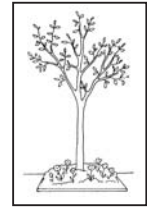
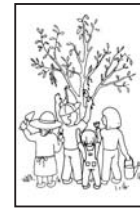




The Pennsylvania Horticultural Society presents

THE TREE TENDERS HANDBOOK



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THE TREE TENDERS HANDBOOK

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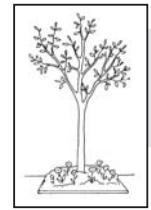
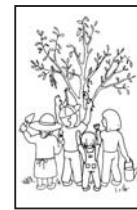
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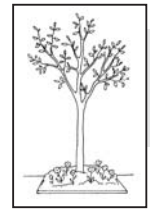
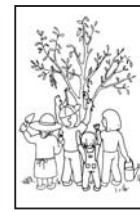
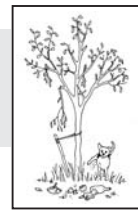


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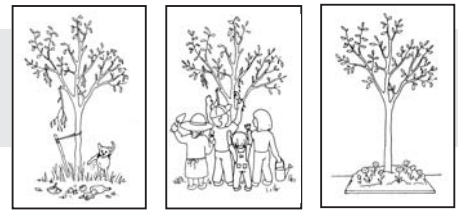
Special thanks to Joan Blair, Eileen Gallagher, Julia Lo, Joan Reilly, Patricia Schrieber, and the thousands of current Tree Tenders and the thousands more to come.



“A tree is a wondrous thing. It runs entirely by solar energy. It turns water and carbon dioxide into building material. It is powerful enough to split rocks. It can contain up to 50,000 cubic feet of wood. It has a plumbing system that can raise water 100 times as efficiently as the best suction pump made. It is the oldest and largest living thing on earth. It can tell time. It may grow to 300 feet in height, yet it supports itself entirely through a network of roots that are finer than a string. It may pour hundreds of gallons of water into the air in a day's time. It befriends us by taking and using our waste products (carbon dioxide) and returning life-supporting oxygen. It sometimes grows so large that it contains enough wood to build a community of 50 six-room houses. It protects itself with bark against insects, disease, and fire. It does all these things and never moves.”

-ANONYMOUS





INTRODUCTION

In 1974, the Pennsylvania Horticultural Society established Philadelphia Green with proceeds from the annual Philadelphia Flower Show.

Now the most comprehensive greening program in the United States, Philadelphia Green works with community groups and residents in neighborhoods throughout the city to plan and implement greening projects. The program also partners with private and public organizations to landscape and maintain public spaces in the city's downtown area and at its gateways. In addition, Philadelphia Green provides information about growing plants in the city, technical assistance, construction materials, plants, and tools.

The Tree Tenders program is part of the Philadelphia Green program. In June 1993, Tree Tenders was created to train city residents affiliated with community groups to plant and care for trees. Basic training consists of sessions about theory, practical information, and hands-on experience. Continuing education workshops are held regularly.

By 2005, more than 1,500 Tree Tenders from 100 neighborhoods have become stewards of Philadelphia's urban forest. Tree Tender volunteers have raised more than \$300,000, planted thousands of trees, and tended more than 10,000 trees in their neighborhoods.

The Tree Tenders program is endorsed by Philadelphia's Fairmount Park Commission.

How City Trees Help

Urban trees....

Release oxygen and absorb carbon dioxide to freshen the air we breathe

Each of us inhales 35 pounds of oxygen daily, all from plants. Every day, we need seven trees to convert our carbon dioxide to oxygen.

–David Nowak, USDA Forest Service Study

Remove ozone and other air pollutants, as well as trap dust and dirt

In Philadelphia, trees provide \$5,400,000 in air-pollution removal value annually.

–R. McPherson, Journal of Arboriculture, 1993

Save energy and reduce cooling costs

Trees strategically placed around a home can shade the home in the summer, cutting air-conditioning costs, and act as windbreaks in the winter, cutting heating costs. Trees also act like mini-air conditioners, releasing cooling moisture into the air.

–Tree values, International Society of Arboriculture

Increase the value of your home

New tree plantings were shown to increase surrounding property values by approximately 10% in the New Kensington neighborhood of Philadelphia.

–Susan Wachter, Wharton School, University of Pennsylvania

Improve health

Hospital patients with views of trees recovered 10% more quickly from surgery and required fewer painkillers than those without the view.

