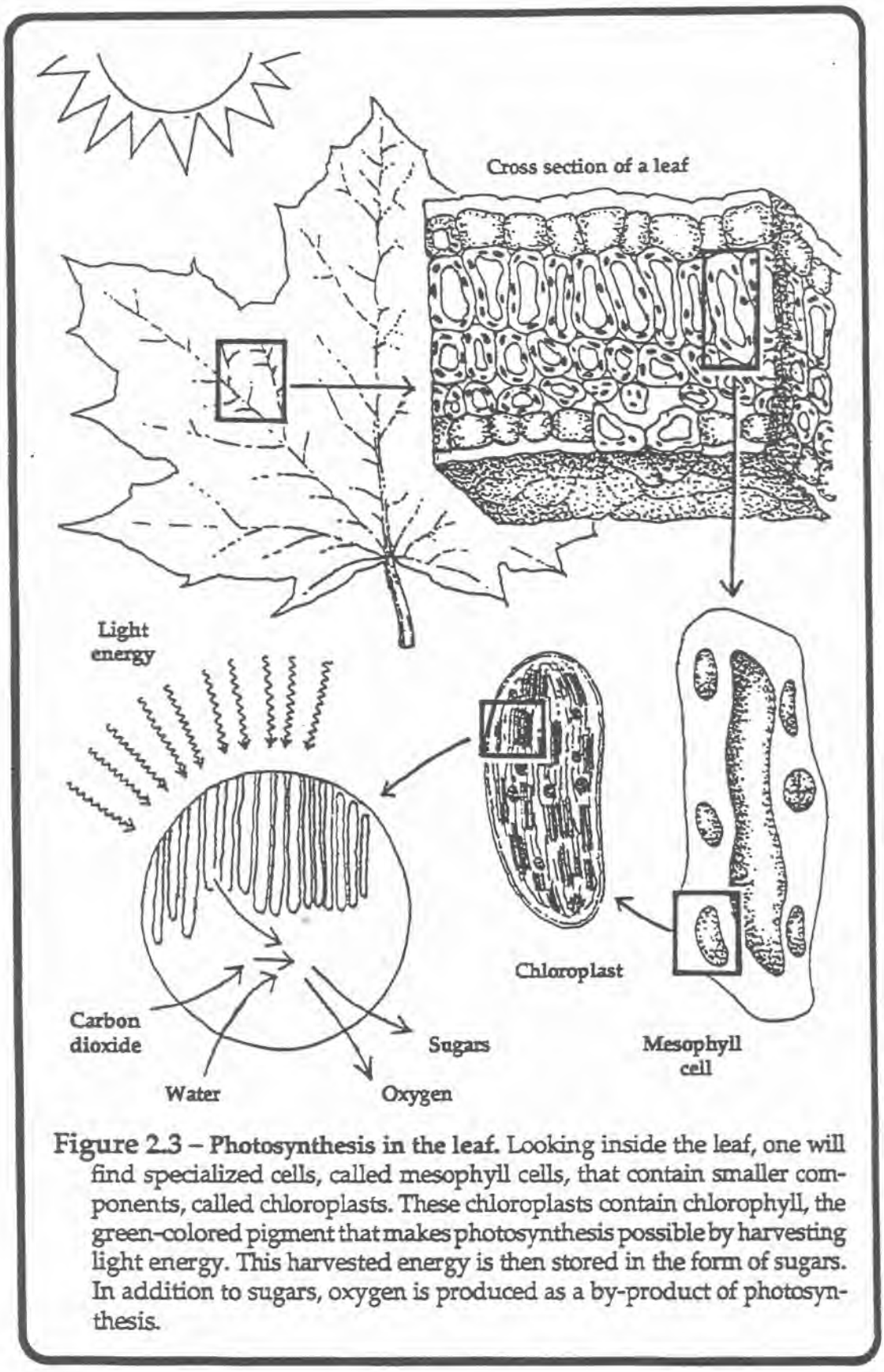



**Figure 2.3 – Photosynthesis in the leaf.** Looking inside the leaf, one will find specialized cells, called mesophyll cells, that contain smaller components, called chloroplasts. These chloroplasts contain chlorophyll, the green-colored pigment that makes photosynthesis possible by harvesting light energy. This harvested energy is then stored in the form of sugars. In addition to sugars, oxygen is produced as a by-product of photosynthesis.

of water molecules up from the soil through the roots up the stem and into the leaves. The stomates control the rate at which water is lost by opening and closing in response to environmental conditions.

## THE LIFE CYCLE OF A TREE

As with all living things, trees and other plants go through a cycle of growth, development and reproduction. Figure 2.4 represents the life cycle of a Norway Maple tree. The plant starts out as a tiny embryo encased within a seed. Under the right environmental conditions, the seed will germinate and give rise to a seedling. The seedling increases in size by growing at the very tips of its shoots and the tips of its roots. Its roots, trunk, and branches increase in thickness by tissue created by the cambium.

The plant eventually develops into a mature tree. The mature tree then produces flowers. Bees in search of nectar unknowingly transfer pollen from the male part of the flower (stamen) to the femal part (pistil). Pollination of th flower allows the development of fruit (in this case, a winged samara), each containing a seed. The winged seeds fall from the tree to theground where they will germinate, thus allowing the life cycle of the plant to start over again.

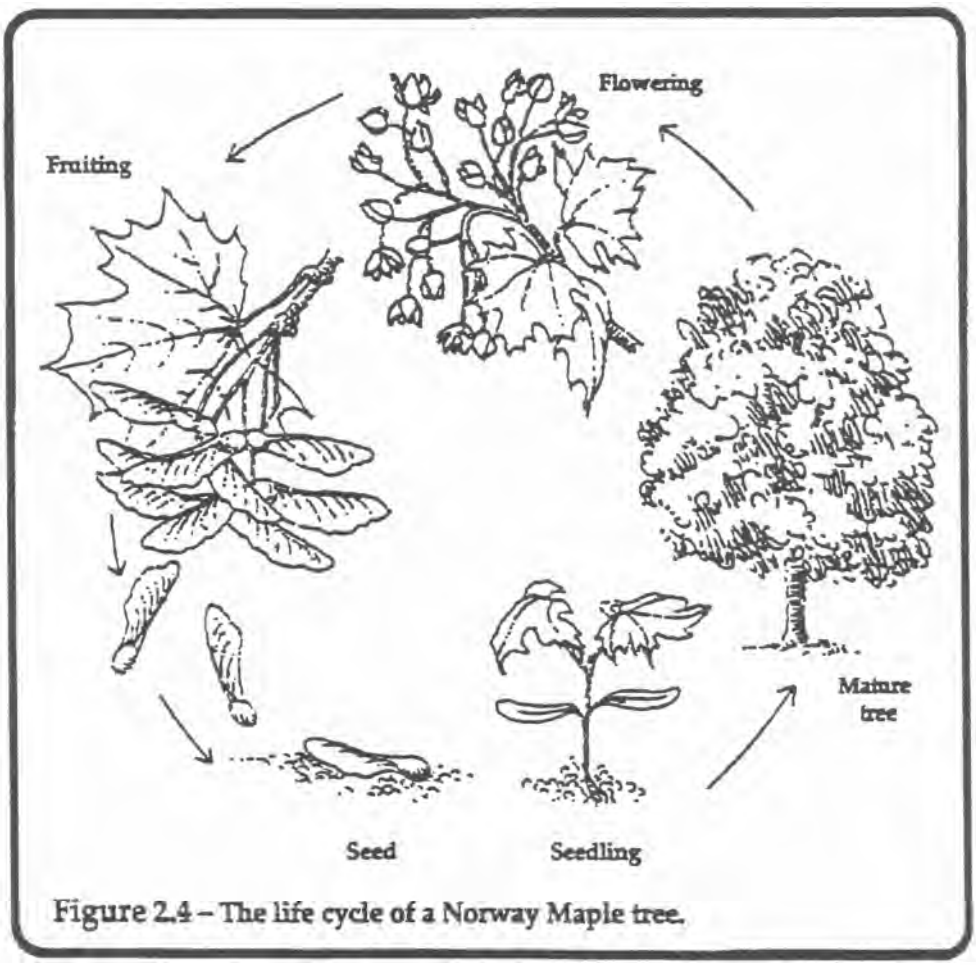



Figure 2.4 – The life cycle of a Norway Maple tree.

## ADDITIONAL DEFINITIONS

**Crown.** A tree's body of leaf-bearing branches.

Habit. Describes the arrangement of a trees's branches; examples, stiffly upright, broadly spreading, horizontal'

## SELF-HELP QUIZ 2

This will not be graded. It is a self-help device. Mark the correct answers and bring it to the next class — we will review it at that time.

1. The horticultural term "habit" refers to:

   a. The pattern of branching of a tree.
   b. What the tree needs to avoid withdrawal.
   c. The tree's flowering cycle.
   d. How the canopy cloaks the tree.

2. Transpiration is:

   a. The sudden act of creative enlightenment.
   b. The exudation of sap from the edges of leaves in the morning.
   c. The release of water vapor from leaves.
   d. A way to get from one place to another.

3. The xylem in the trunk and branches of a tree is:

   a. The layer outside of the cambium which transports food.
   b. The layer inside the cambium which transports water and nutrients.
   c. Composed only of living cells.
   d. The same thing as phloem.

4. Some street trees may succumb to drought even though there has been plenty of rainfall.

   a. True.
   b. False.

10. List the five things that a tree needs to live and grow.

a.
**b.**
**c.**
**d.**
e.

**11.** The three major parts of a tree are the _____, _____, and _____.

**12.** _____ is the study of living things.

# Session Three
# STREET TREE IDENTIFICATION - I

## DESIRABLE STREET TREE FEATURES

No one tree species possesses all these features, but a good street tree should have many of them.

- Cold hardy for the region.
- Tolerant of drought.
- Tolerant of infertile soil.
- Tolerant of salt.
- Resistant to pests and diseases.
- Tolerant of shade.
- Tolerant of street lighting.
- Able to recover quickly from transplanting.
- A consistent, dependable grower.
- Fast growing.
- A crown that provides ample shade.
- Tough, glossy leaves which resist pollutants, wind, and sun scald.
- Free of excessive suckers and watersprouts.
- Free of self-sowing seeds.

- Branching habit and wood strength that resist breakage from ice and high winds.
- Small leaves that will not clog sewer drains when they fall.

Special desirable ornamental characteristics include:

- A crown and habit which harmonize well with their surroundings - neither too large nor too small, neither too broad nor too narrow.
- Attractive flowers.
- Attractive fruit.
- Attractive bark coloration or pattern. However, trees that have peeling bark, are prone to vandalism because the bark can be peeled off, resulting in disfiguration of the tree.

## IDENTIFYING TREES

Identifying a plant is very much like doing a jigsaw puzzle – by putting together all the pieces, you end up with a complete picture. Remember, it is always best to learn at least a few special features for each species.

Here are some clues to what to look for when identifying a tree. Look at diagrams while learning the definitions.

A. Lear and land arrangement: Are the leaves (spring, summer, or fall) or buds (any time of the year) arranged on the branch opposite each other or do they Alternate on the stem? See Figure 3.1.

B. Leaf form: (spring, summer, or fall) Are the leaves Simple or compound (one leaf composed of several leaflets)? If they are compound, how many leaflets are there? Are the leaflets arranged in a pinnate (feather-like) or palmate (all leaflets attached to the leaf stalk at one point) pattern? See Figure 3.2. What is the size and shape pi she leaf DE leaflet? Is the edge (margin) of the leaf or leaflet Smooth (entire) or toothed; lobed or unlobed? Are the leaves covered with hairs

C. Buds and twigs: (any time of the year) What is the color of the buds and twigs? What is the size and shape of the buds? How many bud scales cover each bud? Are the scales overlappi g (imbricate) or joined along the edges (valuate)? Are the buds and/or twigs covered with hairs (pubescent) or not (glabrous)? Do the twigs have lenticels, lines, or are they covered with a waxy bloom?

D. Bark: What color is the bark? Is it smooth or does it have fissures? Is the bark flaking (exfoliating)?

E. Flowers: (useful only during the flowering season). What time of year? What shape, size, color, and number of petals and other flower parts? Are the flowers borne singly or in clusters?

F. Fruit: (useful only when present on the tree or on the ground). Fleshy or dry? What kind: acorn, samara, berry, pome, drupe, pod?

G. Overall plant size, crown shape, and branching habit (any time of the year).

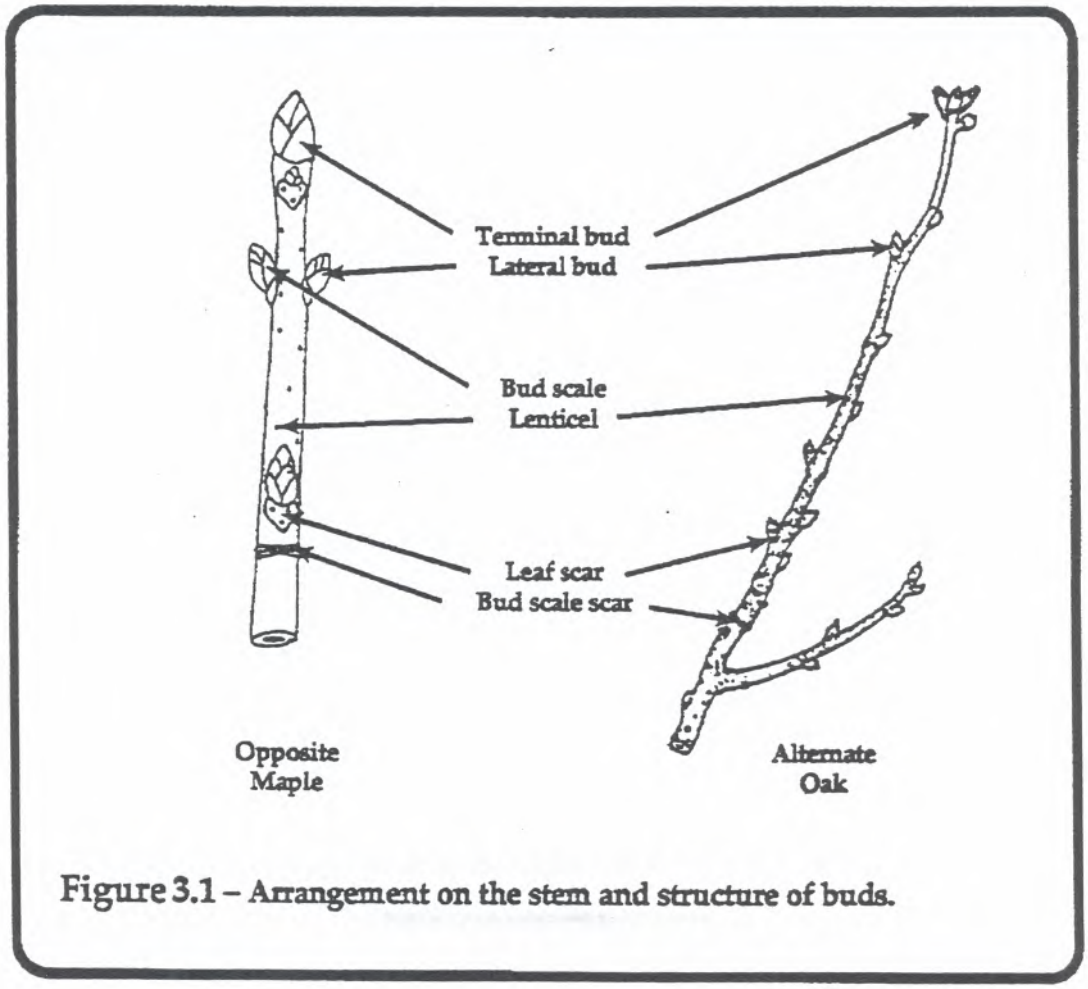



Figure 3.1 – Arrangement on the stem and structure of buds.

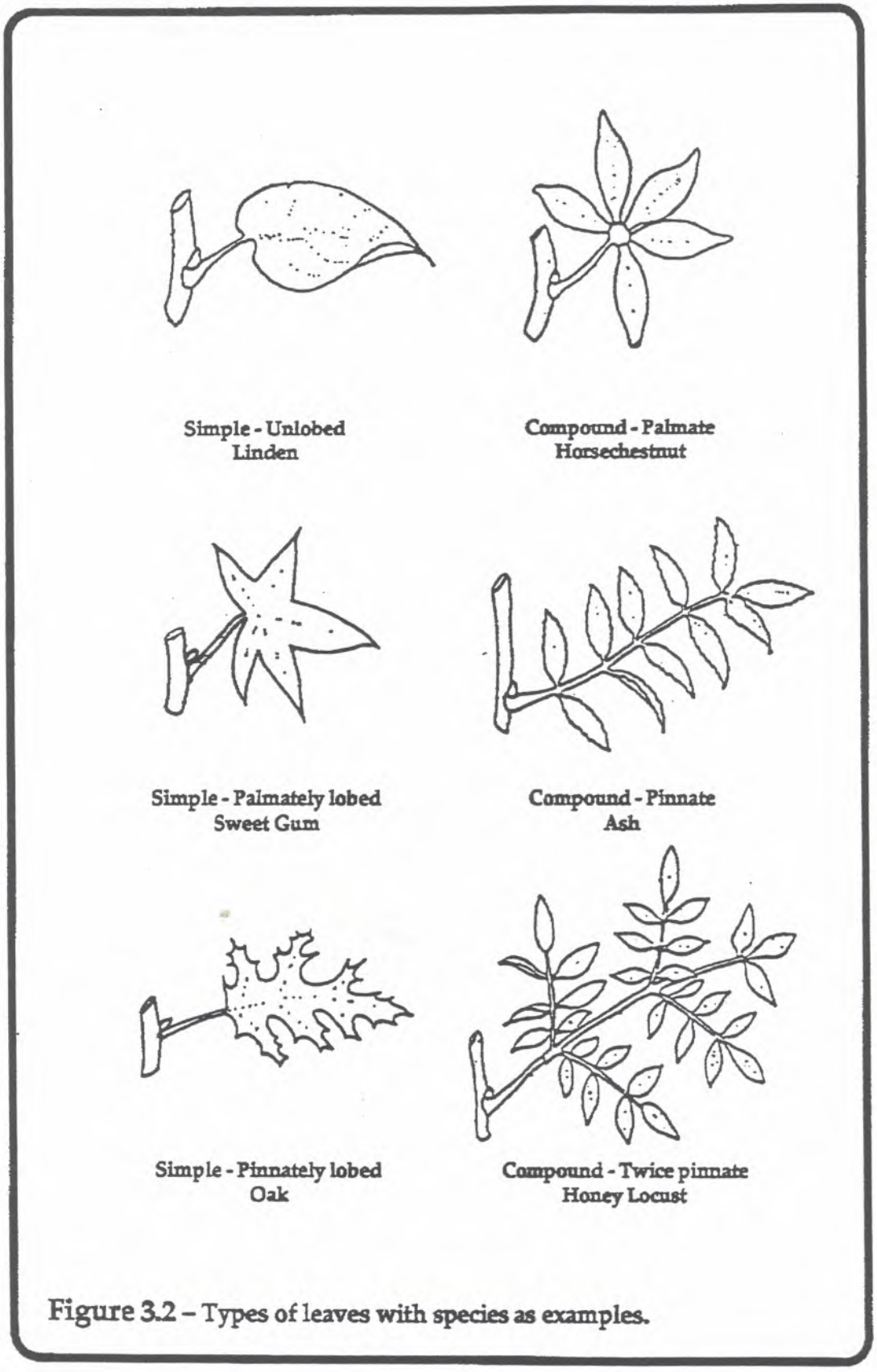



**Figure 3.2** – Types of leaves with species as examples.

# COMMON STREET TREES OF NEW YORK CITY

Listed below are some of the most common street trees used in New York City. Keep in mind that many are not good street trees. However, in the past they were thought to be good trees and were planted in great numbers on the City's streets. Over time, though, problems with them became obvious. For example, *Ulmus americana,* American Elm was the most widely planted street tree until Dutch Elm Disease, a fungal disease imported from Europe, decimated them. Other species are avoided for use as street trees due to certain annoying traits, such as Norway Maples that have surface roots prone to cause excessive damage to sidewalks. We are continually learning which trees are better and advocate planting them.

For each of the 15 tree species listed on the following pages, the scientific (in italics) and common names are given. Clues useful for identification and a description of the tree's size, shape, branching habit, as well as illustrations of an overall view and of leaf, twig, and fruit are also provided. The bar next to the silhouette of each tree represents a height of 6 feet.

For the certification exam, you will be required to:

A. Identify a picture of a leaf for each species.

B. Know either the common or the scientific name of each species spelled correctly.

**C.** Recall noteworthy comments for each species, like good points (e.g., attractive flowers, salt tolerant, etc.), problems (e.g., serious pests, weak wood, etc.), and culture.

To help you learn the trees on the following pages, first memorize the name of each tree. After doing that, associate the illustrations of the leaf, habit, etc. with the name of the corresponding species. Finally, learn the noteworthy information for each species. This is the easiest way of learning tree identification and culture.

Illustrations are from "Street Trees: A Field Handbook" (1990, 1995) by Barbara Schaedler and T'NY/NYCSTC, "Landscape Plants for Eastern North America" (1983) by Harrison Flint from John Wiley & Sons, Inc., "City of Trees" (1981) by Melanie Choukas-Bradley and Polly Alexander from Acropolis Books Ltd., Dr. Robert G. Mower of the Department of Floriculture and Ornamental Horticulture, Cornell University and graphic artist Ms. Barbara Wolff.


Comments: Overused in the Northeast and is restricted for use as a street tree. Dense shade and shallow roots often prevent anything from growing underneath this tree. Roots also tend to heave sidewalks. Prone to self-girdling by encircling roots. Susceptible to verticillium wilt. Tends to self-sow and be weedy in natural areas. The Sycamore Maple, *Acer pseudoplatanus,* is a good substitute, though it too tends to be weedy.

Culture: Tolerates most soils, compaction, drought, and salt; transplants easily B&B in spring or fall.

Size: Large, HT: 40-60 feet, WD: 30-50 feet.

Growth Rate: Moderate to fast.

Bark: Light to dark gray with many shallow vertical fissures.

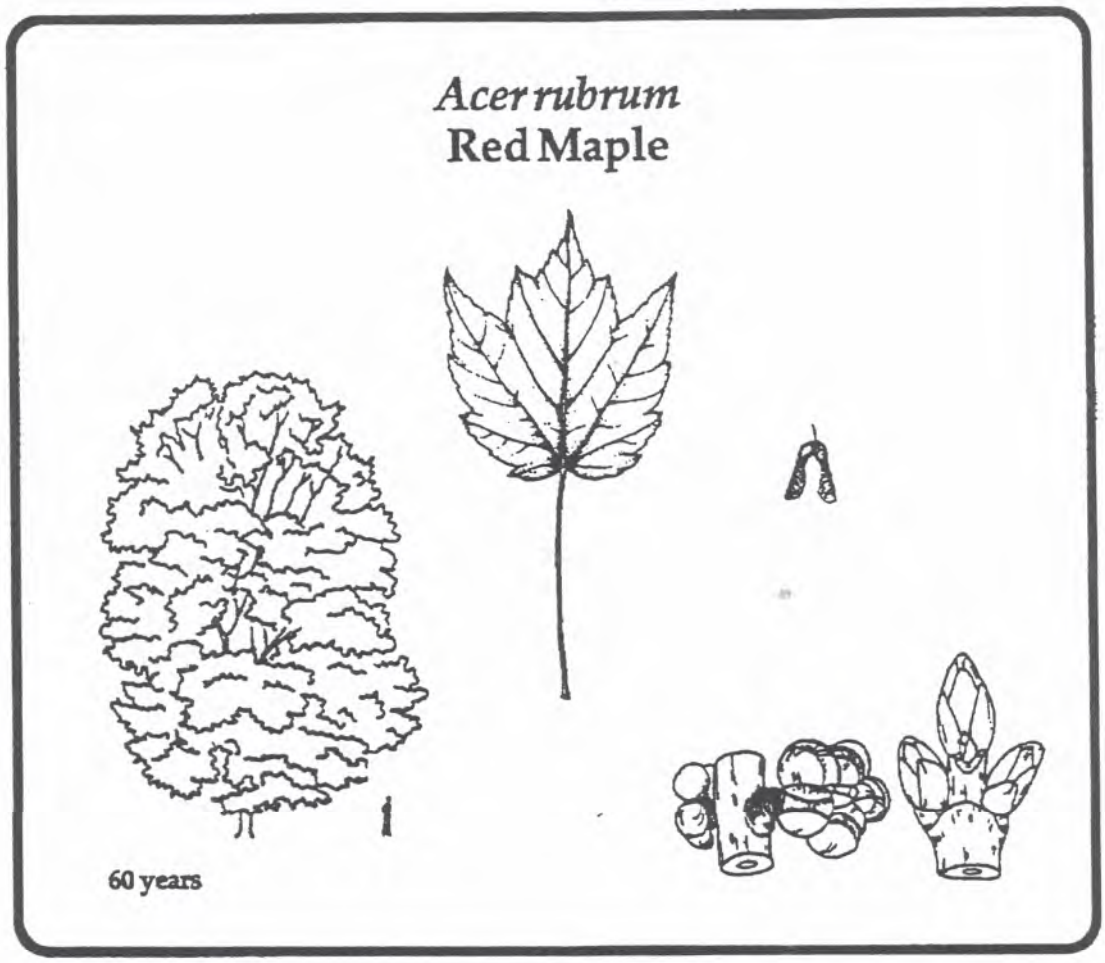
Leaf and Bud: Arrangement — Opposite; Leaf Form - Simple, palmately lobed, 6-10 inches long with a long leaf stalk (petiole). White milky sap comes out of a broken leaf stalk.