–David Nowak, USDA Forest Service Study

Encourage serenity and relaxation

People watching natural scenes recover from stress faster and more completely than those who saw urban scenes without trees.

–Roger S. Ulrich, Science Magazine, 1984

People report more positive emotions and have lower blood pressure when watching urban scenes with trees than without.

–Lohr & Mims, Washington State University, 1996.

Reduce violence

Studies have shown that being near trees reduces violence among residents of public housing in Chicago, prison inmates, and Alzheimer patients in nursing homes.

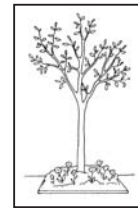
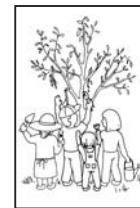
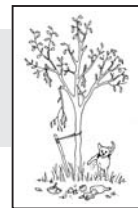
–Sullivan & Kuo, University of Illinois at Urbana-Champaign

Increase pride in local communities

People view outdoor urban residential spaces with trees as more attractive, safer, and more appealing to use.

–Sullivan & Kuo, University of Illinois at Urbana-Champaign

How Tree Tenders Can Help



Advocacy

- Act as eyes in the community
- Report** hazardous trees to the Fairmount Park Commission
- Notice urban stresses on trees
- Remedy** what you can
- Call an arborist when necessary
- Ask politicians to support more funding for tree planting and maintenance

Organizing

- Work with neighbors to organize a community tree program
- Raise funds for tree planting and tree maintenance

Tree care

- Plant** the right tree species in the right place not only for today, but for years to come
- Water** new transplants and drought-stressed trees slowly and deeply
- Prune** conservatively and correctly
- Weed** tree pits
- Cultivate** tree-pit soil
- Mulch** neighborhood trees
- Hug** a tree



"To leave the world a bit better, whether by a healthy child, a garden patch or a redeemed social condition. To know that even one life has breathed easier because you have lived. This is to have succeeded."

-RALPH WALDO
EMERSON

I. GETTING ORGANIZED

Build From the Community

Like trees, Tree Tender groups come in a wide variety of shapes and sizes. Along those lines, you can think of a group's organizational structure and operating principles like the root system of a tree. Some systems are large and complex, while others are less expansive. But whether the root system is simple or complex, all trees require a root system to grow. Clearly, all groups need a level of structure and intentionality to succeed.

No matter if you are a Tree Tender group with 3 or 33 members, here are some key elements that will help your group to grow in healthy and well-nourished ways:

Mission

Groups need to discuss and decide why they want to work together. Establishing the mission of a group can provide direction in the group's planning process. The work of developing a mission or purpose can help a group discover the common ground that brings them together.

Planning

The planning process includes:

GOAL SETTING

What do we want to do?

OUTCOMES

How will we know if we are successful?

ACTION PLAN

How will we accomplish it?

Roles and responsibilities

It is important that groups spend time clarifying roles and responsibilities. Once group members are clear about the plan, they need to know their role and relationship to it. Who will do what by when? [See *Delegate responsibilities.*]

Leadership

All groups need leadership. Some groups may decide to have elected officers with terms of service, while other groups have individuals who volunteer to take on specific leadership roles. Whichever system you select, it's best when leadership is shared. There also must be opportunities to develop new leadership in groups.

Decision-making process

There are many ways for a group to make decisions (for example, two-thirds majority of membership; simple majority of those present; a consensus, etc.). A group may also decide to use a wide range of decision-making processes, depending on the issue. Whichever method(s) a group employs, it's important to decide how they will make decisions. This will help avoid problems and confusion down the road.

Communication

Establish ways to share information, plan, and problem solve. Meetings, written minutes, phone calls, email, articles in the local paper, and group workdays provide wonderful opportunities for communication. It's always good to talk.

Evaluation

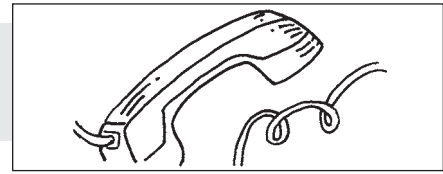
When you finish a project, it's helpful for the group to spend some time thinking about what they have learned from it. Reflecting together on what went well, what didn't go well, and making suggestions for improvement can significantly enhance future work.

Make time to appreciate and celebrate

Make time to celebrate the efforts and achievements of the group. Consider having an annual Tree Tender party

"Whatever you think you can do or believe you can do, begin it. Action has magic, grace and power in it."