Fall Color: Yellow late in the fall.

Flower: Small, Greenish-yellow in clusters in April.

Fruit: Winged seed (samara), borne in pairs, 2-3 inches long, drops in fall.

Cultivars: 'Emerald Green' and 'Summer Shade' are good. Narrow cultivars include `Cleveland' and 'Columnare'. 'Crimson King' has dark purple foliage.




Comments: In alkaline soils, plants suffer from a nutrient deficiency, manganese chlorosis. Because of this and its intolerance to dry conditions, this tree is restricted for use as a street tree in NYC. Silver Maple, A. *saccharinum„* is similar — it has a more deeply-cut leaf and is an even worse tree because of severe heartwood rotting.

Culture: Prefers moist, fertile, acid soil with a pH 4.5-6.0; intolerant of dry sites or alkaline soils; transplant B&B in spring.

Size: T arge, HT: 40-50 feet, WD: 30-40 feet.

Growth Rate: Fast.

Bark: Light gray, roughening and turning darker with age.

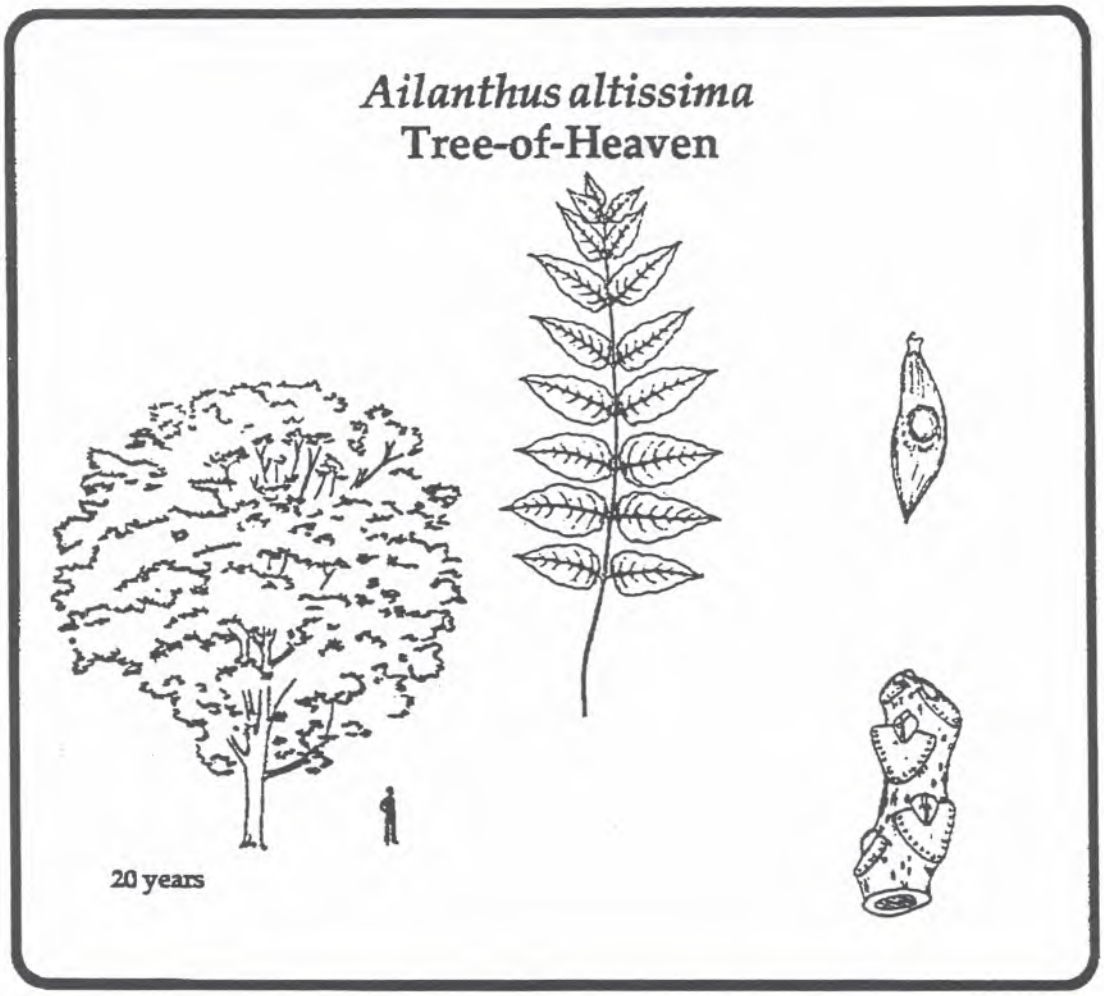
Leaf and Bud: Arrangement - Opposite; Leaf Form - Simple, palmately lobed with 3-5 lobes, 3-4 inches long with a long petiole and many large and small teeth.

Fall Color: Brilliant orange to red.

Flower: Small, red in clusters in early spring.

Fruit: Reddish samara, borne in pairs, 1 inch long in midspring.

Cultivars: 'October Glory', 'Red Sunset', and 'Armstrong' are popular.




Comments: Prohibited for use as a street tree in NYC. This Chinese species is one of the most adaptable trees. It is found in inner city sites, growing between rubble and through cracks in sidewalks and buildings. It is very weedy. This is the subject tree in "A Tree Grows in Brooklyn".

Culture: Tolerates a very wide range of soil conditions, including dry soils, acid or alkaline; transplant B&B or bareroot in spring or fall if you really want it.

Size: Medium to large, HT: 25-50 feet, WI): 20-40 feet.

**Growth Rate:** Fast.

**Bark:** Smooth light gray to brown.

**Leaf and Bud:** Arrangement — Alternate, twigs are very thick 1/2-1 inches in diameter, Leaf Form - Compound, pinnate; 13-25 roughly oval leaflets 2-6 inches long with a few blunt teeth, whole leaves can be as large as 3 feet long.

**Fall Color:** Yellowish.

**Flower:** Small yellowish flowers in large, dense clusters.

**Fruit:** Flat, elliptical samara, 1-11/2 inches long, tan to red in large clusters on female trees.

**Cultivars:** None.


Comments: Although this tree has been widely planted in NYC, plants are very prone to borers, especially plants that are stressed. Borers usually kill the tree. Ash yellows is a disease that may cause trouble in the future. Because of these problems, it is best to plant a different species.

Culture: Tolerates a wide range of soils including alkaline conditions. Transplants easily B&B in spring or **fall.**

**Size:** Large, HT: 50-60 feet, WD: 30-40 feet.

**Growth** Rate: Fast.

**Bark:** Light gray with criss-cross fissures.

**Leaf and Bud:** Arrangement — Opposite, twigs may be hairy; Leaf Form - Compound, pinnate; 5-9 leaflets 3-4 inches long with fine teeth, up to 6-10 inches long.

**Fall Color:** Yellow.

Flower: Inconspicuous.

Fruit: Narrow samara, 1 inch long, red or **yellow.**

**Cultivars: 'Summit' and 'Newport' are good performers.**


Comments: An excellent, very durable street tree with an irregular shape that improves with age. Plant only male trees, due to problem with malodorous fruit. An ancient species which has changed little over the past 125 million years — thus often called "The Living Fossil".

**Culture:** Tolerates most soils, drought, pollution, compacted soils, and a confined root zone. Transplants easily spring or fall.

**Size:** Large, HT: 50-70 feet, WD: 35-50 feet.

**Growth Rate:** Moderate.

**Bark:** Light gray-brown with deep fissures.

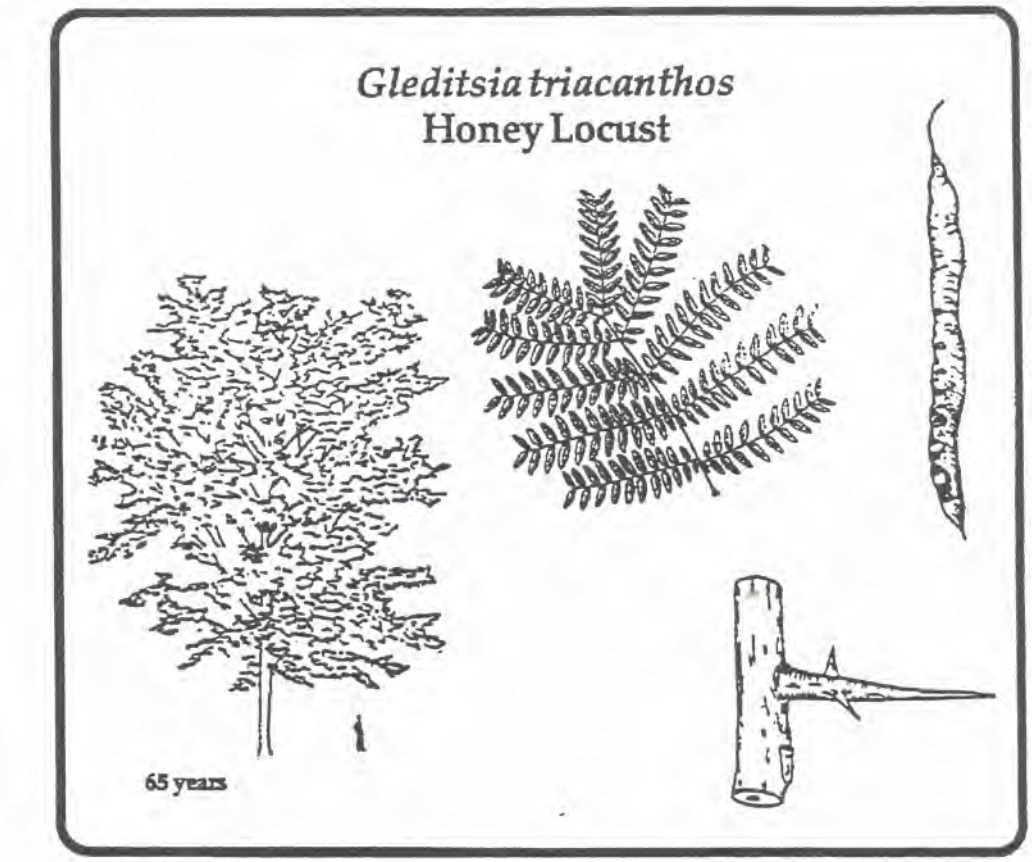
**Leaf and Bud:** Arrangement — Alternate or in clusters at the end of stubby, twig-like branchless alternating down the branch; Leaf Form - Simple, fan-shaped, 2-4 inches long with long petiole.

**Fall Color:** Bright yellow.

**Flower:** Not showy.

**Fruit:** On female trees only. Not a true fruit - a naked seed with a fleshy covering, round, 34 inch in diameter, and has an offensive smell when crushed.

**Cultivars:** 'Princeton Sentry' is a male with a narrow-upright habit.




**Comments:** A graceful, fine-textured native tree. Susceptible to many problems such as mimosa webworm, spider mites, bagworm, leaf spot, canker, and sun scald, but these are usually not serious. This has been overplanted, so better to plant something else. Transplants easily B&B spring or fall. Very large (3-5 inches long) thorns are typical for the species and can be very dangerous — thornless cultivars are available.

**Culture:** Tolerates most soils, drought, pollution, salt; transplants easily spring or fall.

**Size:** Large, HT: 40-50 feet, WD: 30-50 feet.

**Growth Rate:** Fast.

Bark: Dark gray to gray, smooth, roughens with age.

Leaf and Bud: Arrangement — Alternate; Leaf Form - Compound, pinnate or twice-pinnate 6-12 inches long with small *1/2-3/4* inch long oblong leaflets.

**Fall Color: Bright yellow.**

**Flower:** Not showy.

**Fruit:** Large, 1 foot long, dark brown, flattened and twisted pods, but absent on many of the newer **cultivars.**

**Cultivars:** Var. inermis is thornless; the cultivars `Shademaster', 'Majestic', and `Skyline' are some of the best forms.

## MAKING AN HERBARIUM

An herbarium is a collection of leaves of different plants that have been pressed, dried, and mounted onto paper. To make an herbarium, place a good, undamaged leaf between two sheets of newspaper carefully spreading out the leaf. Then place a heavy book on top of it. Repeat for all of your sample leaves. After several days, the leaves will be dry and can be mounted on construction paper. Put many droplets of rubber cement on the back side of the leaf, then flip the leaf over onto the paper and position it. Do not use too much rubber cement. After the leaf is positioned, place a sheet of newspaper over it and again place a heavy book on top. Allow the glue to dry overnight. Finally, on each sheet, write the full common and full scientific names of each species as well as whether the tree's leaves and buds are opposite or alternate. For the class project, you will be required to make an herbarium containing 10 different tree species, each labeled correctly.

## SELF-HELP QUIZ 3

1. When selecting a proper street tree, you should always avoid species which:

a. Tolerate droughty conditions.
b. Burst into flower once a year.
c. Requires a lot of water.
d. Possess tough, glossy foliage.

**2.** Which street tree is often called a "living fossil"?

*a. Ginkgo biloba,* Maidenhair Tree.
*b. Arbor prehistorica,* a rare species existing since the Dinosaur Age.
*c. Quercus rubra,* Red Oak.
*d. Tilia cordata,* Littleleaf Linden.

**3.** It's the middle of winter and you want to identify a street tree. You can do so by:

a. Interfacing with the Gotham Tree Data Network (GTDN).
b. Examining its buds, twigs, bark, and overall habit.
c. Gutting off one of its major branches and counting its rings.
d. Asking it.

4. Which tree has opposite buds and leaves?

a. Ailanthus altissima, Tree-of-Heaven.
b. Acer platanoides, Norway Maple.
c. Pyrus calleryana, Callery Pear.
d. Liquidambar styraciflua, Sweet Gum.

**Fill in the Blank**

5. An _____ is a collection of leaves from different kinds of plants that have been pressed and mounted on paper.

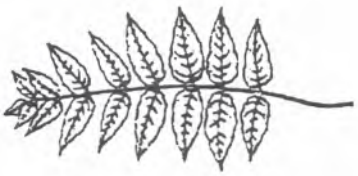
6. Name six characteristics of a a good street tree.

a.
b.
c.
d.
e.
f.

7. When a tree has leaves situated across the stem from each other, this type of arrangement is called _____, as compared to _____, in which leaves are staggered up the stem.

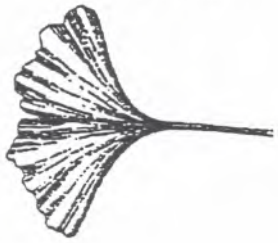
**Identify the following tree species using only the leaves.**

8. Scientific Name: _____
Common Name: _____
Leaf/Bud Arrangement: Alternate



9. Scientific Name: _____
Common Name: _____
Leaf/Bud Arrangement: Opposite

10. Scientific Name: _____
Common Name: _____
Leaf/Bud Arrangement: Alternate



# Session Four
# STREET TREE IDENTIFICATION - II

## STREET TREES FOR SPECIAL SITUATIONS

Listed in Appendix II are the best trees species for use in special situations in the New York City area. Large trees, small trees, narrow trees, flowering trees, trees for wet or dry soils, salt resistant trees, etc., are listed there. These lists are very helpful for quickly determining the best tree for a given site.

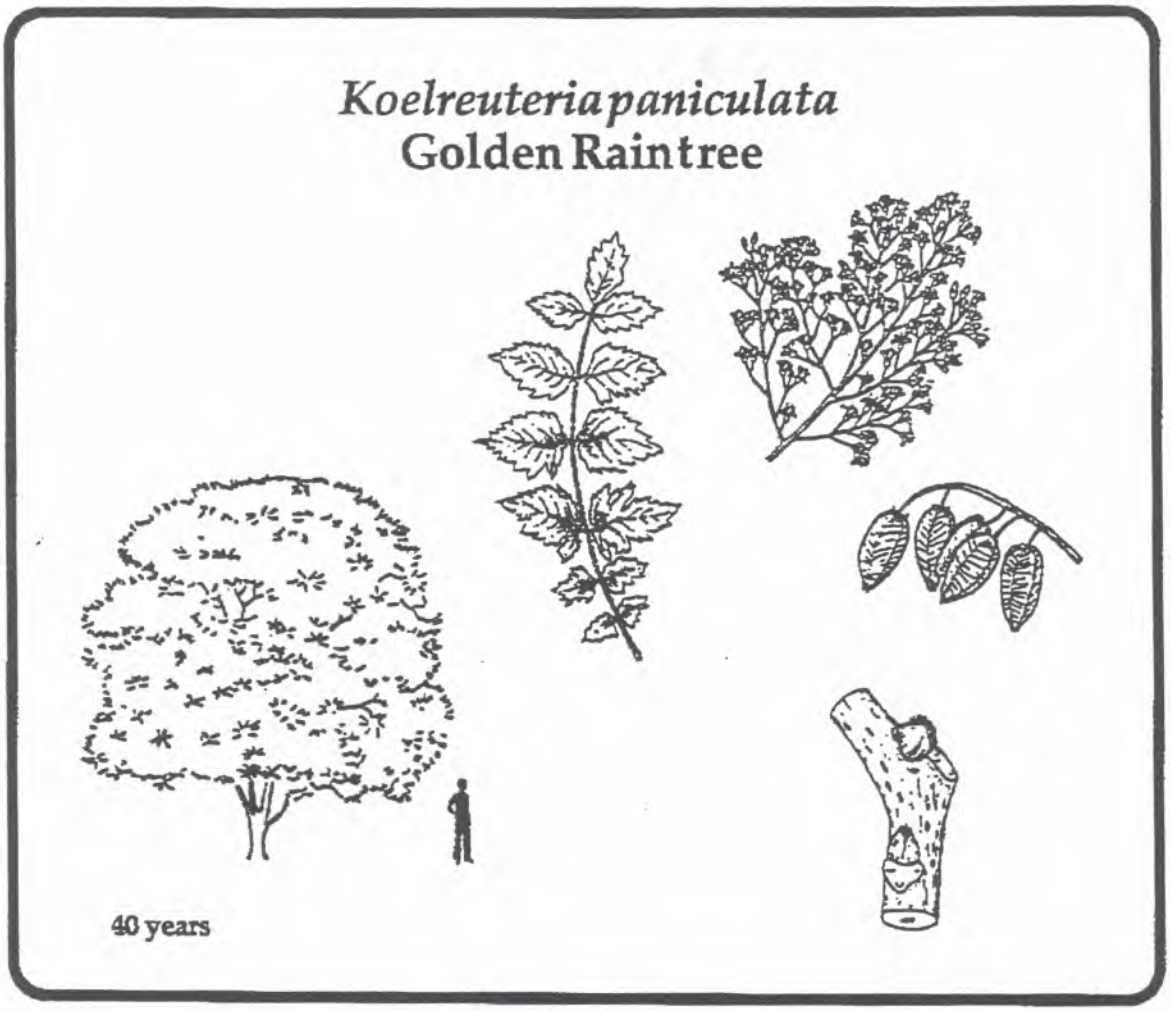
## TREES FOR RESTRICTED USE AND TREES PROHIBITED FOR USE AS STREET TREES IN NEW YORK CITY

**Trees For Restricted Use** - Contact the NYCDPR for permission to plant any of these in a particular site.

| | |
|---|---|
| *Acer platanoides*, large forms | Norway Maple |
| *Acer rubrum* | Red Maple |
| *Alnus glutinosa* | Black Alder |
| *Betula nigra* | River Birch |
| *Maclura pomifera* | Osage Orange |
| *Platanus x acerifolia* | London Planetree |
| *Styrax* spp. | Snowbell |
| *Syringa reticulata* | Japanese Tree Lilac |
| *Ulmus carpinifolia* | Smooth-leaved Elm |
| *Ulmus parvifolia* | Chinese Elm |
| *Ulmus* 'Christine Buisman' | Christine Buisman Elm |

**Prohibited Trees** - These trees are weak-wooded, and/or are highly susceptible to a fatal disease.

| | |
|---|---|
| *Acer saccharinum* | Silver Maple |
| *Ailanthus altissima* | Tree-of-Heaven |
| *Morus* spp. | All Mulberries |
| *Populus* spp. | All Populars |
| Most *Prunus* spp. | Most Flowering Cherries |
| *Salix* spp. | All Willows |
| *Ulmus americana* | American Elm |
| *Ulmus pumila* | Siberian Elm |




**Comments:** An excellent, city-tough small flowering tree. Do not confuse with the Golden Chaintree, *Laburnum anagyroides*, which makes a poor street tree.

**Culture:** Tolerates drought, poor alkaline soils, and salt. Transplant B&B in spring only.

Size: Small, HT: 25-30 feet, WD: 25-30 feet.

**Growth Rate:** Slow.

**Bark:** Light brown, fissured with age.

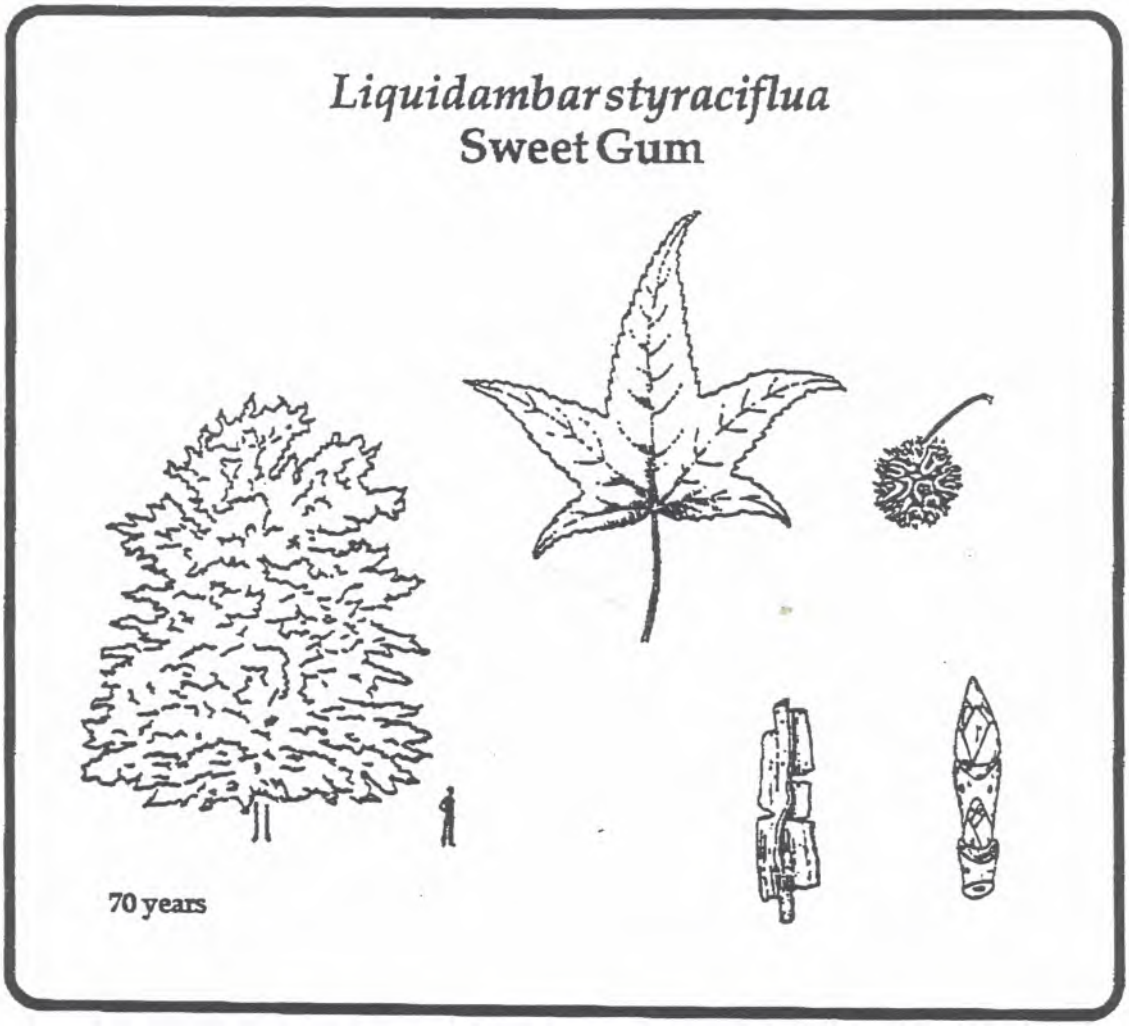
**Leaf and Bud:** Arrangement — Alternate; Leaf Form - Compound, pinnate 6-12 inches long, with 7 or more coarsely-toothed ovate leaflets.

**Fall Color:** Yellowish.

**Flower:** Showy, small, golden yellow flowers in large showy panicles in July and August.

**Fruit:** Persistant, dehiscent, inflated, papery brown capsules 11/2-2 inches long, enclosing a black seed.

Cultivars: 'September', which flowers later.




Comments: Excellent choice for wet sites. Does not tolerate alkaline soils. Fruits may cause a litter problem.

Culture: Requires a moist, acid soil with pH 5.5-6.5. Tolerates wet sites. Transplant young plants B&B in spring only.

Size: Large, HT: 50-70 feet, WD: 30-50 feet.

Growth Rate: Slow to moderate.

Bark: Gray and fissured; older branches can have corky ridges.

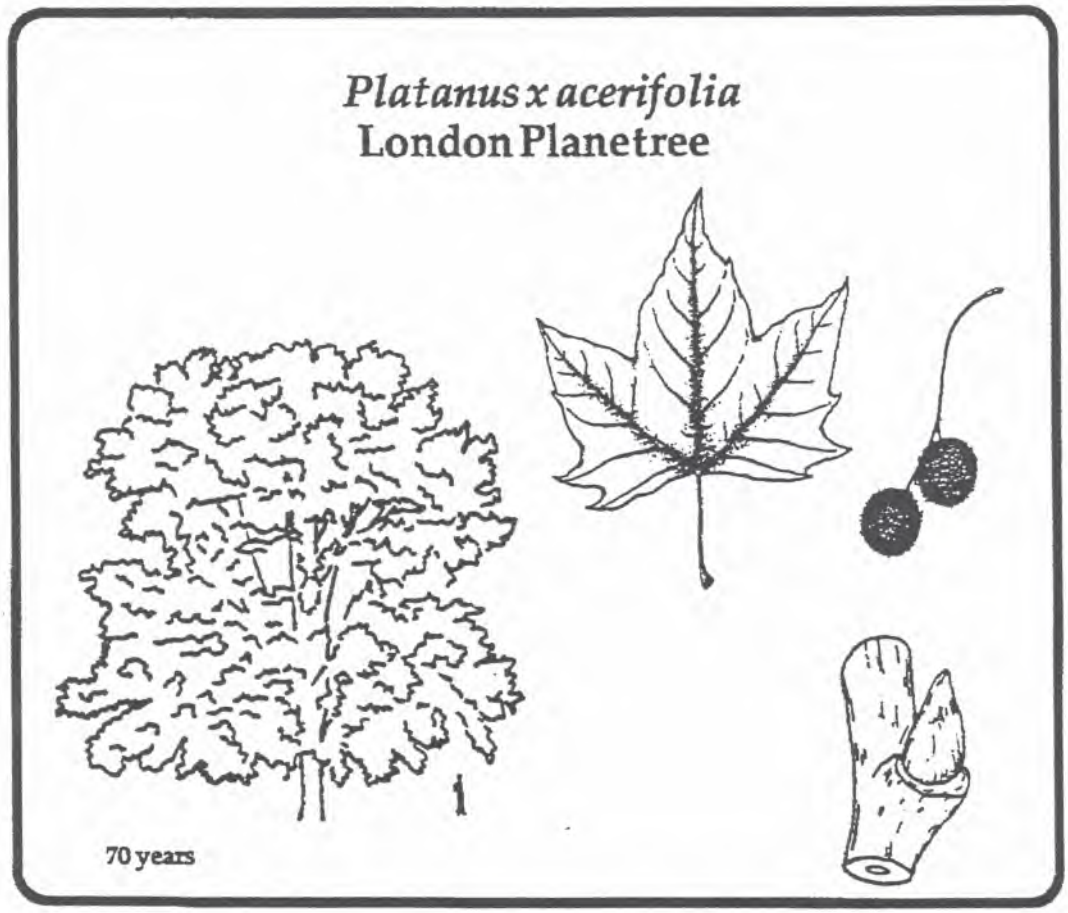
Leaf and Bud: Arrangement - Alternate, buds often green; Leaf Form - Simple, palmately lobed, with 5-7 pointed lobes, 4-7 inches long with fine teeth on the margin and a long leaf stalk (petiole)..

Fall Color: Red, yellow, and bronze.

Flower: Ball-like, not showy.

Fruit: Woody, spherical, dehiscent capsules, 1 inch across, and covered with little horns.

Cultivars: 'Festival' has attractive fall color in various shades of red, yellow, and purple.




**Comments:** A very adaptable tree. It is the most common species of street tree in NYC, so much so that is has created a monocultural condition. In wet years, this tree can be completely defoliated by the fungal disease called anthracnose. Trees usually become infested with the sycamore plantbug that riddle the leaves with tiny holes - this causes the tree little real damage, but it does give it the characteristic smell of London Planetrees. This tree is for restricted use only.

**Culture:** Tolerates most soils, wetter sites, compacted soils, drought; transplants easily in spring or fall.

**Size:** T a rge, HT: 40-60 feet., WD: 30-40 feet.

**Growth Rate:** Fast.

**Bark:** Yellowish brown and green, smooth, exfoliating (flaking off) in large patches especially in late summer and fall.

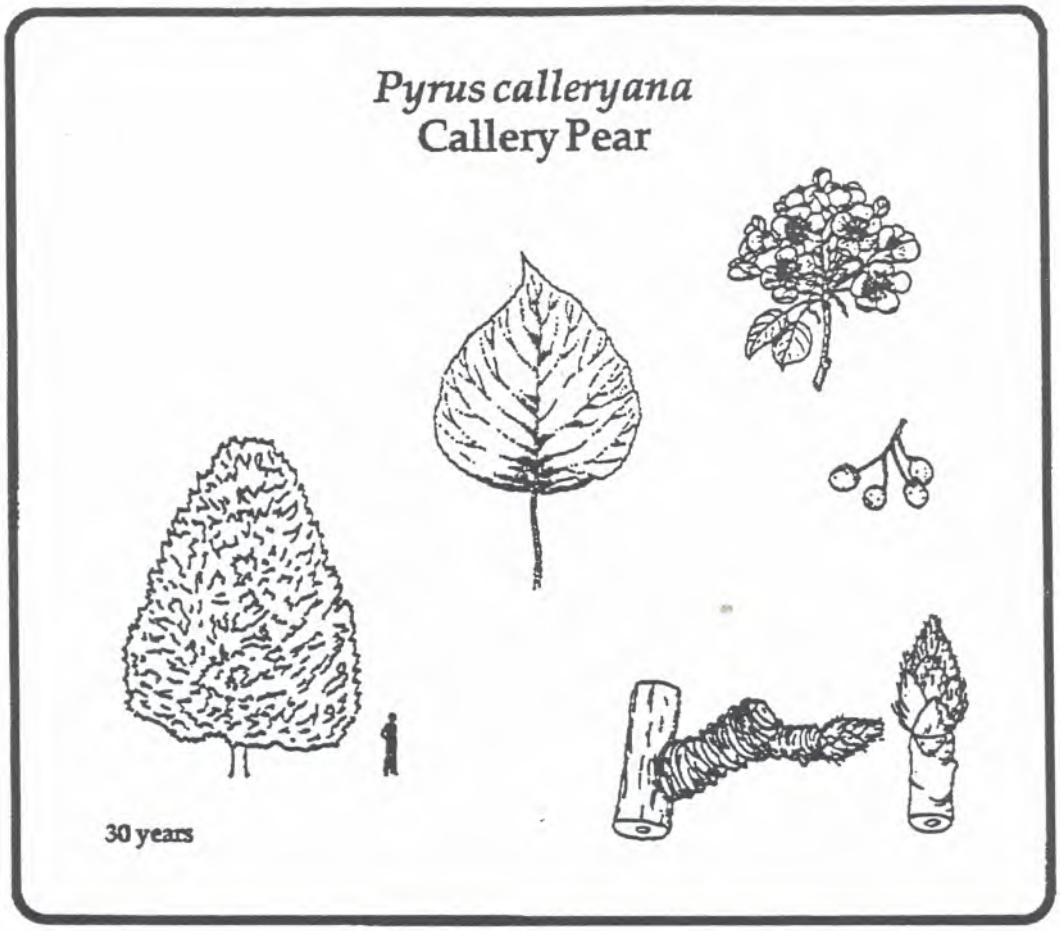
**Leaf and Bud:** Arrangement - Alternate, with buds embedded within the base of the leaf stalk (petiole); Leaf Form - Simple, palmately lobed (mapleleaf-shaped), 6-8 inches long with a long petiole.

**Fall Color;** Dull yellowish brown.

**Flower;** Inconspicuous.

**Fruit:** Spherical, 1 inch diameter, borne in pairs, composed of elongated achenes

Cultivars: 'Liberty' and `Bloodgood'.




Comments: This plant offers three attractive features: 1) very showy flowers, 2) excellent quality foliage in summer, and 3) nice fall color. Because it has so much to offer, this tree is being overplanted. It is highly prone to crowded branches and weak crotches and therefore demands good selective priming when young to thin the branches and prevent major wind and ice storm damage.

Culture: Tolerates a wide range of soils. Transplants easily B&B in spring.

Size: Small, HT: 25-30 feet, WD: 15-20 feet.

Growth Rate: Moderate to fast.

Bark;, Smooth gray, roughening with age.

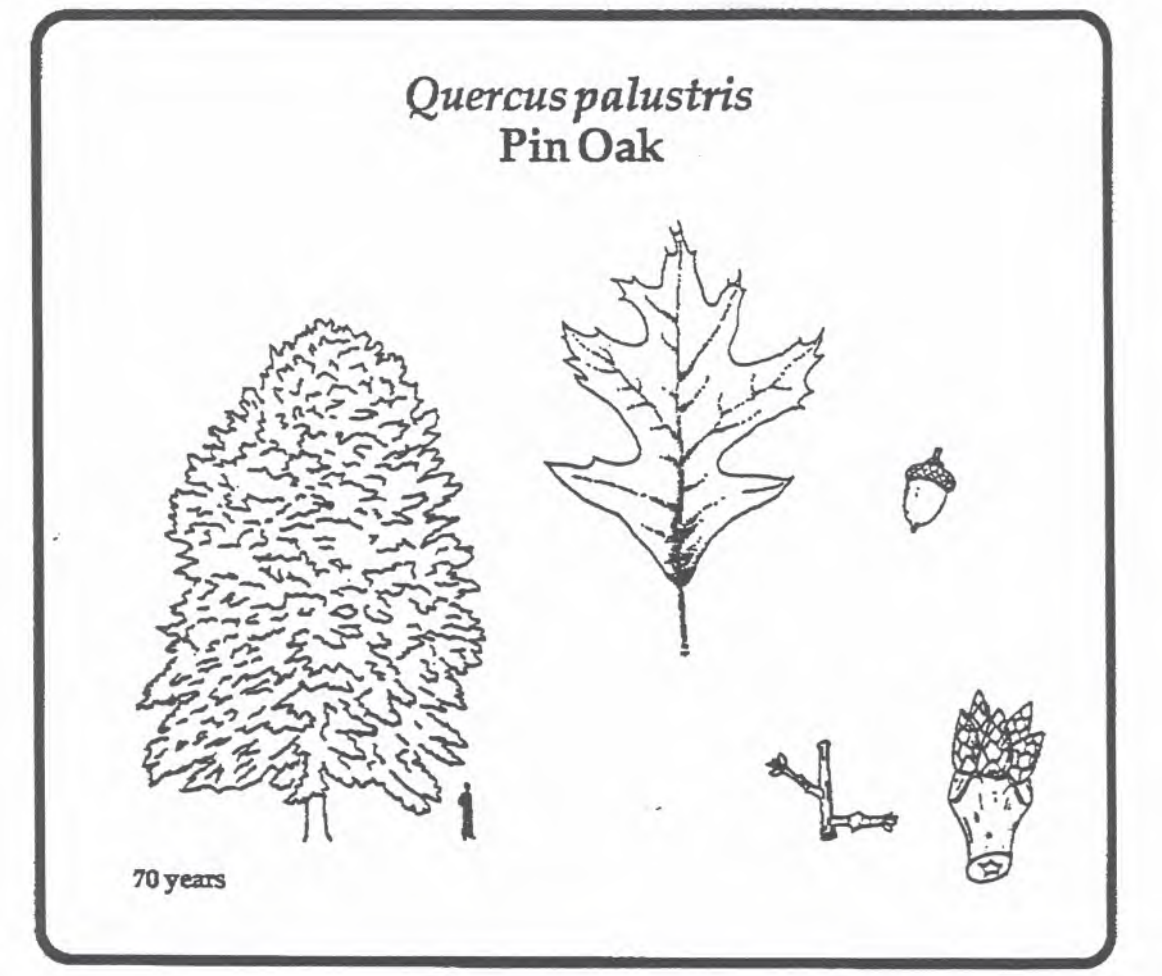
Leaf and Bud: Arrangement - Alternate, buds are covered with brown hairs; Leaf Form _ Simple, oval with fine teeth and long petiole, 2-4 inches long; excellent, glossy, dark green leaves.

Fall Color: Burgundy to scarlet.

Flower: Showy white flowers in April.

Fruit: Small 1/2 inch in diameter, grayish-brown pomes.

Cultivars: 'Aristocrat'. 'Autumn Blaze', 'Chanticleer', and `Redspire' are all excellent; 'Whitehouse' is a columnar form while 'Fauriei' is a dwarf.




**Comments:** Lower branches gradually bend down to ground and must be pruned off. In alkaline soil, plant suffers from iron chlorosis — *Q. rubra* tolerates alkaline soils better. Willow Oak, *Q. phellos,* is a similar looking tree but has narrow, unlobed willow-like leaves.

**Culture:** Demands an acid soil with pH 5.0-6.0; tolerates dry sites; transplant B&B in spring.

**Size:** Large, HT: 50-70 feet, WD: 30-50 feet.

**Growth Rate:** Moderate to fast.

**Bark:** Brownish-gray, smooth but fissured with age.

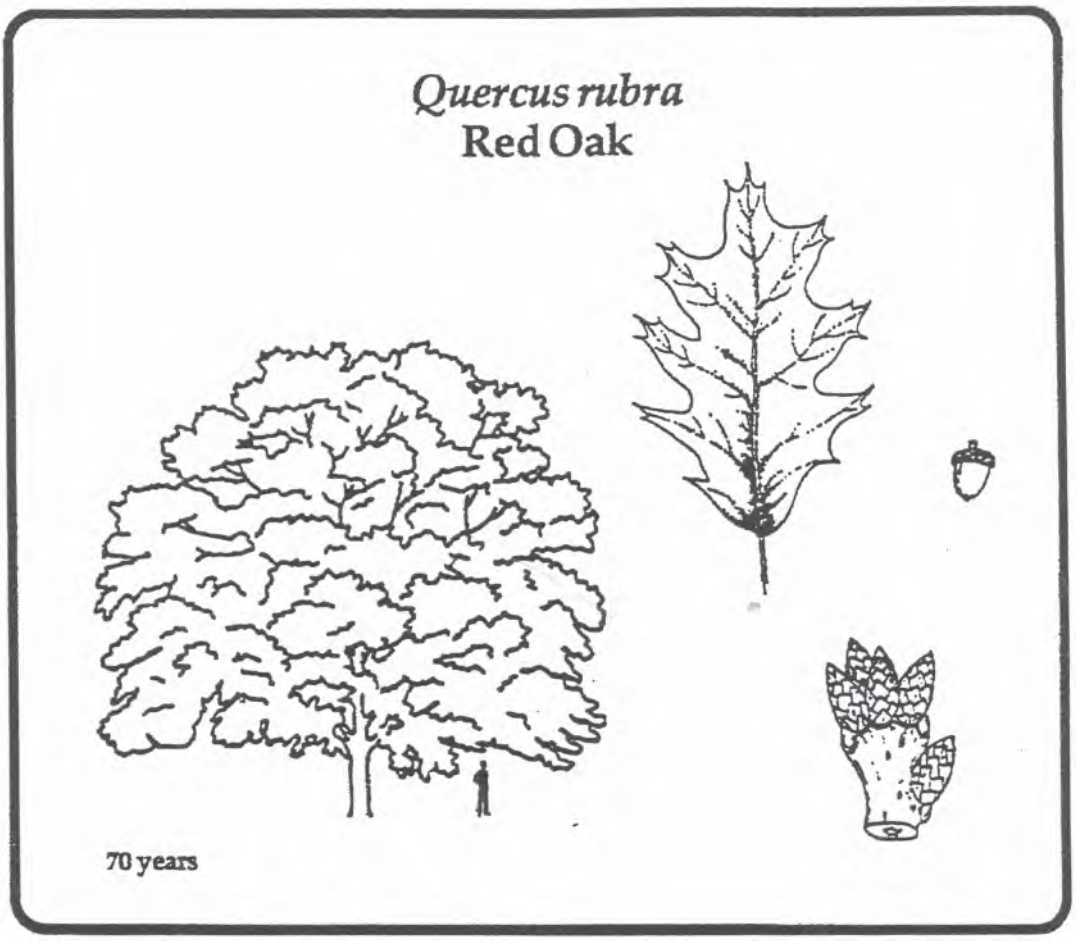
**Leaf and Bud:** Arrangement — Alternate with many buds clustered near the twig tip; Leaf Form - Oval with 5-9 large lobes pinnately arranged and separated by deep sinuses, 4-6 inches long; glossy foliage; often holds leaves in winter.

**Fall Color:** Dull brown or bronze.

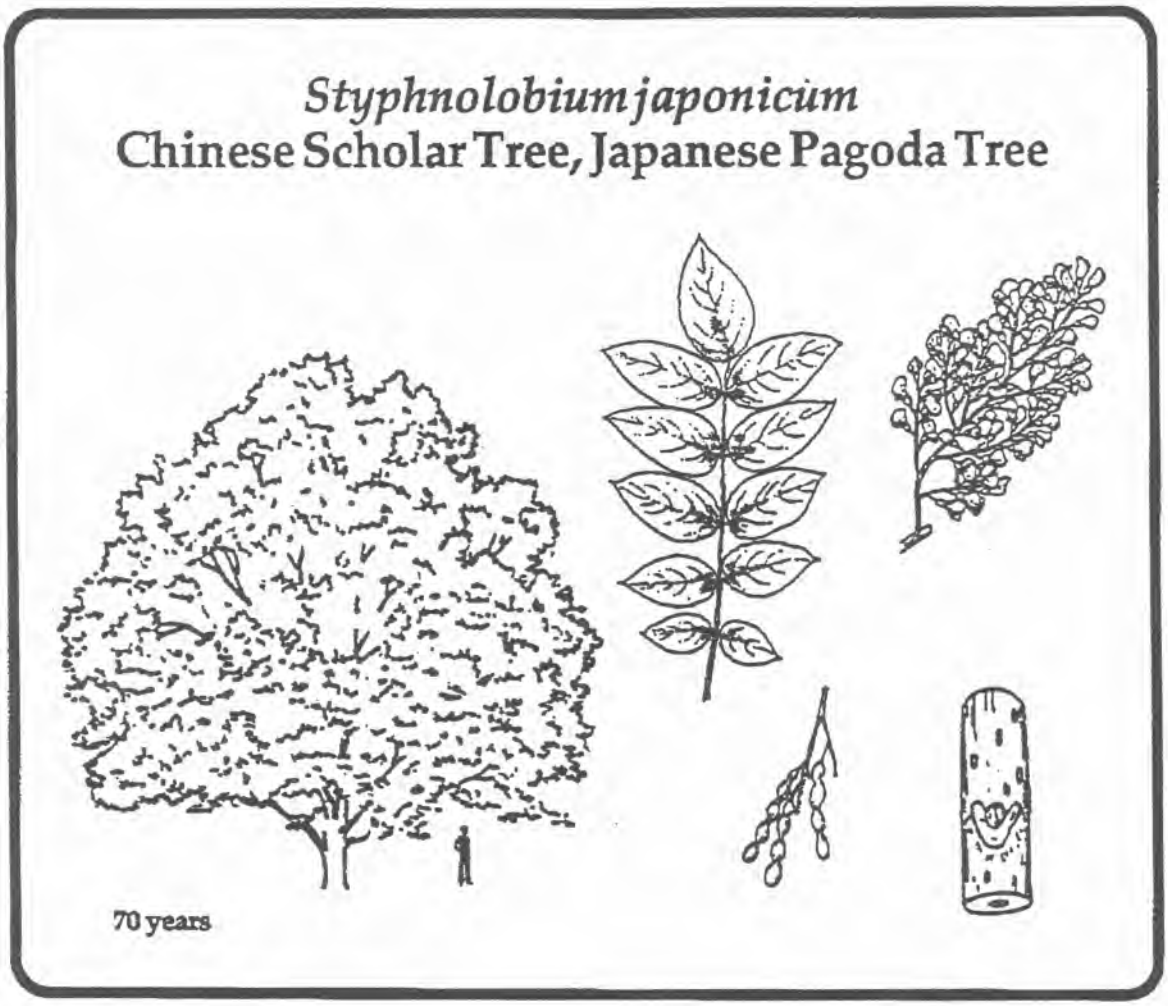
**Flower:** Male flowers borne on light brown tassels (catkins), 3-4 inches long in April, females on solitary or several-flowered spikes.

**Fruit:** Acorn.

**Cultivars:** None widely available.




Comments: A better tree than Pin Oak becasue it tolerates alkaline soils better and its lower branches do not droop. Salt resistant. Grows into a stately tree.
Culture: Tolerates soils with moderately high pH. Transplant B&B in spring only.
**Size:** 1arge, HT: 50-60 feet, WD: 30-40 feet.
**Growth Rate:** Moderate to fast.
**Bark:** Dark brownish-black.
Leaf **and** Bud: Arrangement - Alternate with many buds clustered near the twig tip; Leaf Form - Oval with 5-7 large lobes pinnately arranged and separated by shallow sinuses, 5-8 inches long; dull foliage.
**Fall Color:** Dull yellow brown to reddish brown.
**Flower:** Male flowers in tassels (catkins), females as spikes.
**Fruit:** Acorn.
Cultivars: None available.




**Comments:** The scientifc name of this species has recently been changed from *Sophorajaponica* to this much more cumbersome one. Tolerates drought, alkaline soils, and salt. A durable tree that is attractive in flower. Fallen pods sometimes cause a mess.

**Culture:** Tolerates most well-drained soils. Transplant B&B in spring or fall.

**Size:** Large, HT: 40-60 feet, WD: 25-30 feet.

**Growth Rate:** Fast.

**Bark:** Gray-brown, slightly fissured.

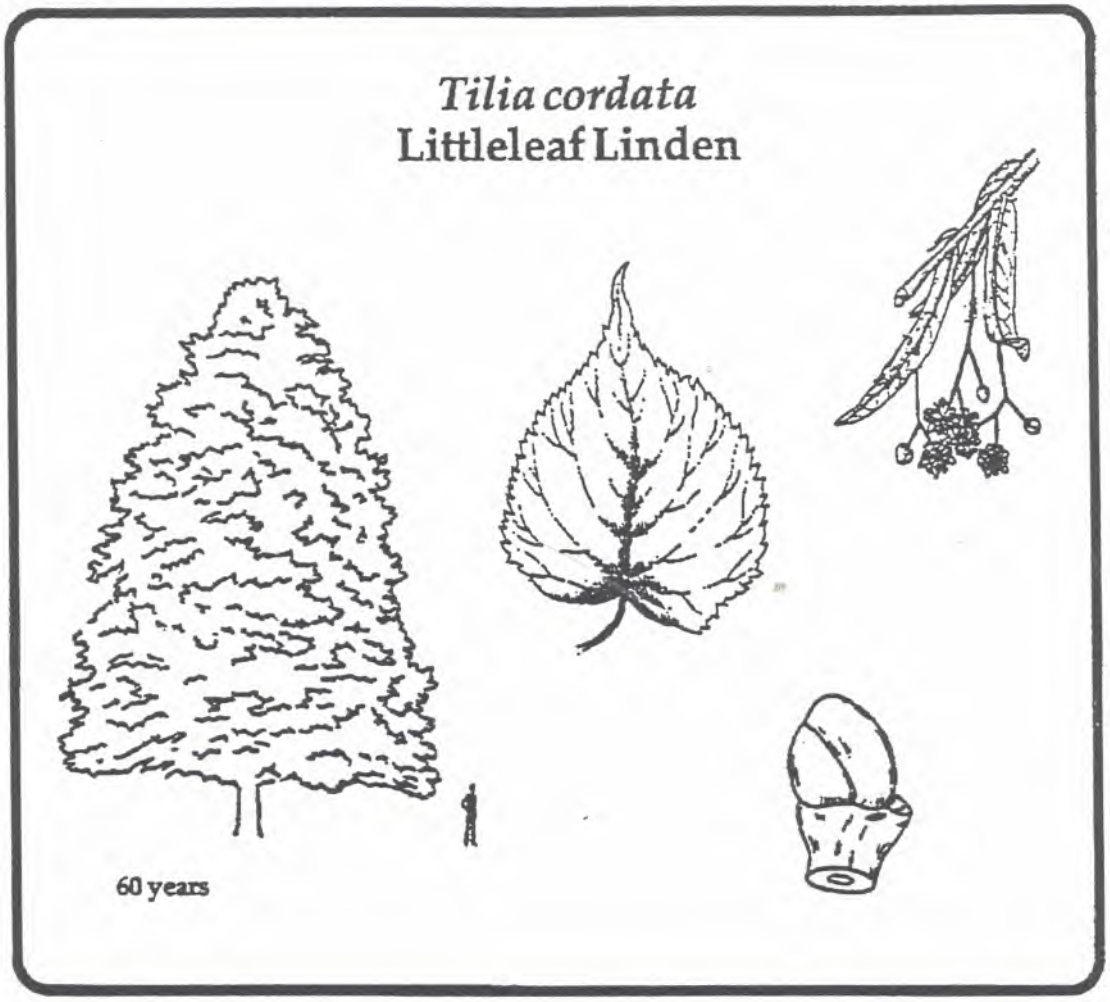
**Leaf and Bud:** Arrangement - Alternate, buds are sunken into the twigs, twigs are bright green; Leaf Form - Compound, pinnate, with 7-17 ovate leaflets, 3\14-1 1/2 inches long.