- GOETHE



or small gatherings to celebrate the work, build relationships in the group, and have fun together. [See *Reward volunteers.*]

Building a strong Tree Tenders group involves recruiting participants, identifying resources, and building on common goals as well as unique interests.

Recognize available resources in your neighborhood.

People. Identify and involve decision makers and other people in your neighborhood. The number one reason people volunteer is because they were asked!

Organizations. Identify community and non-profit groups, churches, and schools that could provide support such as people and meeting space. Seek and publicly acknowledge support from local banks, utility companies, and other organizations for special projects.

Reach out to neighbors

Flyers. Be brief and to the point. Focus on the 4 “Ws”: *who, what, when, and where.* Photos, graphics, and colorful paper attract people’s attention.

Media. Brief, clear, concise public service announcements, and press releases can reach a lot of readers.

Special events. Combining work sessions and cleanups with fun, food, and music is a highly visible way to keep veteran volunteers and attract newcomers. Be prepared with a sign-in sheet or hold a raffle to obtain new volunteers’ names, phone numbers, and addresses.

Phone chains. Volunteers calling each other not only share the responsibility, but it’s also an opportunity for them to get to know each other better. Pre-existing, collaborative groups often have their own phone chains; activate them.

Neighborhood canvassing. Distribute flyers and invitations door-to-door. People are likely to volunteer when asked by someone they know or recognize.

Supplies and materials. Identify, patronize, and ask local restaurants, bakeries, print shops, stationery stores, photocopying centers, and other businesses to donate supplies and offer their services. Approach business owners and managers for contributions. Be sure to thank them publicly for support.

Government agencies and politicians. Identify and contact state legislators, City Council members, relevant city staff, and departments such as Streets, Recreation, and Licenses and Inspections, all of which have funds, influence, skills, and other resources.

Delegate responsibilities. Although it may seem easier to do everything yourself, learn to share the work. Volunteers have a lot to offer and they appreciate the opportunity to contribute their skills, time, and energy. The more people get involved, the more they have a stake in making the project successful. Delegating helps avoid burnout and resentment from those eager to work.

How to delegate:

- Decide the goal together
- Identify the tasks and agree on ground rules
- Assign tasks
- Set deadlines
- Hold scheduled meetings
- Allow time for people to report on progress
- Provide additional leadership if the task isn’t being completed
- Supply people with the resources they’ll need such as good instructions, tools, and partners

GETTING ORGANIZED

Find and keep volunteers. People volunteer for many different reasons. Some want to do something positive for their community, others want to keep busy, learn new job skills, or find a new job.

Ask, ask, ask! People tend to volunteer when someone asks them. If one person isn't able to help, ask if she or he knows someone else who might be interested.

Create volunteer job descriptions. The process of identifying and defining volunteer jobs helps group members figure out what needs to be done. Having clear job descriptions helps volunteers understand tasks, expectations, and opportunities. Matching volunteers' interests with the work helps keep them happy. A satisfied, long-term volunteer is likely to bring friends along to help next time.

Reward volunteers. Being a volunteer is hard work. Everyone appreciates being thanked for a job well done, so be generous with praise and thoughtful rewards. Make sure volunteers feel special and valued.

Ways to say "Thank You":

- Having food at meetings
- Awarding certificates
- Organizing a potluck dinner celebration
- Giving hats or t-shirts to build group identity
- Providing ongoing training
- Having volunteers be spokespeople at media events
- Including volunteers' names and photos with press releases.

[See Appendix for article on volunteer recruitment titled "Volunteers in Urban Forestry" by Sally McCabe, published in The Public Garden, January 1994.]

Fundraising

Fundraising is related to every part of your program. Why do you need to

raise funds? To purchase and plant new trees, pay for services such as sidewalk cuts, tree pruning, buying mulch or tools, and organizing special events like Arbor Day.

Recruiting of volunteers, publicity, and public education help provide credibility and contacts for the fund-raising process. Fortunately, fund-raising events are good opportunities for recruiting new volunteers.

Funding sources

Individuals: Don't be afraid to ask family, friends, and neighbors for contributions; the worst they can do is say "no." If they cannot provide money, perhaps they will volunteer their time.

Community institutions: Approach the following groups to start the process: churches, colleges, parent-teacher organizations, and community groups (Kiwanis, garden clubs, etc.).

Local businesses: Ask home and garden centers, hardware stores, print shops, bakeries, delis, etc. for cash donations or in-kind services. Sometimes receiving donuts or tools can be more beneficial than a cash contribution, depending on your circumstances.