**Fall Color:** Yellowish-green.

**Flower:** Showy, pea-like, creamy-white in large clusters in August.

**Fruit:** Green pod, (loment) up to 12 inches long, with tight constrictions between each of the large seeds contained within.

**Cultivars:** 'Regent' is a superior selection.




Comments: Susceptible to sun scald_ Tike other lindens, this is tolerant of alkaline soils. Silver Linden, *T. tomentosa,* is a better tree, which has leaves that are bright white on the underside - the whole tree brightens up when the wind blows through the canopy. In addition, Silver Linden is more drought tolerant.

Culture; Tolerates most soils including alkaline soils; transplant B&B in spring or fall.

Size: Large, HT: 50-70 feet, WD: 30-50 feet.

Growth Rate: Slow to moderate.

Bark: Gray, smooth but fissured with age.

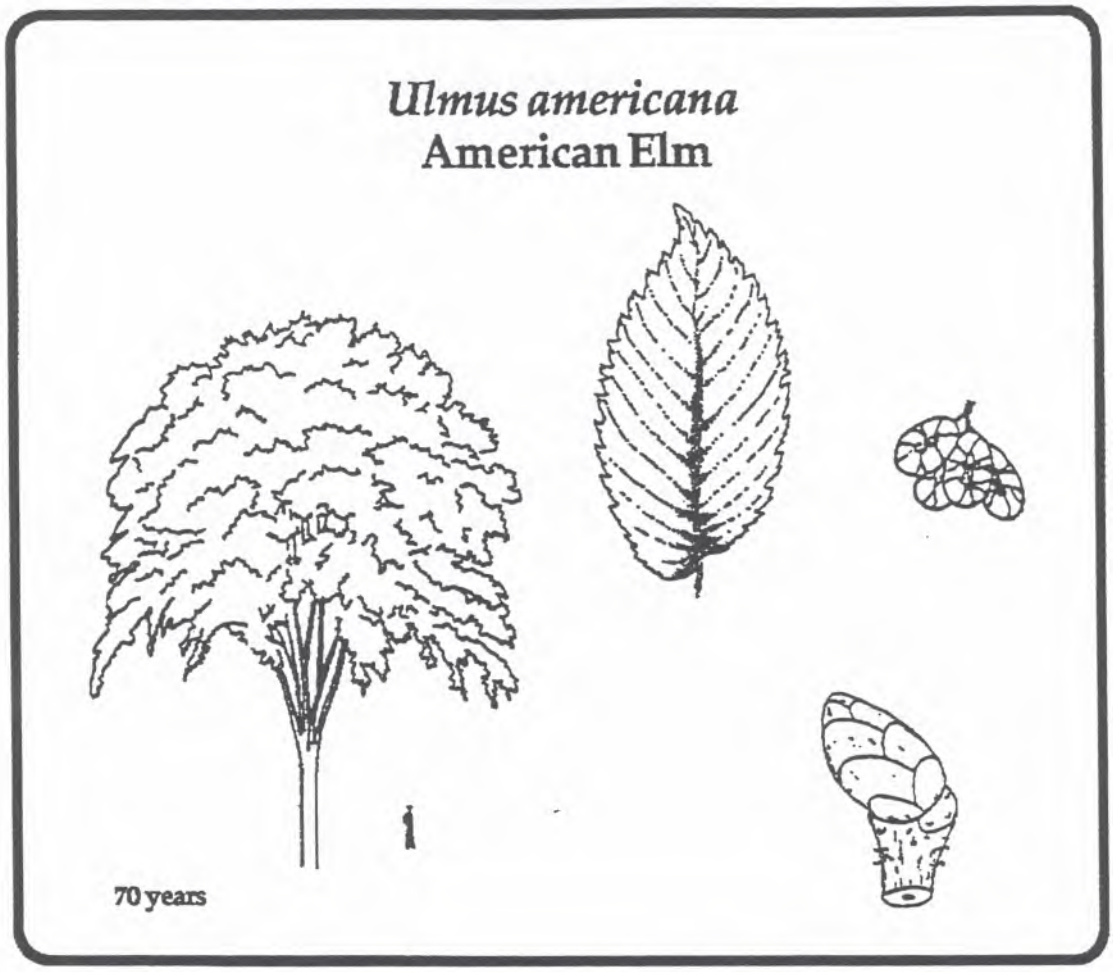
Leaf and Bud: Arrangement - Alternate, with buds covered with only 2 or 3 scales; Leaf Form - Heart-shaped, with an asymmetrical leaf base, 2-3 inches long with fine teeth and a short petiole.

Fall Color; Yellowish.

Flower: Small, yellowish-white flowers in clusters borne on a stalk with a papery sheath or bract attached. Fragrant.

Fruit; Small, 1/8-1/4 inch in diameter and nutlet-like in clusters with the bract attached.

Cultivars: `Greenspire, `Glenleven', and 'Chancellor'.




Comments: Prohibited for use as a street tree in NYC because it is very susceptible to Dutch Elm Disease and phloem necrosis. Once extensively planted throughout the US, most stands have been obliterated. In NYC, some trees have escaped DED and are still around.

**Culture:** Tolerates most soil conditions. Transplants easily B&B spring or fall.

Size: Large, HT: 50-70 feet, WD: 30-50 feet.

**Growth Rate:** Fast.

**Bark:** Brownish-gray with vertical plates and fissures.

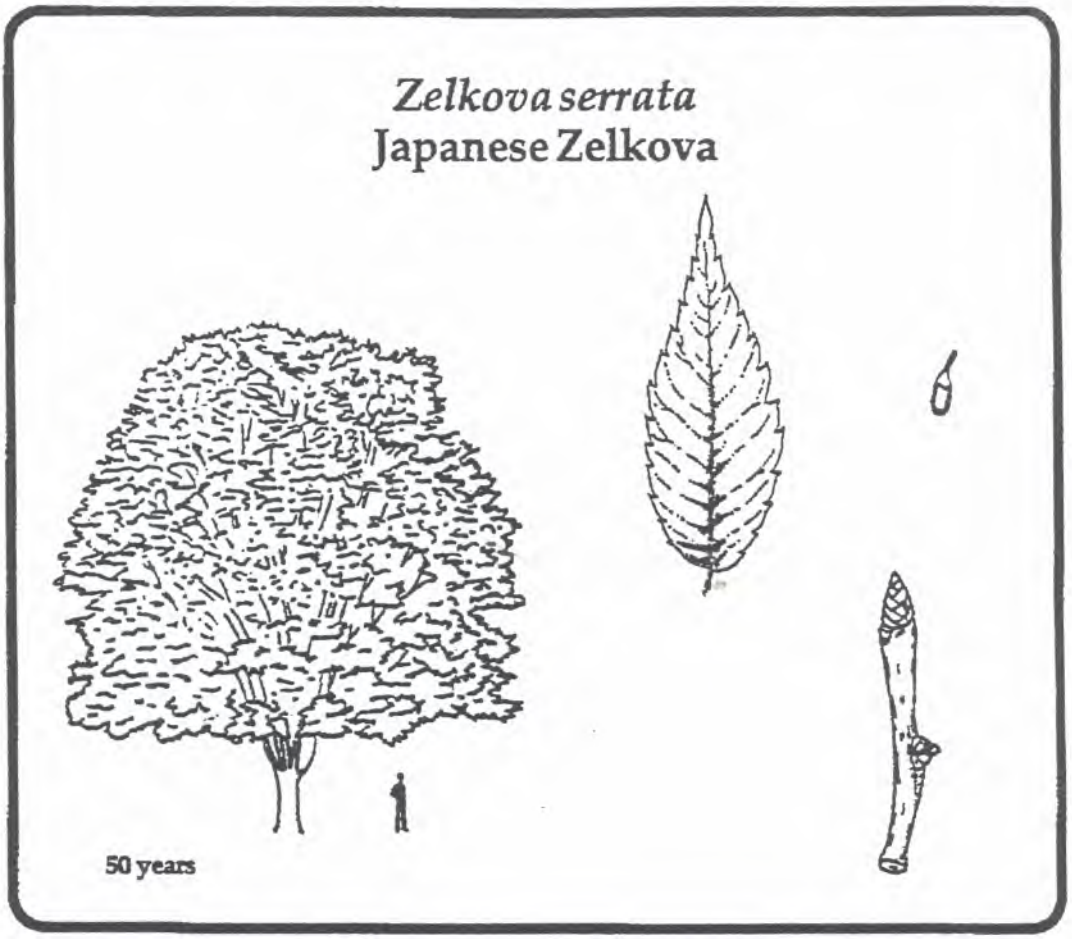
Leaf **and Bud:** Arrangement- Alternate positioned on slightly zigzag ging twigs; Leaf Form - Simple, oval with an asymmetrical leaf base, 2-4 inches long, with a toothed leaf margin and a short leaf stalk

**Fall Color:** Yellowish.

**Flower:** Small, inconspicuous.

**Fruit:** Papery, disc-like samaras Y2-3/4 inch in diameter.

**Cultivars:** None are recommended. *U. carpirufolia* 'Christine Buisman' is another elm for restricted use but lacks the vase-shape of *U. americana* and is susceptible to nectria canker and elm leaf beetle.




Comments: Very prone to developing weak crotches which often will require cabling in the future. Recovers slowly from transplanting. Susceptible to elm leaf beetle. Once thought to be a good replacement for American Elm, but it lacks grace.
Culture: Tolerates most soils. Transplant B&B in spring only.
Size: Large, HT: 40-50 feet, WD: 30-40 feet.
Growth Rate: Moderate.
Bark: Reddish-brown with large prominent bands of lenticels.
Leaf and Bud: Arrangement - Alternate, positioned on slightly zigzagging twigs; Leaf Form - Simple, oval with prominent teeth on the leaf margin and a short petiole, 2-3 inches long.
Fall Color: Dull yellow.
Flower: Inconspicuous.
Fruit: Small, 1/4-1/2 inch, green, oblong cherry-like drupe.
Cultivars: 'Green Vase' and 'Village Green' are two of the better cultivars.

ADDITIONAL DEFINITIONS

**Broadleaved .** A tree with thin, flat, broad leaves growing on woody branches which spread from a woody trunk. Broadleaved trees all bear true flowers, although many are very inconspicuous, and are all classified as angiosperms - seeds are contained in a closed ovary. Most street trees are broadleaved. Most street trees are broadleaved. Examples: Maple, Oak, Elm.

**Conifer.** A deciduous or evergreen tree bearing cones rather than true flowers. Conifers are classified as gymnosperms - having seeds that are naked. Foliage is needle-like or scale-like. Examples: Pine, Spruce, Fir, Larch, Dawn Redwood, Bald Cypress.

**Deciduous.** A tree which drops its foliage at the end of the growing season and develops new foliage the next spring. Not synonymous with broadleaved. Some conifers (examples: Larch., Dawn Redwood, Bald Cypress) drop their needles each fall.

**Evergreen.** A tree which retains its foliage throughout the year. Not synonymous with conifer. Some broadleaved trees (examples: American Holly, Southern Magnolia, Live Oak) are evergreen. There are no recommended evergreen street trees.

**Monoculture.** A population of trees comprised mostly of one species or variety. Monocultures should be avoided lest a disease or pest decimates many trees in a neighborhood instead of merely killing one or two. (For example: the American Elm, *Ulmus americana,* was planted in vast quantities; now Dutch Elm Disease has virtually eliminated the species.)

## SELF-HELP QUIZ 4

By now you realize that these quizzes are very easy, but they do serve a purpose. Take the time to go through each question; these reinforce key concepts for The Certification Exam.

1. When using *Quercus palustris,* Pin Oak, as a street tree, one should remember that:

   a. It secretes a sweet substance that attracts birds.
   b. Its lower branches gradually bend to the ground and must be pruned off periodically.
   c. Its foliage becomes chlorotic (yellow) in alkaline soils.
   d. Both b and c.

2. Conifers are:

a. All conically-shaped trees.
b. Always evergreen.
c. Make up many of the species on the NYC recommended street tree lists.
d. Trees that produces cones instead of flowers and fruit.

3. Which of the following is a conifer?

*a. Zelkova serrata,* Japanese Zelkova.
*b. Acer rubrum,* Red Maple.
*c. Metasequoia glyptostroboides,* Dawn Redwood.
*d. Liquidambar styraciflua,* Sweet Gum.

4. Which tree does not have compound leaves?

*a. Gleditsia triacanthos,* Honey Locust
*b. Styphnolobium japonicum,* Chinese Scholar (or Japanese Pagoda) Tree.
*c. Fraxinus pennsylvanica,* Green Ash.
*d. Platanus x acerifolia,* London Planetree.

5. Which tree has opposite buds and leaves?

*a. Ailanthus altissima,* Tree of Heaven.
*b. Acer platanoides,* Norway Maple.
*c. Pyres calleryana,* Gallery Pear.
*d. Liquidambar styraciflua,* Sweet Gum.

6. A deciduous tree is a tree which:

a. Drops all of its foliage annually and produces new foliage the following growing season.
b. Is synonymous with a broadleaved tree.
c. Never can be a conifer.
d. All of the above.

7. Which statement is true?

*a. Gleditsia b iacanthos,* Honey Locust, is a fine-textured tree that tolerates most soils, drought, pollution, and salt.
*b. Tilia tomentosa,* Silver Linden , is generally a better tree than Littleleaf Linden.
*c. Quercus rubra,* Red Oak, tolerates alkaline soils better than Quercus palustris, Pin Oak.
d. All of the above.

**8.** In the past London Planetrees were planted on New York City Streets almost everywhere. What has happened to this monoculture?

a. The trees have spread like wildfire throughout the city's unprotected parks and gardens.
b. Many people have become severely allergic to them.
c. In wet years, a disease called anthracnose has swept through and defoliated them.
d. The trees have made the city so distinctive that the poet Wilbur Freemont has called New York City the "City of the Great Planes".

**9.** Using Appendix II, which species recommended for use as a street tree in NYC is good for *wet sites?*

*a. Tilia tomentosa* 'Sterling', Silver Linden.
*b. Prunus* 'Accolade', Flowering Cherry.
*c. Celtis occidentalis* 'Prairie Pride', Hackberry.
*d. Taxodium distichum,* Bald Cypress.

**10.** Again, using Appendix II, which species is good as a *small flowering tree* that *is salt resistant* and *good for alkaline soils?*

*a. Acer ginnala* 'Flame', Amur Maple.
*b. Malus* 'Sugar Tyme', a variety of Crabapple.
*c. Koelreuteria paniculata,* Golden Raintree.
*d. Maclura pomifera,* Osage Orange.

**11.** Which tree(s) is(are) prohibited for use as a street tree(s) in New York City?

*a. Acer saccharinum,* Silver Maple.
*b. Ailanthus altissima* . Tree-of-Heaven.
*c. Ulmus americana,* American Elm.
d. All of the above.

**Identify the following tree species using only the leaves.**

**12.** *Scientific Name:* _____
Common Name: _____
Leaf/Bud Arrangement: Alternate

**13.** Scientific Name: _____
Common Name: _____
Leaf/Bud Arrangement: Alternate

**14.** Scientific Name: _____
Common Name: _____
Leaf/Bud Arrangement: Opposite

**15.** Scientific Name: _____
Common Name: _____
Leaf/Bud Arrangement: Alternate

# Session Five
# GATHERING INFORMATION ON CITY STREET TREES

The gathering of information concerning our City's street trees is not a wasted effort. Unfortunately, there is not enough information about these trees to allow us to help them. We know more about the **rain forests** that are thousands of miles away than we know about our own urban forest. The street trees in the city are our "rain forest", and have a greater effect on our health. Our rain forest is cleaning the air that we are breathing this very minute. It is removing the carbon dioxide emitted by the fossil burning fuel power plants here in the city. Our supply of manufactured and farm raised goods are delivered by vehicles burning gasoline and diesel fuel. Our electricity is supplied by power generators that burn oil. During the winter our homes are heated by the burning of oil and natural gas. The amount of fossil fuels burned each day is staggering, and there is nothing between our lungs and this burning . . . *nothing except trees.*

The larger the tree, the more cubic feet of carbon dioxide it is able to remove. Each branch of a large tree is equal to a small newly planted tree and is removing pollution from the air that we breath. This is why it is so important to preserve our existing trees. There are approximately 740,000 trees growing along our city streets. Of these, 10,000 to 11,000 tress die each year from a lack of maintenance. The city has a tree planting program that gives us 7,00 to 8,000 new tress each year. You do not have to be a mathematical genius to figure out that someday there will be NO MORE TREES in the city.

Travel to Mexico City, Mexico and you will see what New York City could look like in the next century. Only instead of the air looking yellow, it will be black. One of our most important basic needs, clean breathable air, will no longer be free. We will have to pay for it. This is happening today in Mexico City; you can go into a telephone booth like structure, deposit some money, and oxygen is released. It is a city without trees to clean its air; a city where breathing is hazardous to your health.

## TAKING A SURVEY

Taking a survey is not a difficult task to accomplish. The information is recorded on a form for use by tree care people.

### Tree Survey Form

1. ADDRESS — This is the building and/or house address that the tree is in front of. For example: 123 East 15th Street; or 456 Main Street.

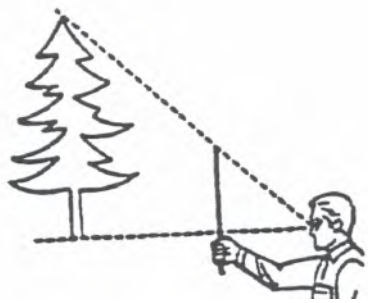
need a measuring tape, and a straight length of stiff material (wood or metal) at least three (3) feet long. For example: a push broom or rake handle; a "Yard Stick"; or a non-folding umbrella.

Using a broom handle as a straight length of material:

a). Grasp handle in either hand, with the lenght of it extending away from the thumb.

b). The length of the handle extending away from your thumb must measure the same as the length from you outstretched hand to your *"aiming eye"*. To determine which eye is your aiming eye look with both eyes at a distant object. Block out that object with the thumb of your outstretched hand and then close one of your eyes. If the object is still blocked out, that eye is your aiming eye. If the object is still not blocked out, then your other eye is your aiming eye.

c). Return the handle to the verticle position. Using caution., back away from the tree aiming at it. When you reach the point where you can see both the base and the top of the tree (as in the diagram below), **STOP.**



d). Measure the distance from where you have stopped, back to the tree's base. This measurement (in feet) will also be the height measurement (in feet) for the tree.

5. AGE — The true age of a tree can only be assessed by either cutting down the tree, or cutting out a large section (more than half) of the trunk. Of course, these are not steps that we would want to take. The tree's age can be fairly estimated by using a formula published by the International Society of

Arborists. After determing the tree's DBH in inches, multiply it by the designated factor given to certain species of trees.

| *Species* | *Factor* |
|---|---|
| Hedge Maple | 4 |
| Norway Maple | 4.5 |
| Red Maple | 4.5 |
| Silver Maple | 3 |
| Sugar Maple | 5.5 |
| Green Ash | 4 |
| Kentucky Coffee | 3 |
| Common Horse Chestnut | 8 |
| Sweet Gum | 4 |
| Tulip == | 3 |
| London Plane | 4 |
| Callery Pear | 3 |
| Red Oak | 4 |
| Pin Oak | 3 |
| Linden | 3 |
| American Elm | 4 |
| Any other | 4 |

For example: A Norway Maple tree has been determined to have a DBH of 22 inches. The Norway Maple age factor is 4.5. (22 x 4.5 = 99.0) The Norway Maple is approximately 99 years old.

There are many factors that have a bearing on the age of a street tree. These are mainly its ability to take up water and nutrients; as well as its ability to deal with the stresses of life in an urban environment. The distance between the annual growth rings of a tree give evidence on how well it accomplished the above. It is most likely safe to assume that using a factor of 4.5 for all street trees would be all right

6. CONDITION — Determing the health condition of a tree is an exact science to the professional. A number of different things have to be taken into consideration. For the purpose of this survey, the following guide is to be used.

| *Condition* | *Reason* |
|---|---|
| GOOD | 90% of tree living, and there are no broken branches. |
| FAIR | 80-90% living, and three (3) or less branches are damaged. |

| | |
|---|---|
| POOR | Less than 80% living, and/or more than three (3) branches damaged. |
| DEAD | Little or no living branches. |

7. TREE PIT SIZE — Unfortunately, most street trees are confined to a small area cut into the area between the street curb and the building property line. It is the area that a newly planted and/or adolescent street tree's roots received their water and oxygen. This area is measured in square feet, multiplying its lenght by its width.

For example: A tree's pit (cut out area) length along the curb side measures sux (6) feet. Its width from the curb to bulding/property line measures four (4) feet. ( 6 x 4 = 24 sq. ft.) The size of the tree pit is twenty-four (24) square feet.

The city's Department of Parks and Recreation has the responsibility for our city's street trees. In their effort to help the street trees survive, they have required all newly constructed tree pits to be a minimum of five (5) fen by five (5) feet.

8. CUBIC FEET OF SOIL — This calculation shows the amount of soil that a street tree has available to contribute to its survival. Where a tree is gowing out in a meadow or open area, its roots will extend out over twice the extent of its spreading branches. As stated in your session on Basic Tree Biology, each part of a tree depends on the health of the other. The limiting of area that a tree's roots have to grow in, will also limit the amount of support it can provide to the rest of the tree. This support is both structural, and nutritional.

Due to the structure of the soil in the city's tree pits, the tree's roots rarely grow deeper than three (3) feet below the surface. Water and oxygen have a very hard time penetrating this soil; both of which are required for the root's survival. It is because of this that the depth factor of three (3) is used for calculating the amount of soil.

The formula used to determine the amount of immediate soil available to the tree is:

Length in feet, times width in feet, times the depth factor three (3). This will give you the cubic feet of soil (L xWxD= cu. ft. of soil)

For example: You are surveying a tree that has a tree pit measuring five feet (5) long and five feet (5) wide. 5 x 5 x 3 = 75 cu. ft. of soil in the tree's pit. Or a tree pit measuring eight (8) feet long by four (4) feet wide. 8 x 4 x 3 = 96 cu. ft. of soil in the tree's pit.

9. REMARKS — In this section you are able to note other physical conditions that have or may have a negative effect on the trees being surveyed. Some of these physical conditions are:

    a). Overhead utility lines (wires) such as electric, telephone, fire and cable television lines.

    b). Street lights; when their function of providing light at times of darkness are inhibited by the tree or its branches. As the safety of the public is a high priority, the tree will have to be pruned back.

    c). Traffic lights, stop signs, street signs for names, parking restrcitions and directions that the public has to be able to see in order to comply.

    d). Physical and/or natural damage to the tree's roots, trunk, and/or branches.

    e). Sidewalk conditions; cracked, broken, or lifted pavement.

    f). Any other comments that the surveyor feels are important to be known to the person that the survey is going to.

STREET TREE SURVEY
COMMUNITY BOARD #____

| (1) ADDRESSES | (2) SPECIES | (3) DBH inches | (4) HGT feet | (5) AGE years | (6) COND | (7) . TREE PIT SIZE LxW | (8) CU.FT. SOIL | (9) REMARKS |
|---|---|---|---|---|---|---|---|---|
| | | | | | | | | |
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TNY

PAGE TOTALS: NUMBER OF LIVE TREES ____ GOOD ___ FAIR ___ POOR ___ DEAD ___ AVERAGE AGE LIVE TREE ___
AVE. AGE DEAD TREE _____

# Session 6
# PLANTING A STREET TREE

There are four steps that one must go through in the street tree planting process. They include obtaining the appropriate planting permits, selecting the right kind of tree to meet the demands of the site, obtaining a specimen that meets the City's requirements, and finally getting the tree planted in the ground.

## STREET TREE PLANTING PERMITS

To get a street tree planted, one should call her or his local community board (for that number, call the Community Assistance Unit for information at (212) 788-7418) and ask for a Street Tree Request form. Fill out all the requested information including an approval from the property owner/management company in front of whose property the tree will be planted. Indicate if a tree pit already exists and if the pit requires that a stump or a dead tree be removed. You can also indicate the species of tree you would prefer by using Appendix II to help you select an appropriate one for the site in question.

Before a street tree can be planted, the planting site must, by law, be approved and a street tree planting permit obtained from the NYCDPR If you want to plant a tree in an empty existing pit, you only need a street tree planting permit from the NYCDPR

To obtain a street tree planting permit, call your Borough Forestry Office:

| | | | |
|---|---|---|---|
| Bronx | (718) 430-1876 | Manhattan | (212) 860-1844 |
| Brooklyn | (718) 768-0224 | Queens | (718) 699-0873 |
| | Staten Island | (718) 816-9193 | |

If you want to plant a tree in a tree lawn (a strip of grass or unpaved area between the curb and the sidewalk) or to make an opening in a paved area to create a pit to plant a tree in, you must have approval from the Parks Department as well as an inspection of the site by an official with the Department of Transportation to determine proximity to electical wires and buried utility lines and vaults. If the site is acceptable, the inspectors will provide the appropriate permits. The permit costs $135 per block, whether there are one or several pits to be dug on the block NOTE: The fee does not include the cost of removing pavement. To obtain both permits, call your Borough Forestry Office listed above and your Borough DOT Permit Office:

| | | | |
|---|---|---|---|
| Bronx | (718) 931-3388 | Manhattan | (212) 323-8549 |
| Brooklyn | (718) 780-8088 | Queens | (718) 520-3223 |
| | Staten Island | (718) 390-5153 | |

If you pay for it yourself, you may hire a landscape contractor to plant a tree. The average price for a 21/2-inch caliper tree, installed (without breaking pavement or removing a stump) with a one-year guarantee is about $600. Provided in Appendix IV is a list of tree planting contractors as well as tree pruning contractors. Appendix V has information on other horticultural assistance sources available to NYC residents. NOTE: In certain landmark areas, street trees are presently not allowed - call the Landmarks Preservation Commission at (212) 553-1100. For an additional fee of 20% of the cost of a tree, TNY, (212) 227-1887, will find a bonded contractor, secure the permits, and get a tree planted for you.

Note, any tree planted within NYC's right-of-way automatically becomes the property of the City, regardless of who plants it.

## CHOOSING A TREE

When choosing which kind of tree to plant, one should consider.

- What ? Ideally, the soil inside and outside the tree pit has good fertility, drainage, aeration, and water-holding capacity. Because this is often not the case, only a relatively small number of trees are adapted to life on the street. In locations where special problems occur, choose a species that is especially adapted to it. If a puddle remains over the planting area a day after a rain, the site is poorly drained - choose a species adapted to this condition. If the soil is sandy and dry, then choose a drought resistant tree. Also, many trees need an acid (low pH) soil. Although the native soil in the NYC area is acid, many urban soils have cement and mortar rubble mixed into them and therefore have become quite alkaline. If in doubt, a soil sample may be taken and sent for testing of fertility and pH to the Soils Lab, Department of Floriculture and Ornamental Horticulture, Room 20 Plant Science Building, Cornell University, Ithaca, NY 14853. For instructions, call (607)255-4532. The fee is $15.00. If the soil is infertile and/or alkaline, choose a tree which tolerates these conditions. If the planting site is on a street that has a history of frequently being de-iced with roadsalt then choose a salt resistant species.

- How much above ground space does the Lt.= have to grow in? If there are low electrical wires, use a shorter growing species. If there is little distance (less than 8-10 feet) between where the tree will be planted and a building or between the tree and a street that has lots of truck traffic that can break off lower branches, choose a tree with more upright branching or a fastigiate or columnar shape.

- How much below ground space? *A large tree demands at least 1,000 cubic feet of soil* to meet its water requirement. Because the volume of a standard 4 feet by 4 feet by 3 feet tree pit is 48 cubic feet, a tree's roots must grow far outside the tree pit to find water or else it will die during times of drought. Most of the space outside the tree pit cannot be taken up by buried pipes, utility lines, etc. If it is, choose a smaller-growing species.

After determining the conditions of the planting site, select a tree that is appropriate. Use the tree selection table in Appendix II to determine which tree(s) is(are) best for your site.

## REQUIREMENTS OF A STREET TREE

A tree planted as a street tree:

- Must be at least 2½ inches in caliper.
- Must be planted B&B (before it's in full leaf) or container-grown. If container -grown, may be planted at any time of the year, but the root ball must be scored vigorously with a hand cultivator or serrated knife to prevent encircling roots from girdling the tree as it matures.
- Must be in good health, and, if in leaf, without many wilted, damaged, or diseased leaves; if the trunk is wrapped, unwrap and check for mold or damage to the bark.
- Must have a straight trunk and a well-shaped crown with no major broken branches.

## PLANTING A TREE

Trees that are B&B should be planted in the spring before leafing out or in the fall before the ground freezes. A few trees, like Oak, Cherry, and Golden Raintree, are best planted in the spring only. To plant a tree properly (Figure **6.1):**

A. Dig a hole to a depth equal to the height of the tree's root ball but as wide as possible. Remember, most of a tree's roots grow near the surface and far outside the bounds of the pit. If a stump is present, it must be removed; stumps up to 3 inches can be hand dug, larger than this must be professionally dug. All rubble must be removed from the pit.

B. Place the tree in the center of the hole (Figure 6.1). A 2½-inch caliper, B&B tree weighs roughly 300 pounds, meaning it will take a few strong people to move the tree into place. For B&B material, remove all metal root ball cages, plastic burlap, and ties

(Figure6.1). For containerized material, the pot must be removed. Remember to vigorously score the roots of container-grown plants with a hand cultivator to prevent encircli_g roots from girdling the plant in the future.

C.

(5-10% by volume): if the soil is made too "nice", the tree's roots will not grow out of the pit. Pack the soil firmly with your foot around the root ball during backfilling. Once the soil has settled, make sure the new soil line is not higher than the original planting line . The trunk flare should be visible.

D. Stake the tree. Although it is no longer recommended that trees in low-traffic areas be staked, street trees should be staked because the stakes help protect them from car doors or people dislodging the trees. Cedar stakes should be placed on the upstreet and downstreet sides of the tree. Wire or preferably jute twine should be threaded through 1-foot sections of rubber hose. Position the rubber hose against the trunk at a height of 4-5 feet and tie the wire or twine taut around one stake. Repeat for the other stake.

E. Water the tree

base of the tree. Water deeply once a week, twice a week during hot., dry weather.

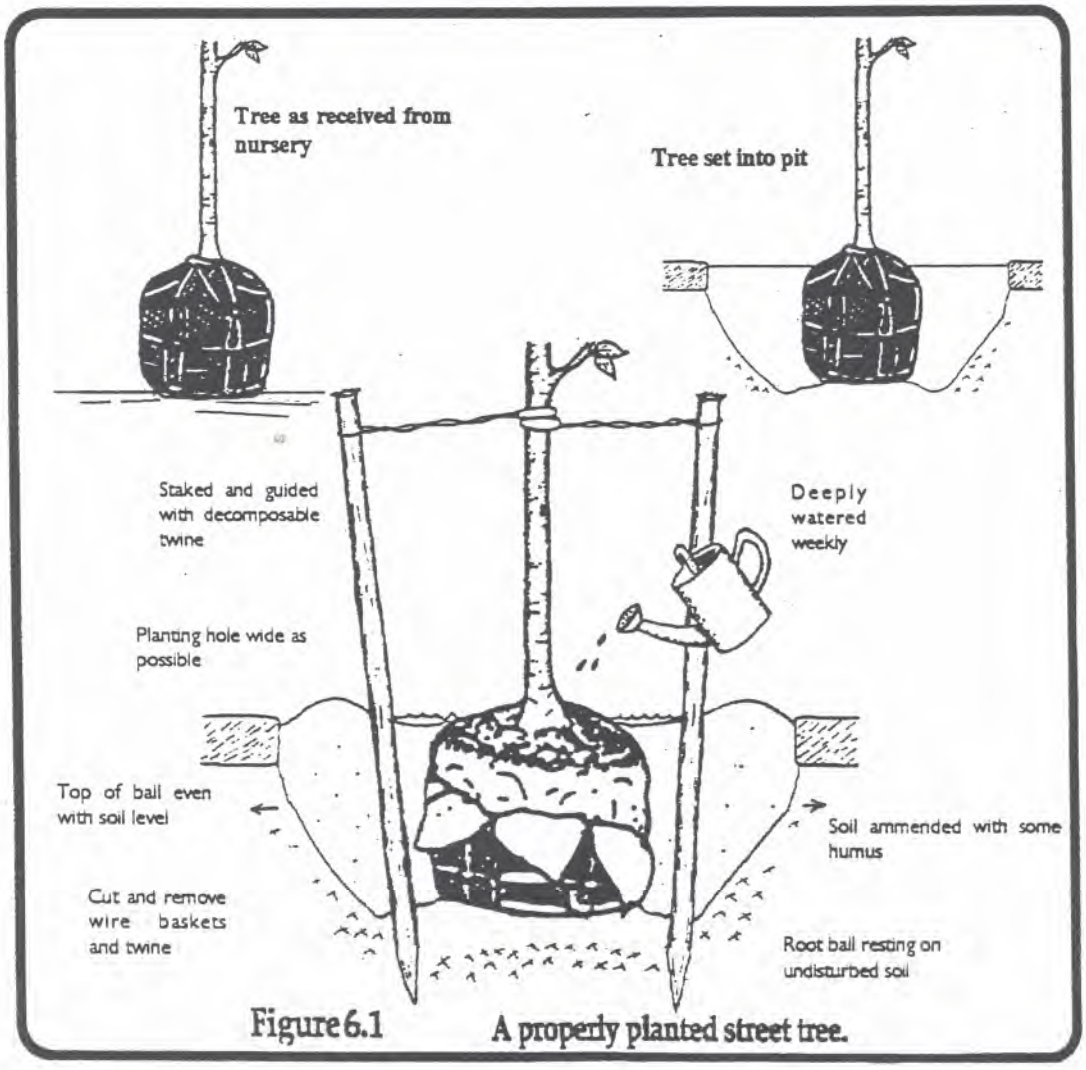



Figure 6.1 A properly planted street tree.

## SPECIAL TOPIC - Destruction of the Rainforests

**The Destruction of the Tropical Rainforests** has serious implications for all of us who live on this planet. Vast areas of the Amazon River Basin in Brazil, Equatorial Africa, Malaysia, Indonesia, and other places are being cleared at an astonishing rate. In the Amazon, an area equivalent in size to the entire state of Pennsylvania is cleared and burned *every year*.

At this rate, nearly all the earth's rainforests will be gone in ten years. Most of the clearing is done by peasants who need land to farm and raise cattle. Unfortunately, the soil in these forests is almost pure clay and without the protection of the forest, becomes like cement in the baking tropical sun. As a result, the soil is useful for only 1 to 2 years. After this, farmers are forced to clear even more land, leaving behind barren earth. Rainforest devastation adds to global warming not only by reducing the numbers of trees that can absorb carbon dioxide from the atmosphere but by producing more carbon dioxide when the trees are burned. Another tragedy is the destruction of the extremely rich diversity of plants and animals found only in these forests. Many plants have medicinal qualities and it is believed that the cures for many diseases like cancer can be found there.

## ADDITIONAL DEFINITIONS

Caliper. The diameter of a newly planted tree's trunk, as measured by nurseries, at 6 inches above the planting line. Exisiting trees are measured 41/2 feet (DBH) above ground.

Guy wires. Wire or twine tied to wooden stakes used to secure a newly planted tree to keep it in an upright position.

## SELF-HELP QUIZ 5

1. You've decided to get a new street tree. Good for you. Which of the following *shouldn't* you do?

   a. Have it planted by the Parks Department or by a certified contractor.
   b. Obtain a tree 21/2 inches or larger in caliper with a strong, straight, and undamaged trunk.
   c. Remove all plastic burlap, ties, and metal collars and, if container-grown, vigorously score the root ball to prevent girdling roots.
   d. Get a tree with lots of dead, damaged, and diseased branches as well as crowded and competing branches so that you can practice your pruning techniques.

2. When you spot a large street tree that is either dead, severely damaged, diseased, and/or dangerous, it is best to report it to:

   a. The Mayor.
   b. Your Borough's Forestry Office of the Department of Parks and Recreation.
   c. The Department of Environmental Protection.
   d. Your mother.

3. By putting up tree pit guards, cultivating the soil, and planting flowers in the tree pit, you are:

   a. Doing nothing that will truly help the tree.
   b. Not only beautifying your street, but also showing everyone in the most visible way that someone cares for the tree.
   c. Helping to ensure that the tree will receive enough water because the flowers by wilting will indicate when the soil is dry.
   d. b and c.

4. Guy wires wrapped around a tree's trunk should be removed:

   a. When they biodegrade.
   b. When they go out of fashion (Upper Fast Side only).
   c. After one year so as to avoid cutting into the bark and girdling the tree.
   d. By decapitating the tree and slipping the wires off the stump.

5. Using Appendix IV, who might you employ to plant a street tree in front of your home?

   a. New York Botanical Garden.
   b. Cornell Cooperative Extension.
   c. Rosedale Nurseries.
   d. Your mother.

6. Before breaking up pavement to plant a tree in a streetside location, one:

   a. Need do nothing — just sneak out after dark, jackhammer a hole in the pavement, and jam a tree into the spot.
   b. Obtain a street tree planting permit from your Borough's Forestry Office of the Department of Parks and Recreation.
   c. Obtain a pavement breaking permit from your Borough's Permit Office of the Department of Transportation.
   d. b and c.

7. When you plant a new street tree it should be "B&B". What does "B&B" mean?

   a. "Big and Beautiful" — picture perfect, at least 15 feet tall.
   b. "Black and Blue" — somewhat bruised and damaged to better prepare it for the rigors of urban life.
   c. "Broad and Budded" — a specimen that is large and well budded.
   d. "Balled and Burlapped" — with its soil ball intact and wrapped in burlap.

8. When selecting the kind of tree that is suitable for planting in front of your house, you should:

   a. Determine what the soil conditions are, e.g., dry, high alkaline, etc.
   b. Determine how much above ground space is available.
   c. Determine how much below ground space is available.
   d. All of the above

9. List the five steps in properly planting a tree.

**a.**
**b.**
**c.**
**d.**
e.

**Fill in the Blank.**

**10.** The destruction of the tropical rainforests is a tragedy with global consequences. The cutting and burning of the rainforest trees add to the increase of carbon dioxide in the atmosphere in two ways:
1) _____ and,
2) _____.
The rainforests are also home to many of the world's species of plants and animals. It is felt that some of these plants may hold the cure for _____ and other diseases

# Session Seven
# PRUNING A STREET TREE

The art of tree pruning combines aesthetics with technique and common sense. Before pruning a street tree, one must know the basic equipment as well as why, what, when, and how to prune a tree. Also, there are safety rules and City regulations as well as guidelines and proper etiquette that must be followed when pruning a street tree.

## PRUNING EQUIPMENT

For the complete care of street trees, there are many tools in the Citizen Pruner's arsenal. Included here are not only tools and equipment used for pruning, but also those things useful in the planting and cultivating of street trees. These tools include (Figure 7.1):

- Pruning shears (hand pruners) - For cutting back or removing branches ½ inch or less in diameter.
- Lopping shears - For cutting back branches under 1 inch, and cut up brush.
- Folding saw - For removing branches, ½ inch and larger.
- Pole pruner - Very useful for pruning higher branches from ground levels; usually equipped with cross-cut pruners and a saw; the telescoping pole must have a locking device.
- Wire-cutters and sheet metal snips - For removing guy wires and sheet metal collars, to prevent girdling of the tree.
- Hand cultivator - A 3-pronged, short-handled tool for loosening tree pit soil.
- Trowel - For planting bulbs, ground covers, etc.
- Spade - A pointed shovel for loosening and breaking up soil.

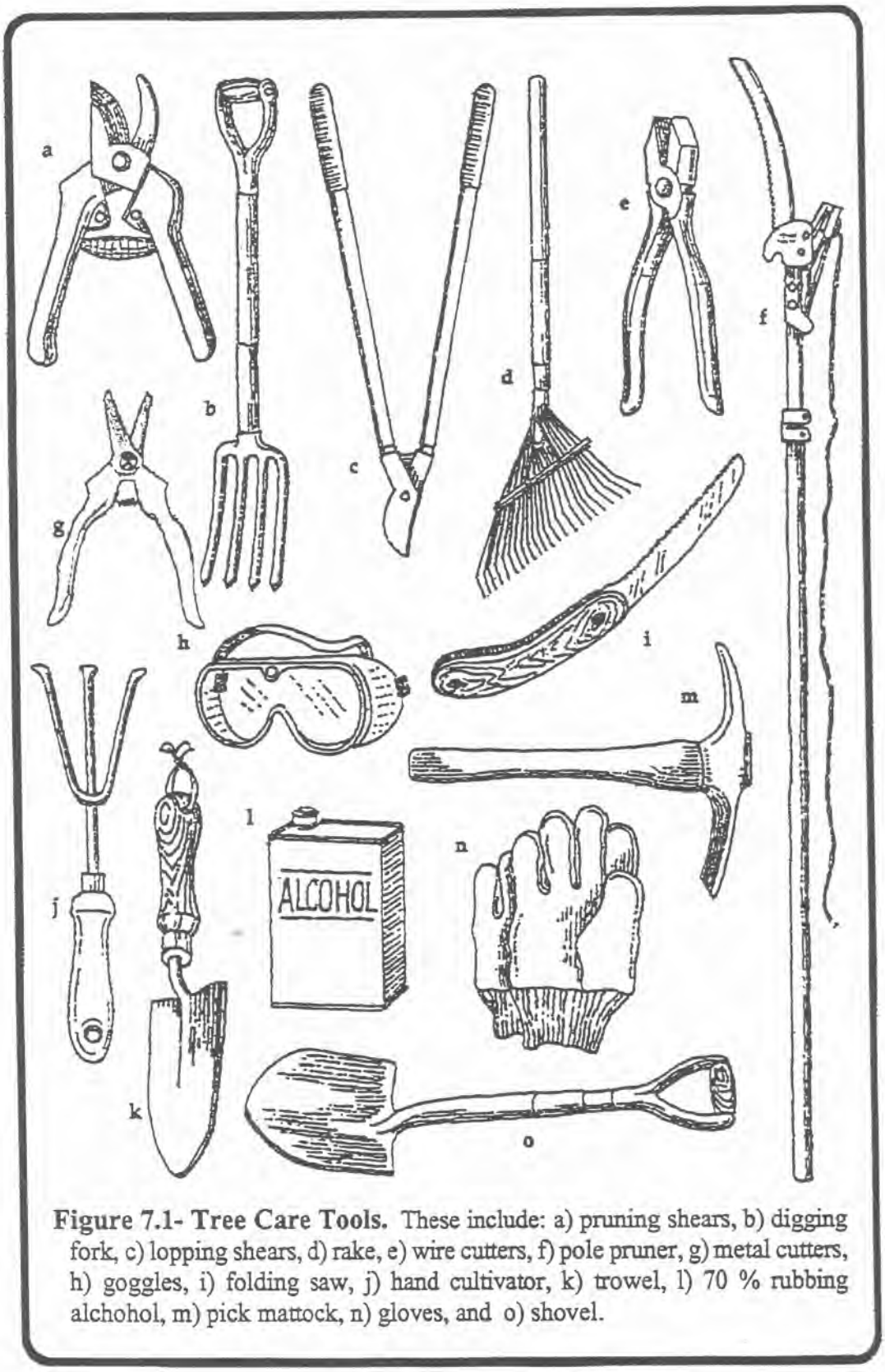



**Figure 7.1- Tree Care Tools.** These include: a) pruning shears, b) digging fork, c) lopping shears, d) rake, e) wire cutters, f) pole pruner, g) metal cutters, h) goggles, i) folding saw, j) hand cultivator, k) trowel, l) 70 % rubbing alchohol, m) pick mattock, n) gloves, and o) shovel.

- Digging fork - Similar to a pitchfork, but its tines are thicker for loosening soil.

- Pick Mattock - Similar to a pick axe, but with a wider blade for digging; very effective in breaking up compacted soil too hard for a spade and is used to dig a hole for planting a street tree; watch where you swing it to avoid injuring others nearby.

- Rake, dust pan, and broom - For cleaning up the tree pit area after the job is done.

- Goggles - For adequate eye protection.

- Good gloves - Washable leather ones are the best.

- 70% Rubbing Alcohol - For disinfecting tools used to prune diseased branches.

To properly care for tools:

A. Clean the tools after use.

B. Oil tools to prevent rusting - do not leave them outside.

C. Keep all blade surfaces sharp.

D. Store tools in a safe and dry place.

## WHY PRUNE

Pruning a tree can:

- Remove dangerous limbs that can fall and injure pedestrians and damage property.

- Control and prevent diseases insects, fungi, and bacteria such as galls (tumor-like growths) and heartrot (the rotting of the heartwood), thereby increasing the tree's life span.

- Develop a stronger branching structure that resists damage and breakage, especially during storms.

- Improve the tree's aesthetics.

## WHAT TO PRUNE

Before you start to prune, analyze what the problems are. Since your pruning at any one time should not exceed 20% of all wood, you should plan your cuts before you begin. Always prune off branches that most obviously need to be removed. Note: BE CONSERVATIVE!!! - do not prune excessively, especially live wood. Remember that most street trees are existing in a very stressful situation. Excessive pruning only compounds their stress. Be thoughtful when you plan your cuts. You can always return again in approximately 2 years time.

These are the things that you should look for when pruning (Figure 7.2).

The 2 D's:

- Dead branches – Brittle, lacking green leaves. A dead twig when broken is brown inside, a live twig is green.

- Damaged living branches – Broken, sprung, or fractured.

After determing the 2 D's, look for these next problems:

- Stubs – From a branch that has been broken off or improperly pruned.

- Suckers and watersprouts – Branches that sprout from the roots or along the trunk and main branches. These are often a sign of a tree under stress. Before pruning any live wood, determine if this is a tree that is naturally prone to sprouting, e.g. *Gleditsia triacanthos*, Honey Locust. On a healthy, vigorously growing tree, suckers and watersprouts can be managed by selectively pruning in summer only. On a tree that is stressed DO NOT CUT Stressed trees use this form of growth as a survival strategy.

- Hangers – Branches that are bent or deformed and pointing downward.

- Rubbing branches – Two branches that are rubbing against each other. Usually the stronger branch is saved and the lesser one removed, but only if the larger branch is healthy and has a superior branch angle.