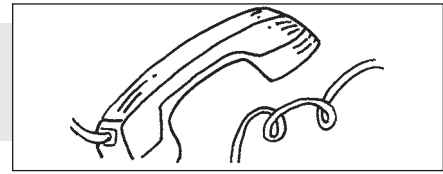
Local politicians: Contact state legislators and city council members.

Local corporations: Approach banks, utility companies, fuel companies, and other locally based corporations, such as pharmaceutical companies.

Grants: These can be obtained from funders, such as the Pennsylvania Urban & Community Forestry Council (610-489-4315), Environmental Protection Agency (800-438-2474), National Tree Trust (800-846-8733), and others.

Grant writing

When writing a proposal, follow the instructions and guidelines precisely.



Funders often eliminate proposals that do not contain the necessary information or meet their guidelines. Pay attention to the format including margin size, number of pages, and the sequence of information. Any additional materials that add credibility to your organization should be added. List and show supporting information from the following areas: specific job quotes, letters of recommendation in support of the project, and any publicity that your group has received in the past.

Here are some of the general questions asked in the proposal:

- Who is applying for the grant?
- What is the group's mission?
- What is your group asking for? (Try to be as specific as possible.)
- How will your group accomplish the task? (Be as detailed as possible.)
- Who are the group's partners?
- What is the impact of this project on the community?
- How will the organization evaluate the project?

Other fundraising options

Ongoing fundraising: Sources may include *direct mail*, *door-to-door canvassing*, *raffles*, *dedications*, and *bake/candy sale*, etc. Keep an ongoing list of contributors and add their names to a potential volunteer file for a follow-up mailer.

Event fundraising: Special events are a great way to raise money and generate publicity. These events can be as varied as a *community flea market*, *spaghetti dinner*, *tour of community houses and gardens*, and *concerts* (with local talent from schools, churches, and other groups). Additional events that go hand-in-hand with the events mentioned are a 50/50 raffle or a silent auction.

Charge a fee for service: Ask the recipients of the newly planted tree to contribute to part of the cost. For

example, by asking the homeowner to contribute \$25 towards a tree that costs \$100 will save Tree Tenders 25% of the cost of the project. This adds up over several projects.

Collaborate with other organizations: Team up with a civic association, local school, or church. Tree Tender groups without nonprofit status could collaborate with an established, tax-exempt 501(c)(3) group.

Advocacy

Tips for meeting an elected official

A personal visit with a member of City Council, an elected state official, or a member of Congress is an effective way to emphasize your interest in an issue or legislative bill. Below are tips for a meeting to urge support or opposition to an issue or piece of legislation.

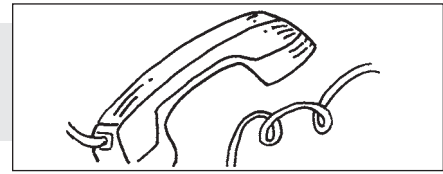
1. Make an appointment. State the subject of discussion, the time needed, and identify persons attending.
2. Select a spokesperson and agree on the presentation.
3. Know the legislative facts as related to your position. Know the Bill's title and number.
4. Present the facts in a positive and concise manner.
5. Relate the positive impact from the legislation and state the problems it corrects.
6. If you are opposing legislation, highlight the negative impact. If possible, have an alternative approach.
7. Leave accompanying fact sheets.
8. Encourage questions and discussions.
9. Ask the legislator for favorable consideration. Thank the legislator for his or her courtesy and time and leave promptly. Make sure you follow up the meeting with a thank-you note.

GETTING ORGANIZED

Tips for writing to an elected official

Elected officials pay attention to their mail. They know your vote can be won or lost by their response to your letter. When writing to an elected official, a personal letter is most effective. The contents should be polite, informative, and concise.

1. Keep your letter to one typewritten page.
2. State your purpose in the first paragraph. Keep it brief. Stay with one subject or issue. Support your position in the rest of the letter. Direct your approach to the legislator's committee assignments, interests, and background.
3. If the subject is related to a bill, cite it by name and number.
4. Be factual and support your position with information about the legislation and the effects on you and others. Avoid emotional and philosophical arguments.
5. If you are in opposition to a piece of legislation, say so, but then indicate the adverse effects it would have. Continue by offering alternative approaches.
6. Ask for your legislator's views, but do not demand support.
7. Be sure your name and address are legible.



Celebrating Arbor Day

Arbor Day was founded by, J. Sterling Morton, in Nebraska, in 1872. Morton believed that trees needed to be planted in Nebraska to act as wind blocks and to conserve moisture.