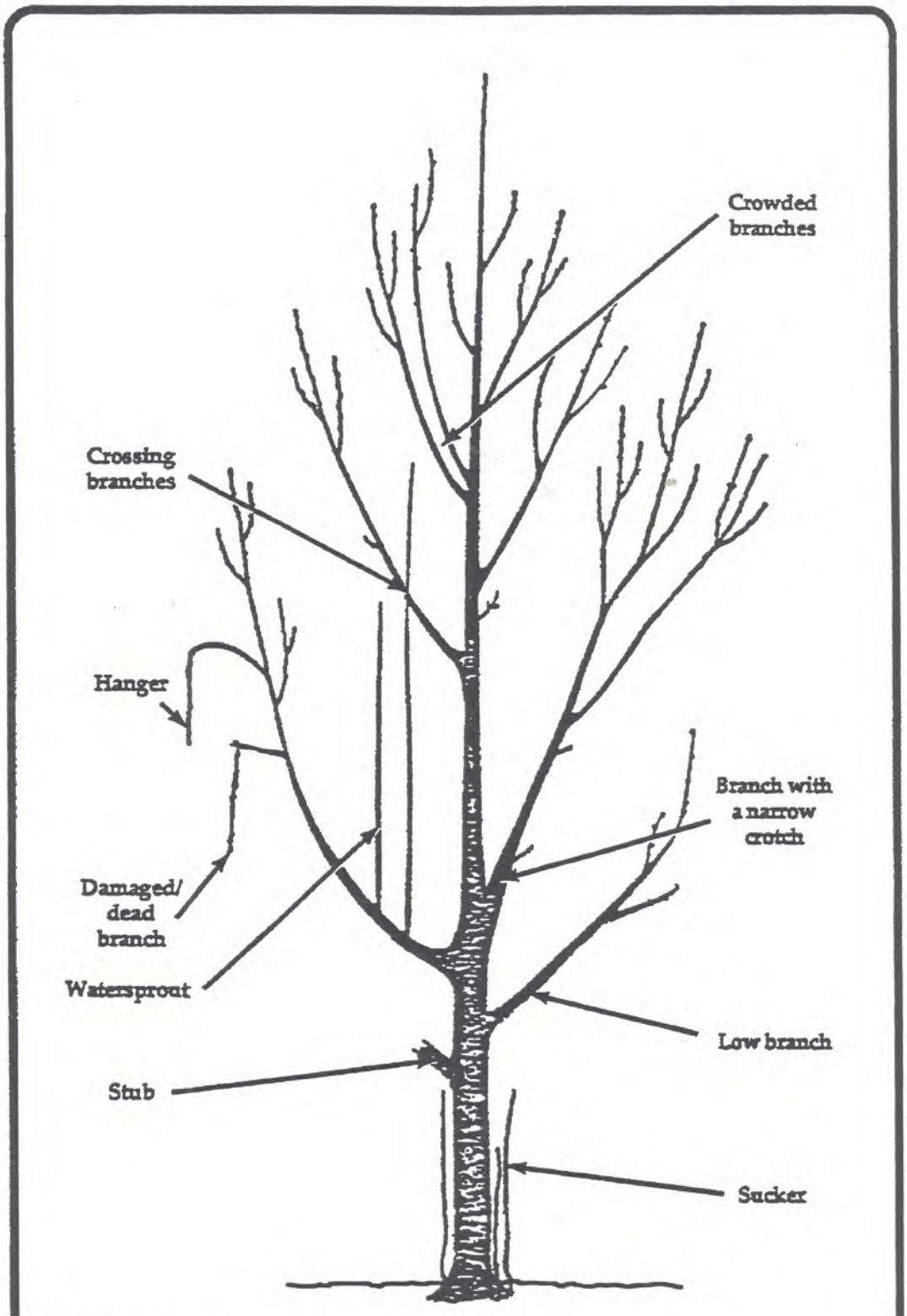



Figure 7.2 – Pruning and the tree's framework.

- Crowded branches – Keep in mind that branches will increase in diameter with time. Branches that will eventually grow into each other must be thinned out. Usually the stronger branch is saved and the lesser one removed, but only if the larger branch is healthy and has a superior branch angle.

- Low branches – These do not allow pedestrians and vehicles to pass underneath unimpeded. There should be at least a 7-foot clearance over sidewalks, more for branches overhanging streets.

- Branches with narrow crotch angles – the crotch angle is the angle formed where the branch meets the trunk. Angles of 20 degrees or less are too narrow for a strong joint to form. Such narrow joints will be very prone to breakage in ice storms, high winds, and hurricanes. A strong joint is made when the branch angle is at 10 o'clock or 2 o'clock. These should be pruned using very selective thinning especially with trees that are prone to this form of branching habit, e.g. *Pyrus calleryana*, Callery Pear. Before cutting, try to get a second opinion from a professional.

A couple of words of caution - Do not prune trees that are within the first year of planting because it will void the warranty. Do not prune stressed trees of any live branch material in spring - wait until late August. Do not get carried away with your pruning. If in doubt, be conservative

## WHEN TO PRUNE

In general, a healthy tree can be pruned at almost any time of the year at any season_ (Note the cautions mentior above.) The best time to prune most trees is in the dormant season when there are no leaves on the tree. At that time, it is especially easy to see problem branches. However, pruning should be done when the temperature is above 40 degrees — frozen wood does not callus over well. Current research has shown that trees form a callus most quickly during the period of active growth in spring and summer.

## HOW TO PRUNE

These are some principles that should always be kept in mind when pruning:

- Always prune back to live, healthy wood. Live twigs and branches have some green just underneath the bark and the wood is usually light in color. The wood of dead twigs is brown in color.
- Avoid tearing the bark surrounding the cut when pruning. Tearing the bark enlarges the wound.
- When pruning damaged twigs or branchlets, either prune back to an outfacing bud (Figure 7.3) or, more correctly, remove the twig or branchlet completely.
- Prune back to the branch bark collar, not flush to the stem when removing a branch. The collar is the swollen ring of tissue at the place where the branch is attached to the tree (Figure 7.4). A much smaller wound is made when pruning back to the collar than when pruning flush to the stem. A smaller wound forms a callus much more quickly than a large wound, thereby reducing the chance of decay-inducing organisms entering the tree and causing the rotting of the wood.

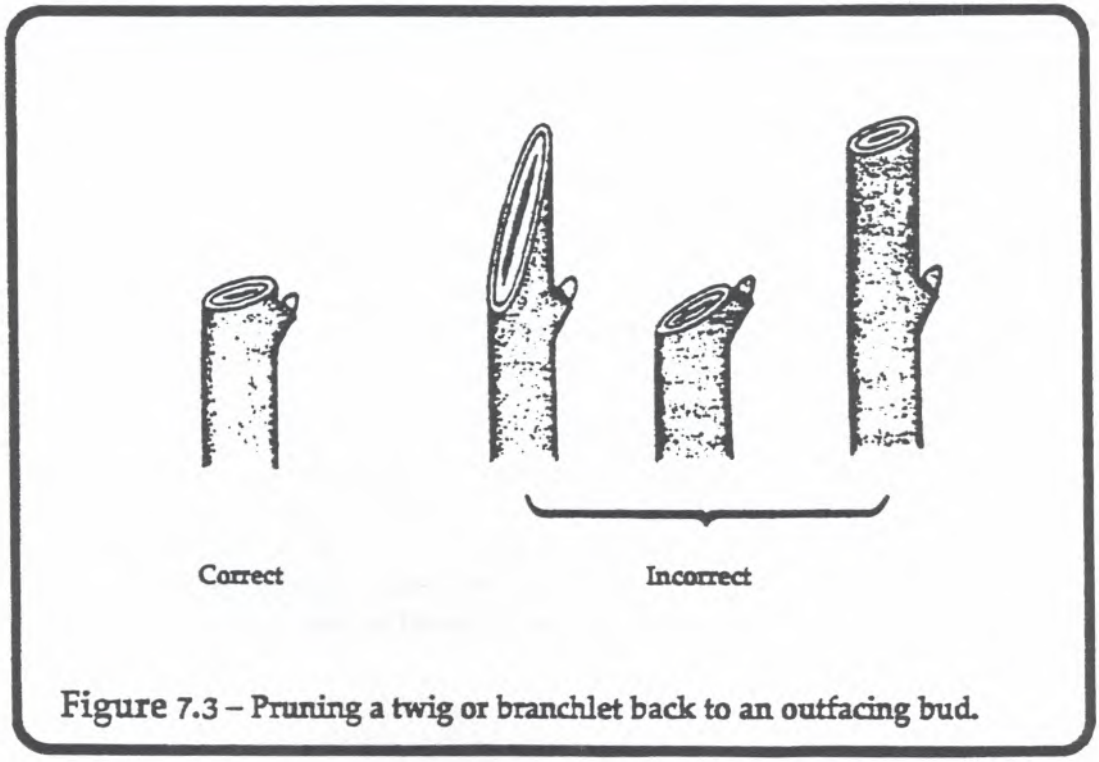



**Figure 7.3 – Pruning a twig or branchlet back to an outfacing bud.**

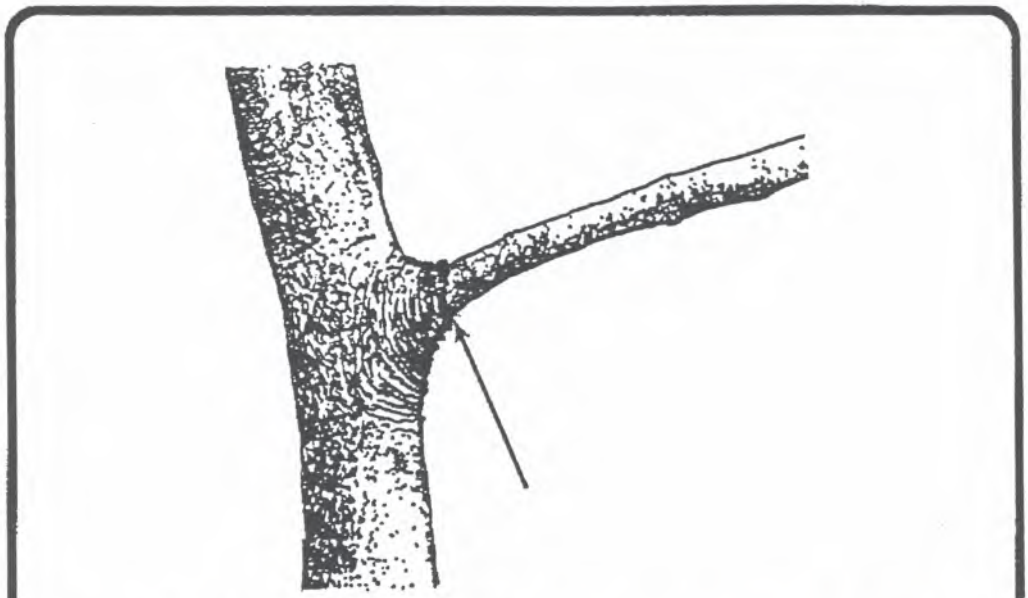


**Figure 7.4 – A branch bark collar is the swollen ring of tissue at a branch's base.**

NEVER LEAVE A STUB! When pruning off a branch, large or small, prune the branch where it is attached to the tree. A tree cannot callus over a stub until many years pass by when the stub has decayed and breaks off. However, it is still best to err on the side of conservatism than to cut into or remove the branch bark collar. Cutting into the collar removes the branch protection zone which lies within the collar. This protection zone is one of a series of barriers that helps control the spread of pathogens from the branch into the trunk area.

Branches under 2 inches thick, cut back to live, healthy wood back to the next larger branch. If the tip of the twig or branchlet is damaged, then you can prune back to an outfacing bud (when pruned back to an infacing bud, there is a greater chance the new shoot will sprout from that bud and cross another branch). Most of the time, however, the entire twig or branch should be removed. For branches under 1/2 inch in diameter, use pruning shears. For branches larger than 1/2 inch, use a hand saw. Remember, never damage the branch bark collar - plan your cuts carefully.

For branches larger than 1 inch in diameter, use the three-cut method with a hand saw (Figure 7.5). This allows one to safely remove a heavy branch, which otherwise would probably strip the bark beneath it. Try to remove as many smaller branches attached to that large branch to reduce as much as possible the weight of the large branch. It helps to hold up the branch or have an assistant hold it up for you. Remove any loose strips of bark that tore away from the wood during cutting.


Figure 7.5 – The three-cut method used to prune off large branches.

## ADDITIONAL DEFINITIONS

**Branch bark collar.** The ring of tissue at the place where a branch is attached to the tree.

**Leader.** The highest main branch rising vertically up the central axis of a tree.

**Sucker.** A new shoot that sprouts from a tree's roots.

**Watersprout.** A new shoot that sprouts and grows from the trunk and/or main branches.

## SELF-HELP QUIZ 6

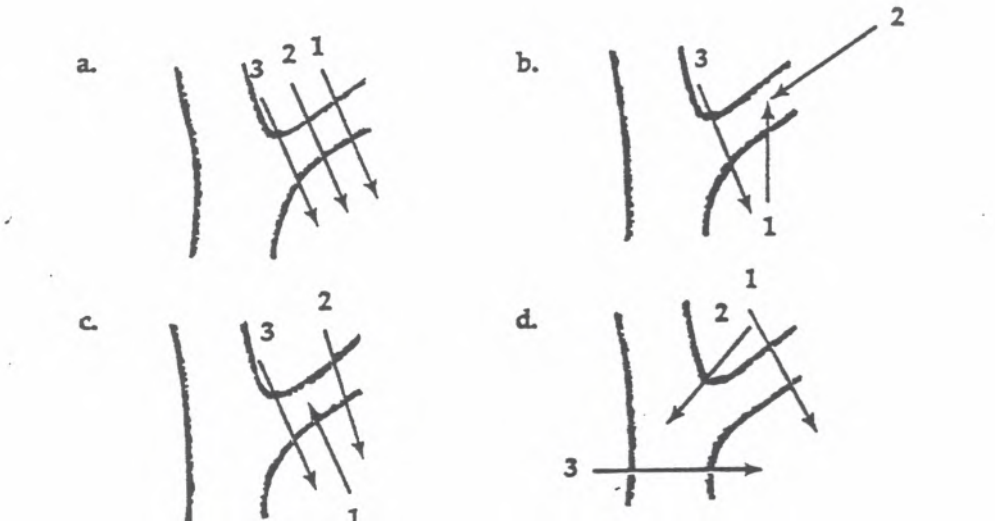
1. When pruning a branch that is a 1/4 inch in diameter, you should use:

   a. Your teeth.
   b. Wire cutters.
   c. Pruning shears.
   d. A folding saw.

2. The blades of cutting tools can be preserved by:

a. Applying the proper oil to them.
b. Immersing them in hot salt water.
c. Storing them in magic pyramids.
d. Using them on metal tree guards.

3. Using the 3-cut method, how should you prune a heavy branch?




4. There you are, with your trusty folding saw clasped firmly in one of your gloved hands. You see two branches on a tree which are rubbing against one another. You should:

a. Do nothing — no harm will happen to either branch.
b. Slash wildly at both branches. The weaker will give way before the stronger.
c. Remove both branches.
d. Remove the thinner, less important branch.

5. While you are eagerly pruning a street tree, a passerby comes up to you and asks you what you are doing. You should:

a. Ignore the person and continue working.
b. Laugh hysterically in the person's face and act like you're mentally deranged.
c. Yell obscenities while threatening the person with your pruning saw.
d. Politely inform the person that you are a certified Citizen Pruner authorized by the NYC Department of Parks and Recreation, show the person your CP ID card in your wallet, explain that what you are doing is good for the tree and why it is important, invite the person to become a Citizen Pruner, and thank her/him for her/his concern.

6. When cutting a branch off a tree, you should:

   a. Never leave a stub by pruning at the branch bark collar (the swollen ring of tissue at the point where the branch is attached to the tree).
   b. Avoid tearing the bark.
   c. Prune back to live, healthy wood.
   d. All of the above.

7. When pruning a tree, you should *not:*

   a. Thin out crossing and crowded branches.
   b. Prune out dead and damaged branches and remove suckers and watersprouts selectively from a healthy tree.
   c. Remove branches with narrow crotch angles.
   d. Randomly cut out branches to open up the crown.

8. You can prime a tree at almost anytime of the year.

   a. True.
   b. False

9. When pruning a tree, one needs to identify problems that need to be pruned out. These include the 2 D's. What are the 2 D's?

   a.
   **b.**

10. List five more things that should be pruned out of a tree.

   a.
   b.
   **c.**
   **d.**
   *e.*

# Session Eight
# SAFETY RULES AND OTHER TIPS

## SAFETY RULES WHEN PRUNING A TREE

Always follow these rules:

- Select the proper tool for each task. The wrong tool may increase the risk of damage to the tree and the tool.

- Remember: Tools are sharp! When not in use, your saw should be folded and your shears in its sheath. Do not leave tools lying on the sidewalk or on cars. Do not allow anyone who is not a Citizen Pruner to handle or use your tools.

- Sharp, clean tools make work easier and safer. If a tool is damaged, stop using it. Always check your saw for a loose blade, especially when using it for the first time.

- Always stand on the sidewalk when working. Do not stand on a ladder or trash can or climb a tree. Allow plenty of room for hand and body motions. Place each branch carefully on the ground; do not let branches fall. Even small branches could injure a passerby or damage private property.

- Be extremely careful when using a polesaw. The polesaw is essentially a long pole with a sharp saw at one end. Since it can be a little difficult to balance, do not allow the saw to tip down to the ground uncontrolably. Recommended for use by advanced pruners only.

- Dispose of branches properly by cutting them into 3 foot pieces using a lopping shear or saw; metal collars and wires should be placed in a garbage bin or other safe container. Provision for returning stakes in good condition to the Division of Forestry in your borough's Parks Department must be made at least 24 hours in advance. Stakes in poor condition must be cut into pieces and placed in closed garbage bins or other safe containers.

- Wear washable gloves when cleaning a tree pit, and wash gloves and hands carefully when your job is done. Diseases, particularly from animal waste, may be transmitted to you or others.

- Wear long sleeves or some other protection on your arms when removing metal collars.

- Wear a hat, preferably a hard hat, but at the very least, wear a cap of some sort.

- Wear goggles if you are working with a hand saw or a pole saw. Sawing wood creates saw dust which can easily find its way into your eyes.

## CITIZEN PRUNER REGULATIONS

The following regulations are printed on the back of the Citizen Pruner Certificate and must be followed.

- You are authorized to prune the following from a New York City street tree or tree growing in a park (pruning park trees requires prior notification of the park's administrator):

  Dead and damaged branches.

  Suckers and watersprouts.

  The least healthy of two branches crossing against each other.

  Crowded branches.

  Branches that have narrow crotches.

  Branches that obstruct pedestrian passage and/or vehicular traffic.

- You may prune only with the following tools: a 12-inch folding saw, pruning shears. Lopping shears, and pole saws are recommended for use by advanced pruners.

- You may prune only from ground level.

- Do not prune trees that have been planted during the past 12 months because such pruning will void the tree's warantee.

- You must disinfect pruning tools with denatured alcohol after pruning a diseased branch.

- You may remove metal collars, stakes, and guy wires from street trees after the trees have been planted for one year. Disposal of collars, guy-wires and stakes must be in accordance with your borough Division of Forestry's policy. If the stakes are not to be picked up, then they must be cut into 3-foot lengths for street collection.

- Safety rules are to be observed at all times.

- Report to the homeowner as well as the borough Division of Forestry, Department of Parks and Recreation, all dead, dangerous, or diseased trees that may cause damage to people or property.

- If there is evidence of street tree care needed on a block, you must ask permission from the block residents before pruning.

We request that you keep track of the trees and/or tree pits you have worked on and when you did the work. Trees New York has "Citizen Pruner Tree Work Evaluation" forms that we can make available to all Citizen Pruners. We maintain a data file for the work Citizen Pruners are doing and when the work was done.

Your certificate is valid for five years. After this period, you will need to be recertified. To take the recertification seminars, contact TNY. Failure to comply with the above regulations will result in automatic revocation of the certificate.

## ETIQUETTE AND PUBLIC RELATIONS

Here are some tips on good manners as a Citizen Pruner.

- Do not block the sidewalk when working.

- If you decide it is necessary to remove a large branch, prune off as many small branches growing off the large branch as possible and bundle or immediately discard them. Not only does doing this reduce the weight of the branch to be cut, it also makes the branch look less important. This psychological tactic might prevent a passerby from becoming alarmed.

- Always be polite to passersby and take time to talk to them. Many people are concerned about street trees, especially if it is the tree right in front of their home. Most people are positive, a few are negative. Keep in mind that you are an ambassador on behalf of Trees New York - you may be able to recruit new volunteers to help care for our street trees.

- Show your Citizen Pruner ID to anyone who questions what you are doing and explain that you have taken a course and an exam for certification. Inform them that what you are doing is best for the tree. Emphasize that you have been authorized by the NYC Department of Parks and Recreation and Trees New York to prune street trees. Thank them for being concerned.

- Discontinue pruning if resistance continues.

## MORE STREET TREE CARE TIPS

Other than pruning, there are several things that can be done to improve a tree's health and chances of survival.

### Dealing with the Paraphernalia of Recently Planted Street Trees

Girdling from guy wires, metal collars**, and tree grat**es, are leading causes of death of young, healthy streets trees.

This hardware can girdle a tree. As the tree grows, its trunk increases in diameter due to the annual production of xylem and phloem tissue by the cambium. Once the trunk gets so large that it fills up the space under the wire or collar, bark, phloem, and cambium are pressed against the hardware and are killed. Food synthesized in the leaves cannot move down the stem to the roots. Without food, the roots die and without live roots, the tree dies. So, REMOVE WIRES AFTER ONE YEAR AND COLLARS, GRATES, AND CAGES BEFORE THEY START TO GIRDLE THE TRUNK.

Be careful when removing guy wires and stakes! First, remove the guy wires by pushing the stakes toward the tree (this removes the tension from the wires), then snip the wires. If the wires aren't slack, they could whip back at you. Remove the stakes and fill the holes with soil. Save the stakes for some other use or cut them up into 2-foot sections and place them in a trash can.

Collars must be removed before they cut into the bark. First try pulling the collar apart carefully at its seams; if that doesn't work, cut it away with tin snips.

Natural jute burlap will biodegrade finlike its plastic counterpart. Plastic burlap and ties must be removed carefully from the tree before planting!

Iron cages and tree pit grates. Tall, slender cages are attractive, but it is foolish to use them. In a matter of a few years, the tree trunk will have expanded enough to touch the cage and the cage will start to girdle the tree. Often the only way to remove them is to hire a welder to cut them off — this cutting process often damages the tree. The same is true for tree grates that do not have removable sections to allow for trunk

expansion. If you see a tree being girdled by a cage or grate, immediately inform the owner of the building where the tree is planted that the hardware must be removed before it is too late.

## Tree Pit Care

The following is a list of things that can be done to the tree pit that will help the tree growing in it. TNY's Adopt-A-Tree flyer (Figure 3.7) describes total tree care. Regular tree pit care is crucial to a street tree's well-being and will, more than anything else, promote a healthier, happier city tree.

- Cultivate the soil by loosening it gently with a spading fork or with a hand cultivator. Avoid damaging shallow tree roots. Smooth the soil so that no large lumps remain.

- Work humus into the soil to improve soil quality. One 40-pound bag per street tree pit will do the job. Remember, do not alter the soil level at the planting line - keep the trunk flare visible.

- Water the tree slowly and deeply for 15-20 minutes once a week - twice weekly during hot and/or dry weather from April through September if weekly rainfall has not been substabtial. Place a hose at the base of the tree using a slow flow of water. If no hose is available, use a bucket. Try to give the tree 15 to 20 gallons of water per watering. This is especially critical to newly planted trees.

- Mulch the soil. Mulch is a blanketing material, usually organic, placed on top of the soil. A mulch conserves water, discourages weeds, and when it breaks down it provides nutrients to the soil. Examples: shredded leaves, wood chips, bark chips, cut Christmas tree boughs. Mulch should not be more than 3 inches deep. Maintain a 6 inch well around the tree to keep the trunk flare visible.

- Install tree pit guards. This is a good way to protect soil in the tree pit from compaction by people walking on the tree pit. The guards greatly reduce problems from dogs and help protect any flowers or groundcover plants planted in the pit (see below). The most attractive guards are 1-foot tall iron hoops or wickets. A low wall made of bricks or granite blocks is also quite satisfactory. Although they can be somewhat expensive, they are very durable. Why not throw a block party to raise money for tree planting and the purchase of wickets?


Figure 3.7 – The Adopt-A-Tree flyer detailing total tree care.

- Plant groundcovers and flowers. Shallow-rooted annuals, bulbs, shade-loving perennials, and groundcovers will beautify any tree pit, converting it into a mini-garden. Planting flowers in the tree pit is the most visible way of showing that someone cares for the tree. Not only that, when annual flowers are grown in the tree pit, they must be watered, ensuring that the tree gets watered too. When they are dry, they will wilt, indicating that not only they need water but that the tree also needs water. The pit will need to be watered more deeply and more often. Whatever you plant, mix humus into the soil and, most importantly, mulch it! This is an excellent way to reduce the need to water and it really cuts down on weeding - a mulch pays for itself many times over. Also, a tree pit guard should be installed to protect the plants from being stepped on and killed. Appendix VI contains a list of groundcovers, perennials, and annuals that are especially suited for tree pits.

## SELF-HELP QUIZ 7

1. While you are eagerly pruning a street tree, a passerby comes up to you and asks you what you are doing. You should:

   a. Ignore the person and continue working.
   b. Laugh hysterically in the person's face and act like you're mentally deranged.
   c. Yell obscenities while threatening the person with your pruning saw.
   d. Politely inform the person that you are a certified Citizen Pruner authorized by the NYC Department of Parks and Recreation, show the person your CP ID card in your wallet, explain that what you are doing is good for the tree and why it is important, invite the person to become a Citizen Pruner, and thank her/him for her/his concern.

2. By putting up tree pit guards, cultivating the soil, and planting flowers in the tree pit, you are:

   a. Doing nothing that will truly help the tree.
   b. Not only beautifying your street, but also showing everyone in the most visible way that someone cares for the tree.
   c. Helping to ensure that the tree will receive enough water because the flowers by wilting will indicate when the soil is dry.
   d. b and c.

3. Guy wires wrapped around a tree's trunk should be removed:

a. When they biodegrade.
b. When they go out of fashion (Upper East Side only).
c. After one year so as to avoid cutting into the bark and girdling the tree.
d. By decapitating the tree and slipping the wires off the stump.

4. According to Appendix VI, which plants are some of the best choices to plant in a tree pit?

a. Rhododendrons and azaleas.
b. Roses, carnations, and gladiolas.
c. Ivy, hostas, and sweet alyssum.
d. Forsythia and junipers.

5. You can help your street tree grow better by:

a. Performing a Neo-Druid ritual on the winter solstice.
b. Allowing dogs to "fertilize" the tree.
c. Mixing in humus while cultivating the soil, applying a mulch, and surrounding the tree pit with a low barrier.
d. Peeling the bark off the tree.

**Fill in the Blank**

**6.** List the eight safety rules that must be observed while pruning a tree.

**a.**
**b.**
**c.**
d.
e.

h.

7. List the nine regulations you must follow as an official Citizen Pruner.

**a.**
**b.**
**c.**
**d.**
**e.**
**f.**

**h.**
i.

8. Pruning improves the appearance, health, and longevity of a tree. List six other things that you can do to help a tree survive and grow.

**a.**
**b.**
**c.**
**d.**
e.
**f.**

# Session Nine
# STREET TREE PROBLEMS

There are pests, diseases, and problems that commonly afflict street trees. Keep in mind that many problems are evident only during certain times of the year, especially from mid summer into the fall. Therefore, only a few can be found in a given location at a given time, so study the material and illustrations provided. Often more than one factor contributes to the decline and death of a tree. In the case where two of more stresses occur at one time, the combined effect on the tree is much worse than the effect of either one acting individually.

## WARNING SIGNS OF TREE STRESS

There are several general warning signs that indicate that a tree is suffering from a problem or pest. Increasing in severity, these include:

- Smaller-than-usual leaves and/or reduced shoot growth. Reduced shoot growth over time results in the overall stunting of the plant.
- Foliage damaged, eaten, or discolored.
- Excessive amount of suckers and /or watersprouts. Note: certain trees, such as *Acer ginnala*, Amur Maple, *Tilia spp.*, Lindens, and *Prunus spp.*, Crabapples tend to sucker even when healthy.
- Twig dieback.
- Branch dieback resulting in the thinning of the canopy.
- Defoliation. Most branches are leafless. If this condition persists for several growing seasons, the tree will die.

# A SURVEY OF COMMON STREET TREE PROBLEMS

Listed below are some of the most common pests effecting street trees. Suggested cures requiring the use of pesticides are *only* to be done by a contractor licensed to apply pesticide, not a Citizen Pruner. Disease and pest control are particularly helpful to a young tree and, because of it's small size, are easy to do. Problems on a large tree, however, can be prohibitively expensive to treat.

## Diseases

Anthracnose. Fungus attacking London Planetree, Flowering Dogwood, and sometimes Maples. Characterized by dead, brown sections of the leaf. Severe defoliation can occur in wet years. Can also cause cankers on branches and dieback. Treat with corrective pruning, sterilizing pruners between cuts.

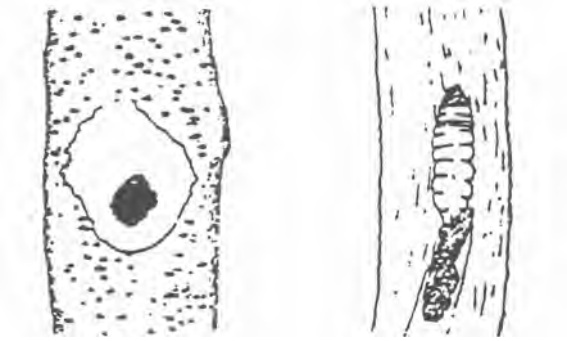
Nectria. Fungus attacking Norway Maple and Christine Buisman Elm (at least in Europe). Cankers form on branches and can be so large as to girdle the branch. If possible, prune off limb back to uninfected wood with sterilized pruners. Sprays are available.

Dutch Elm Disease. Fungus transmitted by Elm Bark Beetles. Has decimated American Elms across the country and can attack other Elms and Zelkova. Look for sudden yellowing and dieback of one or more branches (flagging). Immediate pruning or fungicide injection essential.

Verticillium. Soil-borne fungus causing leaves to wilt on older Norway Maples. There is little that can be done to save the tree. This disease gradually kills the trees over several years. Apply a high-nitrogen fertilizer in early spring to help slow down the progression of the disease.

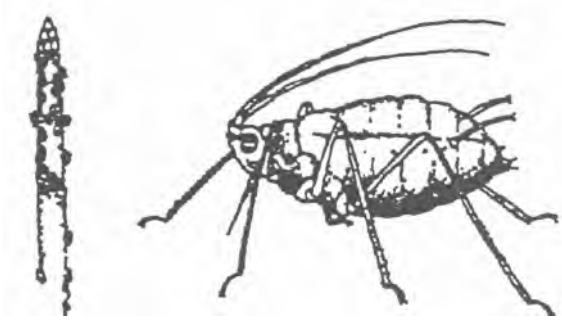
## Insects

Aphids. Tiny soft-bodied green or brown insects that accumulate on the tips of shoots and on leaves and stems, causing leaves to wilt or yellow. Their eggs are white and tiny. They feed on the plant's sap and excrete a sugary liquid called honeydew. Purchase lady bugs or use insecticidal soap.

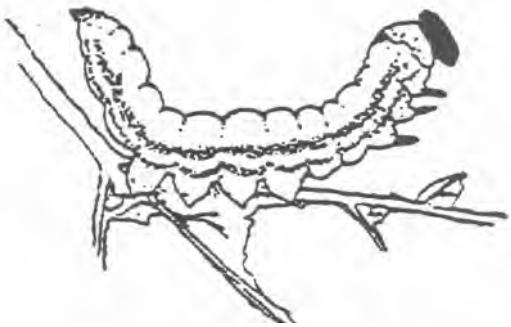


**Caterpillars (Gyspy Moth, etc.). Foliage** eaters on various species. Severe infestations can defoliate a tree and lead to death. Control with hand picking of larvae, stickum strips, sexual lures for adults or sprays. Look for egg masses in winter and remove them.

**Galls.** Abnormal tumorous growths on leaves or small branches, usually caused by insects, mites, or fungi. Unless excessive, rarely are galls a serious problem. Horned Oak Gall on Pin Oak can be a problem, where galls on twigs and branches are caused by a tiny wasp.

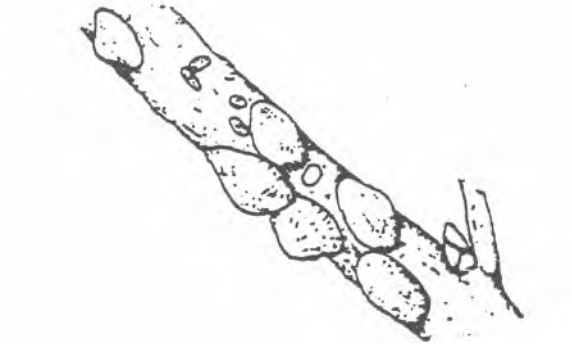


Borer. Larvae of certain species of beetle, moth, or fly bore into the trunk. If severe, their tunnels can girdle a tree. Ash, Crabapple, Dogwood, and Birch are susceptible. They attack already weakened trees. Look for holes bored in trunk, ream them with a wire to kill pests inside.



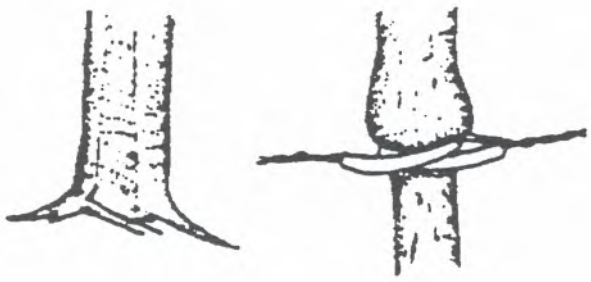
**Elm Leaf Beetle.** Attacks all Elms and Zelkovas. Chinese Elm is very susceptible in the certain areas and can be severely defoliated. The larvae eat the green portions of the leaves voraciously, leaving only a skeleton of veins. Look for 1/2-inch caterpillar-like larvae. Hand picking or sprays.

Mites. Extremely small insect-like arachnids with 8 legs (insects have 6). Look for numerous minute white dots on leaves as well as white eggs and webs on undersides of leaves. Leaves with heavy infestations turn_ spotted, yellow, papery. Most severe in hot, dry weather. Sprays available.

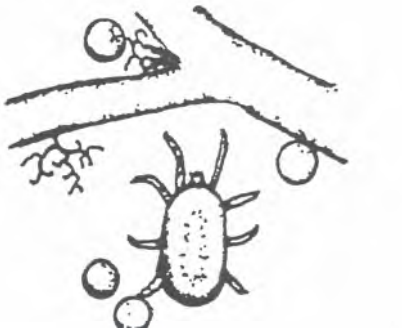


## Miscellaneous

Chlorosis. Chlorosis (or yellowing of the foliage) is a general sign of a tree suffering from a pest, disease, drought, or nutrient deficiency. In alkaline soils, Pin Oak suffers from iron deficiency and Red Maple from manganese deficiency - little can be done to help them.



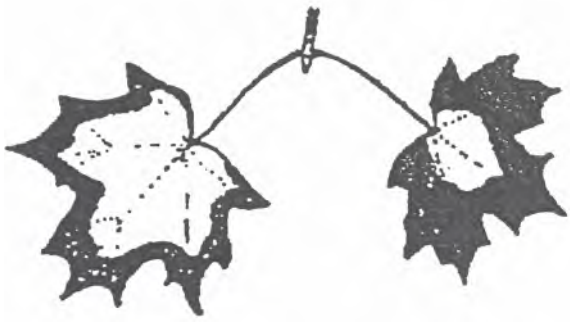
Plantbug. Very common on London Planetrees. They make tiny holes in leaves that are often so numerous they result in large holes and tears. That characteristic "smell" of Planetrees is from the Sycamore Plantbug's excretions. Does not usually endanger the tree and so is not usually treated.

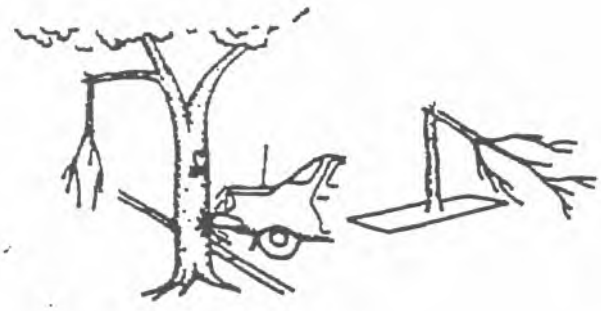


Scale. Small insects that have a hard shell. The head, thorax, and abdomen are indistinguishable. They attach to the trunk, branches, and twigs when young, then never move. I___ aphids, they feed on a plant's sap. Cherry and Ash are especially susceptible. Dormant oil in early spring.

Girdling. From guy wires, guard rails, bicycle locks, paving, etc. Lawnmowers and string trimmers also girdle a tree. Because Norway Maple is susceptible to self-girdling by its own roots, score roots of container-grown plants before planting.

Sun Scald. This condition is not caused by a pathogen or pest, but by drought and/or excess heat coming from surrounding buildings, pavement, and parked cars. Leaf edges turn dry, brown, and papery. Maples and Lindens are particularly susceptible. Mulch and water deeply.





Vandalism. Caused by people who do not respect trees. They break newly planted trees, snap branches, and tear off and gouge graffitti into the bark. Unintentional damage is caused by car doors and bumpers and lawnmowers bashing into the trunk and by trucks clipping-off branches.

For more information on the diseases and pests that effect trees, there are several books written on this topic listed in Appendix I. Some have numerous photographs that are very helpful for identification purposes.

# Epilogue
# HOW TO BE MORE EFFECTIVE AS A CITIZEN PRUNER

When you become certified as an official Citizen Pruner, you are authorized to prune and otherwise care for the street and park trees of New York City (other than those in Central Park and Prospect Park) for a period of five (5) years. We trust that you will do so with enthusiasm. To assist with your effectiveness as a Citizen Pruner, Trees New York has a few suggestions on how to get out there and use your skills.

## CITIZEN PRUNER OUTINGS

More than 3,700 people have been trained and certified as Citizen Pruners. With that number in mind, we realize that there are many variables on how and when Citizen Pruners get out there and prune. Some of our Pruners can never be found without a pair of work gloves, a hand pruner, and a folding saw. They are always on the lookout for a tree that is in dire straights, wherever and whenever. These Pruners do solo outings.

Many Citizen Pruners, however, feel more comfortable in going out with a buddy in a more planned fashion. To facilitate Pruners locating each other, we are always ready to provide a list of the certified Citizen Pruners in each zip code. Just drop a note to Trees New York's Volunteer Coordinator with your name, full mailing address, and daytime phone number and we will be happy to send you the information for your area.

Council on the Environment of New York City does a number of outings each year using certified Citizen Pruners and Trees New York has opened up the course outings to our certified Pruners. Check the Calendar listing in our Newsletter for dates.

The Volunteer Coordinator of TNY is always available to assist Pruners with questions, procedures, suggestions, etc. Call (212) 227-1887 and ask to speak with the Volunteer Coordinator.

## HOW TO GET YOUR COMMUNITY INVOLVED IN STREET TREE CARE

If you are part of a Block Association or an organized Community Group, we suggest that you involve your neighbors in caring for the green infrastructure that is such an important part of the community.

A. TNY provides publications for public awareness on the importance of street trees and their care. Distribute "Tree Tips" and "Tree Tips for Kids" at block parties, meetings, etc. Call TNY to arrange for a supply.

B. Use TNY's "Adopt-A-Tree" flyer to promote your community's assistance with tree pit care. Under your guidance and supervision, interested neighbors can provide much needed routine watering and soil cultivation.

C. Get local children involved in tree care and identification. "Tree Tips for Kids" is a wonderful tool for stimulating interest.

D. Hold a block fair to raise money for trees, tools and supplies.

E. Encourage people to ask questions and try to get a dialogue going.

F. Give testimony at the City Council — Board of Estimate budget hearings dealing with the Parks Department budget for tree planting and care. Call TNY at (212) 227-1887 and ask the Volunteer Coordinator for more information.

G. Call your local community board and ask for more trees to be planted and cared for. To contact your community board, call the Community Assistance Unit of the Office of the Mayor at (212) 788-7410.

## CONTINUING EDUCATION

As part of our ongoing commitment to our Citizen Pruners and the knowledge and training they bring to their community and the streets of New York City, TNY offers four advanced seminars every summer for certified Citizen Pruners. For those Pruners whose certificates have expired, completing three of the four seminars will allow TNY to recertify you.

# Appendix I
# RECOMMENDED BOOKS FOR CITIZEN PRUNERS

## URBAN FORESTRY

**Shading Our Cities.** 1989. Edited by Gary Moll & Sara Ebenreck, Island Press. A "must read" for anyone interested in improving the urban environment by planting trees. Includes practical advice from a variety of voices within the urban forestry and citizen action fields.

**The Simple Act of Planting a Tree.** 1990. Andy & Katie Lipkis, Jeremy P. Tarcher, Inc. Andy and Katie Lipkis, the founders and driving force behind California's "Tree People", share the secrets of their success. This book is both inspirational and an excellent step-by-step "how to" on improving the urban landscape.

**The Granite Garden: Urban Nature and Human Design. 1984. Anne** Whiston Spire, Basic Books, Inc. This book presents a clear picture of the city's natural environment. For anyone interested in gaining a better knowledge of urban ecology.

**Urban Forestry.** 1978. Gene W. Grey & Frederick Deneke, John Wiley & Sons, Inc. Designed as an overview for urban forestry professionals, this book covers the history and composition of the urban forest, benefits of the urban forest, and management from a resource perspective.

**Urban Forestry: Planning and Managing Urban Greenspaces.** 1988. Robert W. Miller, Prentice-Hall, Inc. A text and reference for urban forestry students and professionals, this book may be a little dry for the layperson.

## TREE PRUNING AND MAINTENANCE

**How to Prune Everything.** 1968. John Philip Baumgardt, William Morrow & Co. This inexpensive paperback covers the basic art of pruning as well as giving specific instructions for different tree species.

**Arboriculture: Care of Trees, Vines, and Shrubs.** 1991. Richard W. Harris, Prentice-Hall, Inc. Considered to be the bible among tree care professionals, this technically oriented book discusses the overall benefits of landscaping, plant growth and forms, selection, planting, long term management, and problems associated with landscape plantings.

**Tree Maintenance.** 1988. Pascal P. Pirone, Oxford University Press of New York. Another fine technical reference from a respected expert in the tree care field. Both this and the Harris text are expensive but worthwhile for anyone interested in a well-stocked library on the subject.

**Tree Pruning: A Worldwide Photo Guide.** 1989. Alex L. Shigo, Shigo & Trees, Associates. Alex Shigo, a world-reknowned expert in the field of tree decay, has put together a book aimed at presenting the results of many years of tree pruning research in a manner that can be easily understood by anyone who is interested in trees. The book uses clear, simple language and numerous photographs to explain proper pruning and to demonstrate the damage caused by improper pruning practice. Examples cover nearly every possible situation a citizen pruner may encounter. If you were forced to select only one book, this would have to be at the top of the list.

**Tree Biology and Tree Care: A Photo Guide.** 1989. Alex L. Shigo, Klaus Vollbrecht & Niels Hvass, Shigo and Tree Associates. Written in the same clear, concise manner as Tree Pruning (see above), this book uses numerous photographs to reveal the biological effects of tree problems and tree care treatments. Subjects include cavities, cabling, wounding, tree protection, and other arboricultural activities, with heavy emphasis on tree biology. A book for people interested in the physical effects of common arboricultural practices.

**Diseases and Pests of Ornamental Plants.** 1978. Pascal P. Pirone, John Wiley & Sons Co. Expensive hardcover, but it tells you what is really wrong with your ailing tree.

**Diseases of Trees and Shrubs.** 1987. Wayne A. Sinclair, Howard H. Lyon, and Warren T. Johnson, Comstock/Cornell University Press. This book is a comprehensive pictorial survey of the diseases of trees and shrubs in the U.S. and Canada. An authoritative reference for the professional, the over 1700 illustrations make it a useful diagnostic tool by focusing on symptoms that may be seen with the unaided eye or hand lens. The text includes the biology and ecology of pathogens, key references, and selected biological and cultural controls.

**Insects That Feed on Trees and Shrubs.** 1991. Warren T. Johnson and Howard H. Lyon, Comstock/Cornell University Press. Using the same format as Diseases of Trees and Shrubs, this book provides information on more than 650 species of insects that injure woody plants in North America Once again, numerous color pictures illustrate both the insects and the damage they cause. Text describes characteristics of plant damage, pest distribution, basic biology, life cycle information, and sources of pest control information. Useful for everyone interested in maintaining healthy trees, regardless of education or experience.

## TREE IDENTIFICATION AND SELECTION

Manual of Woody Landscape Plants. 1990. Michael A. Dirr, University of Illinois Press. A large-format book by a great plant expert available in hardback or paperback. For those who wish to learn more about which tree to choose. Its line drawings are poor and few. The text tends to be a little academic, but readable.

Plants That Merit Attention: Volume 1 — Trees. 1984. Edited by Janet M. Poor — The Garden Club of America, Timber Press. A compendium of nearly 150 tree species for use in landscape planting. What makes these trees "plants that merit attention" is the fact that they are seldom used, thereby offering a selection of plant materials other than those normally being pushed by your local nursery. Excellent photography is combined with thorough descriptions and outlines of the cultural needs of each species.

**Trees for American Gardens.** 1990. Donald Wyman, Macmillan Publishing Company. Hardcover, with good listings of street tree species. It discusses recent hybrids, special tree features, etc.

**Trees, Shrubs and Vines.** 1970. Arthur T. Viertel, Syracuse University Press. Paperback and fairly inexpensive, this book features great line drawings. Some common street trees are absent.

**Manual of Cultivated Trees and Shrubs. 1974.** Alfred Rehder. Hardcover, exhaustive, and also exhausting. It's list of trees is huge, but the descriptions are in botanical terminology. Do you know what "glabrous" or "peltate" means? You have to if you use this book.

**Handbook of Landscape Tree Cultivars.** 1989. Willet N. Wandell, East Prairie Publishing Company. Primarily a listing, this book is divided into two main sections. Section I lists trees grown in quantities of 2.000 or more by primary, propagating growers. This section provides a brief description of each cultivar including trade name, introducer, size, shape, seasonal foliage color, and other features. Some historical information on the cultivar's development is often included. Section II is a listing of all landscape tree cultivars located in an exhaustive literature search. The remainder of the book consists of special guides dividing trees into groups based on flowers, fruits, seasonal foliage, shape and size, and primary grower. A very useful text for someone looking for the right tree for the planting site or information on particular cultivars.

**How To Identify Plants.** 1957. H.D. Harrington, Swallow Press. An inexpensive paperback that approaches identifying the numerous parts of plants in a practical and well-illustrated manner. The line drawings are rudimentary but clear and to the point and the glossary is outstanding. An essential handbook especially for the curious beginner.

**Street Trees: A Field Handbook.** 2nd edition, 1995. Trees New York/NYCSTC and Barbara Schaedler, ASLA. Good all-around handbook covering everything you ever wanted to know about street trees, especially if you live in New York City. Well-illustrated for field identification.

# Appendix II
# THE BEST STREET TREES FOR NEW YORK CITY

Listed on the following pages are some of the best species that can be used as street trees in specific situations. Particularly useful are species resistant to specific stress, such as wet and dry sites, alkaline soils, shade, and salt. This is certainly not a complete list, but it does include some tried and true species and cultivars for NYC.

## TAB LE LEGEND

1. Smaller than 30 feet in height.

2. Larger than 30 feet in height.

3. Trees with a narrow, upright habit are useful in places where there is little space between the curb and the buildings.

4. Indicated by puddles of water standing in the tree pit 24 hours after a rainfall.

5. Soils with large amounts of sand and/or gavel mixed in them or hurried beneath them makes them excessively well-drained, predisposing trees to drought stress. A small soil volume and/or large amounts of pavement can create drought-like conditions.

6. Soils with large amounts of mortar rubble tend to be alkaline. It is best to test the soil pH to determine whether it is alkaline.

7. Such as in the shade of tall buildings.

8. Rocksalt used to deice roadways and walkways in winter can wash into the tree's root zone and cause damage to sensitive species. Plant only salt resistant tree species.

| | SPECIES | COLUMNAR HABIT (3) | FLOWERING | FALL COLOR | WET SITES (4) | DRY SITES (5) | ALKALINE SOILS (6) | SHADE (7) | SALT (8) |
|---|---|---|---|---|---|---|---|---|---|
| SMALL TREES (1) | *Acer beugeranum* Trident Maple | | | • | | • | | | |
| | *Acer campestre* Hedge Maple | • | | | | • | • | | • |
| | *Acer ginnala* 'Flame' Flame Amur Maple | | | • | | • | • | | |
| | *Acer platanoides* 'Globosum' Globose Norway Maple | | | | | • | • | | • |
| | *Acer tataricum* Tatarian Maple | | | • | | • | • | | |
| | *Carpinus betulus* ' Fastigiata' Upright European Hornbeam | • | | | | | • | | |
| | *Cornus mas* Cornelian Cherry | | • | | | | • | | |
| | *Crataegus viridis* 'Winter King' Winter King Hawthorn | | • | | | • | • | | |
| | *Koelreuteria paniculata* Golden Raintree | | • | | | • | • | | • |
| | *Malus* 'Snowdrift', 'Centurion', 'Sugar Tyme' Crabapple | | • | | | • | • | | |
| | *Ostrya virginiana* Hop Hornbeam | | | | | | | • | |
| | *Prunus* 'Accolade' Accolade Flowering Cherry | | • | | | | • | | |
| | *Pyrus calleryana* ' Aristocrat', 'Redspire' Callery Pear | | • | • | | • | • | | • |
| | *P.c.* 'Whitehouse' Upright Callery Pear | • | • | • | | • | • | | • |
| | *Styrax spp.* Snowbell | | • | | | | | | |
| | *Syringa reticulata* 'Ivory Silk' , 'Summer Snow' Japanese Tree Lilac | | • | | | | | | |

| | SPECIES | COLUMNAR HABIT (3) | FLOWERING | FALL COLOR | WET SITES (4) | DRY SITES (5) | ALKALINE SOILS (6) | SHADE (7) | SALT (8) |
|---|---|---|---|---|---|---|---|---|---|
| MEDIUM TO LARGE TREES (2) | *Acer platanoides* 'Cleveland', 'Columnare' Cleveland and Columnar Norway Maple | • | | | | • | • | | • |
| | *Acer pseudoplatanus* Sycamore Maple | | | | | • | • | | • |
| | *Aesculus x carnea* 'Briotii' Ruby Red Horsechestnut | | • | | | | • | | |
| | *Alnus glutinosa* Black Alder | | | | • | | | • | • |
| | *Celtis occidentalis* 'Prairie Pride' Prairie Pride Hackberry | | | | | • | • | | |
| | *Corylus colluma* Turkish Hazelnut | | | | | • | • | | |
| | *Eucommia ulmoides* Hardy Rubber Tree | | | | | • | • | | |
| | *Fraxinus pennsylvanica* 'Summit' Summit Green Ash | | | • | | • | • | | • |
| | *Ginkgo biloba* - males only Maidenhair Tree | | | • | | • | • | | • |
| | *G.b.* 'Princeton Sentry' Princeton Sentry M.T. | • | | • | | • | • | | • |
| | *Gleditsia triacanthos* 'Majestic', 'Shademaster' Honeylocust | | | • | | • | • | | • |
| | *Gymnocladus dioicus* Kentucky Coffeetree | | | | | | • | | |
| | *Liquidambar styraciflua* Sweet Gum | | | • | • | | | | |
| | *Maclura pomifera* - males only Osage Orange | | | | • | • | • | | |
| | *Nyssa sylvatica* Sour Gum | | | • | • | | | | |
| | *Platanus x acerifolia* 'Bloodgood' and 'Liberty' London Planetree | | | | • | • | • | | • |

| | SPECIES | COLUMNAR HABIT (3) | FLOWERING | FALL COLOR | WET SITES (4) | DRY SITES (5) | ALKALINE SOILS (6) | SHADE (7) | SALT (8) |
|---|---|---|---|---|---|---|---|---|---|
| MEDIUM TO LARGE TREES (2) | *Quercus acutissima* Sawtooth Oak | | | | | • | | | |
| | *Quercus palustris* Pin Oak | | | | | • | | | |
| | *Quercus phellos* Willow Oak | | | | | • | | | |
| | *Quercus robur* English Oak | | | | | • | • | | • |
| | *Q.r.* 'Fastigiata' Upright English Oak | • | | | | • | • | | • |
| | *Quercus rubra* Red Oak | | | | | • | • | | • |
| | *Styphnolobium japonicum* 'Regent' Regent Chinese Scholar Tree | | • | | | • | • | | • |
| | *Taxodium distichum* Bald Cypress | | | | • | | | | • |
| | *Tilia tomentosa* 'Sterling' Sterling Silver Linden | | | | | • | • | | |
| | *Tilia spp.* Lindens | | | | | | • | | |
| | *Ulmus carpinifolia* Smooth-leaved Elm | | | | | • | • | | |
| | *Ulmus parvifolia* Chinese Elm | | | | | • | • | | |
| | *Zelkova serrata* Japanese Zelkova | | | | | • | • | | |

# Appendix III
# NATIONAL ARBORIST ASSOCIATION PRUNING STANDARDS FOR SHADE TREES

(Revised 1979)

These standards are provided by the National Arborist Association to assist you in writing contract specifications. NAA member companies are highly qualified to accomplish the pruning in compliance with the specifications that best satisfy your budget and other needs. It is recognized that regional practices may dictate variations in this standard.

W.P. Lanphear, Chairman
Standard Practices Committee

## INTRODUCTION

Pruning is to be performed by tree workers who, through related training and on-the-job experience, are familiar with the techniques and hazards of this work, including trimming maintenance, repairing or removal, and equipment used in such operations. The use of climbing spurs or irons is not approved in pruning operations on live trees. This type of work is a potentially hazardous occupation and is to be undertaken only by trained personnel or under the supervision of trained personnel, all of whom are covered with workers compensation, property damage public liability, and completed operations insurance.

There are four classes of pruning:

### Class I: Fine pruning

Fine pruning shall consist of the removal of dead, dying, diseased, interfering, objectionable, obstructing, and weak branches, as well as selective thinning to lessen wind branches. The removal of such described branches is to include those on the main trunks, as well as those inside the leaf area. An occasional branch, up to 1/2 inch diameter, as described above, may remain within the main leaf area to its full length when it is not practical to remove it.

The following specifications shall apply:

A. All cuts shall be made sufficiently close to the trunk or parent limb, without cutting into the branch bark collar or leaving a protruding stub, so that closure can readily start under normal conditions. Clean cuts shall be made at all times.

B. It is necessary to precut branches too heavy to handle to prevent splitting or peeling the bark. Where necessary, to prevent tree or property damage, branches shall be lowered to the ground by proper ropes or equipment.

C. Remove the weaker or least desirable of crossed or rubbing branches. Such removal should not leave large holes in the general outline of the tree.

D. Treatment of cuts and wounds, with tree wound dressing is optional except where open wounds in certain trees may attract insects that carry disease or allow fungus invasion. If such treatment is made, materials nontoxic to the cambium layer must be used and care taken to treat only the exposed wood with a thin coat of dressing.

E. On trees known to be diseased, tools are to be disinfected with methyl alcohol at 70% (denatured wood alcohol diluted appropriately with water) solution after each cut and between trees where there is known to be a danger of transmitting the disease on tools.

F. Old injuries are to be inspected. Those not closing properly and where the callus growth is not already completely established, should be traced where appropriate. If desired, for cosmetic purposes the wound may be treated with a thin coat of wound dressing.

G. Where practical, all visible girdling roots shall be treated as follows:

1. Cut root at either end.

2. Notch root in center with a chisel.

3. Remove entire root without injuring the bark or parent stem.

H. The presence of any structural weakness, disease conditions, decayed trunk or branches, split crotches or branches should be reported in writing to a supervisor and/or the owner, and corrective measures recommended.

## Class II: Medium pruning

Medium pruning shall consist of the removal of dead, dying, diseased, interfering, objectionable and weak branches on the main trunks as well as those within the leaf area. An occasional branch up to one inch in diameter may remain within the main leaf area where it is not practical to remove it.

The following specifications shall apply:

A. All cuts shall be made sufficiently close to the trunk or parent limb, without cutting into the branch bark collar or leaving a protruding stub, so that closure can readily start under normal conditions. Clean cuts shall be made at all times.

B. It is necessary to precut branches too heavy to handle to prevent splitting or peeling the bark. Where necessary to prevent tree or property damage, branches shall be lowered to the ground by proper ropes or equipment.

C. Treatment of cuts and wounds, with tree wound dressing is optional except where open wounds in certain trees may attract insects that carry disease or allow fungus invasion. If such treatment is made, materials nontoxic to the cambium layer must be used and care taken to treat only the exposed wood with a thin cost of dressing.

D. On trees known to be diseased, tools are to be disinfected with methyl alcohol at 70% (denatured wood alcohol diluted appropriately with water) solution after each cut and between trees where there is known to be a danger of transmitting the disease on tools.

E. Old injuries are to be inspected. Those not closing properly and where the callus growth is not already completely established should be traced where appropriate. If desired, for cosmetic purposes the wound may be treated with a thin coat of wound dressing.

F. All girding roots visible to the eye are to be reported to a supervisor and/or the owner.

G. The presence of any structural weakness, disease conditions, decayed trunk or branches, split crotches or branches should be reported in writing to a supervisor and/ or the owner, and corrective measures recommended.

## Class III: Coarse pruning

Coarse pruning shall consist of the removal of dead, diseased, or obviously weak branches two inches in diameter or greater.

The following specifications shall apply:

A. All cuts shall be made sufficiently close to the trunk or parent limb, without cutting into the branch bark collar or leaving a protruding stub, so that closure can readily start under normal conditions. Clean cuts shall be made at all times.

B. It is necessary to precut branches too heavy to handle to prevent splitting or peeling the bark. Where necessary to prevent tree or property damage, branches shall be lowered to the ground by proper ropes or equipment.

C. Treatment of cuts and wounds, with tree wound dressing is optional except where open wounds in certain trees may attract insects that carry disease or allow fungus invasion. If such treatment is made, materials nontoxic to the cambium layer must be used and care taken to treat only the exposed wood with a thin coat of dressing.

D. On trees known to be diseased, tools are to be disinfected with methyl alcohol at 70% (denatured wood alcohol diluted appropriately with water) solution after each cut and between trees where there is known to be a danger of transmitting the disease on tools.

E. The presence of any structural weakness, disease conditions, decayed trunk or branches, split crotches or branches should be reported in writing to a supervisor and/or owner and corrective measures should be recommended.

## Class IV: Cutting back or drop crotch pruning

Cutting back or drop crotch pruning shall consist of the reduction of tops, sides, under branches, or individual limbs.

The following specifications shall apply:

A. All cuts shall be made sufficiently close to the trunk or parent limb, without cutting into the branch bark collar or leaving a protruding stub, so that closure can readily start under normal conditions. Clean cuts shall be made at all times.

B. It is necessary to precut branches too heavy to handle to prevent splitting or peeling the bark. Where necessary, to prevent tree or property damage, branches shall be lowered to the ground by proper ropes or equipment.

C. Remove weaker or least desirable or crossed or rubbing branches. Such removal should not leave large holes in the general outline of the tree.

D. Treatment of cuts and wounds, with tree wound dressing is optional except where open wounds in certain trees may attract insects that carry disease or allow fungus invasion. If such treatment is made, materials nontoxic to the cambium layer must be used and care taken to treat only the exposed wood with a thin coat of dressing.

E. Old injuries are to be inspected. Those not dosing properly and where the callus growth is not already completely established should be traced where appropriate. If desired, for cosmetic purposes, the wound may be treated with a thin coat of wound dressing.

F. Generally, in reducing size (cutting back), not more than one-third of the total area should be reduced at a single operation. When cutting back trees, only drop-crotch as much as necessary. Where practical, avoid cutting back to small suckers. All effort should be made to cut back to a lateral, one-third of the diameter of the cut being made.

G. In reducing overall size, attention is to be given to the symmetrical appearance. Top is to be higher and sides reduced in order to maintain a tree-like form.

H. When cutting back trees, one should have in mind to make them shapely and typical of their species.

I. On thin bark trees, just enough limbs shall be removed to get the effect wanted without admitting too much sunlight to the trunk of the tree or the top of large branches. Care should be taken with the following species: Lindens, Maples, Beeches, Apple, Oaks, and other trees susceptible to sunscald growing in different geographical areas. The above damage may be minimized by doing work on susceptible species during the dormant season.

J. In lifting the lower bottom branches of trees for underclearance, care should be given to symmetrical appearance and cuts should not be made so large that they will prevent normal sap flow.

K. Periodical drop-crotching or cutting back of Silver Maples, Poplars, and other trees with brittle and soft wood is an established practice and has proven beneficial in maintaining the safety of these trees over long periods of growth. Other trees with soft and brittle wood growing in different geographic areas may be specifically named when it is common practice to control the growth by cut-back.

L. An alternate method in some situations for maintaining the safety of these trees would be cabling and bracing as described under that standard.

## TERMINOLOGY

Branch bark collar. Wood tissue that forms around the base of a branch between the main stem and the branch. Usually, as a branch begins to die, the branch collar begins to increase size.

Callus. New growth made by the cambium layer around all of a wound.

Cambium layer. Growing point between the bark and sapwood.

Closure. Refers to the roll of the callus growth around the wound area.

The Cut. The exposed wood area that remains after the branch has been removed.

Cut back. Specified reductions of the overall size of the tree or individual branches, but may include the overall reduction of the sides as well as the top of the tree.

Dormant. A condition of nonactive growth. Deciduous trees are considered to be dormant from the time the leaves fall until new foliage begins to appear.

Girdling roots. Located above or below ground level whose circular growth around the base of the trunk or over the individual roots applies pressure to the bark area, thereby choking or restricting the flow of sap.

Lifting. The removal of lower branches for underclearance.

Parent stem. The main trunk system of the tree.

Precut/Precutting. The removal of the branch at least 6 inches beyond the finished cut to prevent splitting into parent stem or branch.

Pruning. The removal of dead, dying, diseased, live interfering, objectionable, and weak branches in a scientific manner.

Sap Flow. The definite course assumed by sap in its movement through a tree.

Scars/Injuries. Natural or man-made lesions of the bark in which wood is exposed.

Suckers. Abnormal growth of small branches usually not following the general patterns of the tree.

# Appendix VI
# COMPANION PLANTS FOR PLANTING IN STREET TREE PITS

Listed below are some plants that are especially good for tree pits:

## PERENNIAL GROUNDCOVERS

***Hedera helix,*** English ivy. The old, reliable standby. Able to grow in sun or shade, drought resistant, salt resistant; in other words, very tough. The common variety is `Thorndale', with deep green leaves, but there are many kinds with different leaf shapes and white, yellow, or gray variegation. This mat-forming evergreen vine can climb up a street tree, but will not harm it.

***minor,*** **Periwinkle or Myrtle. A** 4-inch tall nonclimbing vine with small, oval glossy evergreen leaves with blue (or rarely white) flowers in April.

leaves. 'Beacon Silver' has pink flowers in May and June, 'White Nancy' has white flowers. *Lamiastrum galeobdolon is* similar but much more rampant.

## SHADE-LOVING PERENNIALS

**These herbaceous plants live for many years.**

***Alchemilla mollis,*** **Lady's-Mantle.** This 1-foot plant has pleated, kidney-shaped leaves and long lasting chartreuse flowers similar to Baby's-Breath. Takes dry shade well.

***Brunnera macrophylla,*** **Siberian Bugloss. This** plant has bold foliage and bright blue Forget-me-not like flowers and grows to a height of 1 foot.

***Hosta*** **spp., Plantain lily or Hosta.** A durable, broadleaved plant with weed-smothering bold leaves. There are white-, yellow-, and gray-leaved forms. Flower stalks rise above the foliage in summer.

***Phalaris arundinacea*** **'Pieta', Variegated Ribbon Grass.** An indestructible white-variegated *grass* that is a rampant spreader. Sometimes turns brown later in summer, but cut it back to the ground and it will sprout a fresh batch of foliage.

## SHADE-LOVING ANNUALS

These live only one year, and therefore must be replanted each spring.

*Begonia x semperflorens - Cultorum,* Wax Begonia. Red, pink, or white flowers. The 6- to 8-inch plants can grow in sun or shade and are quite drought tolerant. Some kinds have bronze foliage.

*Impatiens x wallerana,* Impatiens. A everblooming shadelover with red, pink, or white flowers. The 1-foot plants will wilt badly when dry. The best strain is the Super Elfin Strain.

*Lobelia erinus,* Dwarf Lobelia. This is a low 6-inch plant that is grown for its intense true-blue flowers that bloom continously throughout the season. It also comes in sky blue, reddish purple, and white, and some have a white eye that allows them to be easily associated with other white-flowering or -foliage plants. 'Cambridge Blue' is the most common, with gentian-blue flowers and bronze foliage on compact plants. The cascading types are loose and open and look very nice when allowed to ramble through other plants. Prefers a moist soil rich in humus.

*Lobularia maritima,* Sweet Alyssum. The longest blooming plant of all. Low, broad spreading plants with white (sometimes pale pink or violet) flowers. Occasionally refusing to bloom during the hottest weather, 3-Inch plants flower almost continuously from April to as late as December. Sun or shade.

## SUN-LOVING ANNUALS

Plant at the base of a street only for the first two seasons after planting the tree, when there is still plenty of sun reaching the tree pit.

*Pelargonium x hortorwn,* Geranium. 1-foot plants with red, pink, or white flowers. Remove spent flowers.

*Salvia splendens,* Scarlet Salvia. Red (sometimes purple) flower spikes on 12- to 15-inch plants. Remove spent flower heads.

*Tagetes* spp., Marigold. Long-flowering and easy, with yellow, orange, or white flowers on 8- to 15-inch plants.

## SPRING-FLOWERING BULBS

Plant in September and October. In the spring, after the bulbs have flowered, *never remove leaves until they turn yellow,* even if unsightly.

*Crocus* spp., Crocus. They bloom in yellow, purple, and white in March. Plant corms 2-3 inches deep, 1-2 inches apart, in tight groups. Must be lifted and divided every 3-4 years.

*Chio no doxa luciliae,* Glory-of-the-Snow. These are lesser known than Crocus but are of an intense royal blue with a white eye, 3-4 inches high. It self-sows and does not need to be lifted and divided. Excellent with daffodils. Same planting directions as Crocus.

*Endymion hispanicurn,* Spanish Bluebells. Blue, but also comes in a pristine white and a very intense pink. One-foot spikes bloom in May. An excellent performer. Plant in groups of 3-10, 4 inches deep, 3-4 inches apart.

*Narcissus* spp., Daffodils and Narcissus. Everyone loves these, which may cause a problem. Passerbys map pick the flowers when they bloom in April. Plant 6 inches deep, 4-6 inches apart. Because their leaves stay green until July, Hoop over and look unsightly, they are best treated as annuals by pulling them out after flowering, discarding them, and replanting new bulbs in the fall. Bulbs need to be lifted and divided every 3-4 years.

*Scilla siberica,* Siberian Squill. Deep blue flowers, but not as showy as Glory-of-the-snow. Same planting directions as Crocus.

*Tulipa* spp., Tulips. Available in many flower forms and in most colors execpt true blue and black. Prone to being picked. Plant 6 inches deep, 4-6 inches apart. Unless species tulips are planted, they often do not flower well after the first year. In that case, it is best to treat them like annuals, as with Narcissus.

There are also plastic flowers, reflecting globes, pink flamingos, windmills, deer, and other tacky ornaments. Any citizen street tree pruner caught using these will be tarred and feathered.

# Appendix VII
# GLOSSARY

Achene. A small, dry, 1-celled, 1-seeded, indehiscent fruit, the seed attached to the wall of the fruit at one place. Example: London Plane.

Acorn. A type of dry fruit composed of a nut with a cap of fused bracts. Example: Oak.

Alternate. Leaves one at a node, borne singly. Compare "opposite".

Axil. The place where the leaf stalk (petiole) meets the stem. A dormant bud is often located in this place.

B&B. Abbreviation for "ball and burlap".

Ball and burlap. Method of preparing tree for transplanting. A ball of soil is left around the roots when it is dug up. The soil and roots are wrapped in burlap or plastic to hold it together and retain moisture. Abbreviated "B&B".

Bare root. Another method for transplanting. Dormant trees are dug, roots washed and trimmed, and kept moist until replanted.

Bract. A modified leaf situated near a flower or inflorescence.

Branch Bark Collar. The ring of tissue at the place where a branch is attached to the trunk.

Broadleaved. A tree with broad leaves rather than needle-like leaves. Examples: Maple, Oak, Elm.

Bud. The rudimentary stage of development of a branch, leaf, or flower.

Caliper. The diameter of a tree's trunk, as measured by nurseries, at 6 inches above the planting line.

Callus. Scar tissue formed around cut wounds, eventually covering them. Formation of callus is greatly aided by a smoothly finished pruning cut.

Catkin (Ament). A tassel-like pendulous inflorescence bearing many unisexual flowers. Oak Birch. Willow, and Poplar are catkin-bearing.

**Columnar.** Describes a narrow upright tree form. See fastigiate.

Compaction. Used in reference to soil. Soil becomes hardened and compressed thereby making it difficult for roots to penetrate the soil. Air chambers in between soil particles are also greatly reduced or are nonexistent, making drainage and gas exchange from roots poor.

Compound. A leaf that is composed of two or more leaflets, arranged in a pinnate or palmate pattern. Compare "simple".

Conifer. A deciduous or evergreen tree bearing cones rather than true flowers. Examples: Pine, Spruce, Larch, Fir. Foliage is needle-like.

Deciduous. A tree which drops its foliage at the end of the growing season and develops new foliage the next spring. Not synonymous with broadleaved tree — some conifers (examples: Larch, Dawn Redwood, Bald Cypress) drop their needles each fall.

Dehiscent. splitting open; method of dispersing contents usually of anthers or seed pods by splitting open along defined slits.

Drupe. A type of fruit that has a fleshy exterior with a large pit inside (examples, Japances Zelkova as well as Cherry, Peach., Plum, and Apricot).

Entire. Refers to a type of leaf margin or edge, where the edge is smooth, with no teeth or lobes.

Evergreen. A tree which retains its foliage throughout the year. Not synonymous with conifer — some broadleaved trees (examples: American Holly, Southern Magnolia, Live Oak) are evergreen.

Exfoliating. Bark that peels off in thin layers. Example; London Plane.

Flush. Flat against.

Fastigiate. A tall, narrow tree form with a strong central leader and branch attachments at acute angles.

Girdling. The cutting, removing, or clamping of bark completely around a branch or the trunk of a tree. Can kill the branch or the entire tree.

Glabrous. Devoid of hairs; smooth.

Grafting. A method of inserting a shoot or bud taken from one plant into the stem or branch of another so that the shoot or bud grows and becomes a permanent part of the other plant.

**Guy wire.** A wire used with support stakes to help support a newly planted tree.

Hardpan. Describes a soil condition of extreme compaction; compaction in layers.

Humus. Decomposed organic matter. When added to any soil, humus increases the soil water- and nutrient-holding capacity, porosity, and tilth (particle structure).

Indehiscent. Not opening by definite lines or pores. Compare "dehiscent".

Inflorescence. The flowering part of a plant; specifically, the arrangement of a flower cluster. Examples: catkin, spike, raceme..

Leader. The central stem or trunk that is longer and more vigorous than the side branches or lateral stems.

Leaf. A plant organ whose function in general is to conduct photosynthesis. Usually composed of a stalk (petiole) and a broad portion (blade). In general, a leaf has a bud at its base. Compare "leaflet".

Leaflet. The leaf-like division of a compound leaf. Unlike a leaf, a leaflet does not have a bud at its point of attachment (axil).

Legume. The characteristic fruit of the Leguminosae family consisting of a long pod containing large seeds lined up one by one. Examples: Honeylocust, Chinese Scholar Tree.

Lenticel. Small corky-celled structures on the surface of twigs and branches, and/or trunk of some species, whose function is to allow the transport of gases to and from the inner tissues.

Lobe. A segment of the blade of a leaf. Example: The leaf of a Norway Maple is palmately-lobed. Compare "sinus".

Loment. A leguminous fruit that is characterized by narrow constrictions in the spaces between the seeds. Example: The fruit of the Chinese Scholar Tree.

Margin. The edge of a leaf.

Monoculture. A population of trees comprised mostly of one species or variety.

Mulch. Any material laid on the soil surface to conserve soil moisture, moderate temperature and/or aid in weed control. Wood chips, bark chips, and shredded leaves are examples of organic mulches.

Node. The place on a stem where leaves or branches originate.

Opposite. Leaves two at a node and positioned across the stem from each other. Compare "alternate".

Palmate. A type of leaf whose lobes or segments attach to the stalk (petiole) at one point. Examples: Horsechestnut, Maple. Compare "pinnate".

Panicle. A type of compound inflorescence where the flowers are attached to a multi-branched stem and the youngest flowers are at the apex or center.

Petiole. The stalk of a leaf blade or compound leaf. It can range from very long to completely absent. A *petiolule* is the stalk of a leaflet.

Pinnate. A type of compound leaf with leaflets on two opposites sides of an elongated rachis. Examples: Ash, Chinese Scholar Tree.

Pome. A multi-celled., multi-seeded, fleshy, indehiscent fruit. Examples: Callery Pear, Apple.

Pubescent. Covered with hairs; hairy.

Raceme. An inflorescence where the flowers are attached to an elongated rachis and the youngest flowers are at the apex.

Rachis. The central elongated axis to an inflorescence or compound leaf.

Samara. A dry fruit composed of a seed with a papery wing attached. Examples: Maple, Ash, Elm.

Serrate. A type of leaf margin which has sharp teeth that are angled forward towards the apex of the leaf blade. Compare "entire".

Scion. The bud or shoot which will become the top of a grafted plant.

Simple. A type of leaf which is comprised of only one part and not completely divided into separate segments. Compare "compound".

Sinus. The depression or indentation between two adjoining lobes. Compare "lobe".

Stock. The root, trunk, or branch base used for grafting.

Stub cut. Also called a 3-part cut. Pruning method used to remove a limb without damaging the bark on trunk below the limb being removed.

Sucker. A shoot or stem that originates from the roots.

Tree wound dressing. A petroleum-based product used to cover freshly cut wood to inhibit decay or insect infestation. Current research suggests that the chemicals in these products may inhibit callus formation and therefore slow the closing of the wound. Its use is not recommended.

Umbel. A convex or flat-topped inflorescence where the flowers are attached at one point and the youngest flowers are in the center.

Watersprout. Vigorous shoot, originating above the ground, from the trunk or main branches.

Weedy. The condition where a plant produces abundant seeds which germinate freely in places where they are unwanted.

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