Today we celebrate Arbor Day throughout the United States. In Pennsylvania, it is officially celebrated on the last Friday in April. Pennsylvania State Law requires public schools to celebrate Arbor Day, and this is a great time to encourage children and adults to enjoy the holiday, by planning an Arbor Day event in your community.

Educational materials can be purchased from:

The National Arbor Day Foundation
100 Arbor Avenue
Nebraska City, NE 68410
888-448-7337

An Arbor Day event provides the following results:

- Increases tree awareness, enriches the community, and reduces vandalism.
- Creates new partnerships, recruits new members, and encourages community awareness.
- Helps public schools comply with the state mandate to celebrate Arbor Day.
- Encourages people to work together on park projects, such as *cleanups, pruning, mulching, and letter writing.*

Planning an Arbor Day weekday event for schoolchildren

Develop partnerships among Tree Tenders, park groups, schools, and other neighborhood institutions. Work together to plan and implement school

programs. Consider piggybacking the Arbor Day event with a larger project or something happening in the neighborhood. This is a great time to kick off a new garden or planting, commemorate a community leader, or honor a neighbor.

Decide on how many people to invite and where to have the program.

Involve different schools from the surrounding area. When providing the program to a school for the first time, bring written information such as a poster advertising the event or news articles about the Tree Tenders group. Consider engaging high school students as mentors for the younger students.

Plan educational, entertaining, and interactive activities at various stations for students. Consider the attention span of young children and plan activities that last just 15 to 20 minutes so they can move from one station to the next. Encourage students to create posters and banners and to perform songs and skits.

Invite dignitaries to attend the event such as the mayor, school principal, city council members, and civic leaders.

Send press releases to TV, radio, and the press. The more groups you have involved, the more newsworthy the event becomes. Make sure there are visually pleasing attractions for TV and photo shoots.

A selection of Arbor Day educational activities:

- Recycling games
- Singing
- Arts and crafts
- Seed planting
- Storytelling
- Planting trees, shrubs, & flowers
- Tree mulching

“That land is a community is the basic concept of ecology, but that land is to be loved and respected is an extension of ethics. That land yields a cultural harvest is a fact long known but latterly often forgotten.”

- ALDO LEOPOLD,
A SAND COUNTY
ALMANAC

GETTING ORGANIZED

Planning an Arbor Day weekday event for the community

Plan an activity, like tree planting, park cleanup, or pruning day. An unusual attraction, music, or a performance will draw crowds and the press. If possible, piggyback your Arbor Day program onto another event, such as a popular city park festival or health fair.

Choose a frequently visited spot, such as a park, farmer's market, or shopping area.

Gather support from businesses and community groups including neighborhood associations, town watch groups, etc. Donations of coffee, donuts, hats, and pens are great giveaways that also involve and publicize vendors.

Plan educational and entertaining activities for children to enjoy.

Attract TV, radio, and press. Notify local TV, newspapers, and radio stations prior to scheduled event. To ensure high turnout, encourage organizers to advertise the event through word of mouth, flyers, posters, etc.

Be visible and make sure to get your message across on the day of the event. A good public address system and great music can make your event a big success.

Have display tables where people can pick up educational information about tree care and your group. Suggest ways volunteers can affect tree-related legislation. Have a prominent sign-up sheet for potential volunteers to list their names, addresses, and phone numbers. Holding a raffle is another way to get names and addresses.

Arbor Day event resources:

Bartlett Tree Experts
800-248-TREE
www.bartlett.com

Davey Tree Care
215-343-3631
www.davey.com

McFarland Tree & Landscape Services
215-844-TREE
www.mcfarlandtree.com

Philadelphia Parks Alliance
215-879-8159
www.philaparks.org

Penn State University Urban Forester
610-489-4315
jxs51@psu.edu
www.sfr.cas.psu.edu/

Fairmount Park Ranger Corps
215-685-0144
www.fairmountpark.org/

National Arbor Day Foundation
100 Arbor Avenue
Nebraska City, NE 68410
888-448-7337
www.arborday.org

Recycling:
Philadelphia Recycling Department
215-685-7329

Wildlife:
Schuylkill Wildlife Rehabilitation Center
215-482-8217

Women's Humane Society
Educational Programs
21-750-3100

Working with children

With any tree-care projects you undertake, you'll want to consider how to involve children. Kids can undo a lot of tender loving care very quickly if they don't have a personal connection to your greening effort. But once you tap into kid energy, you will find that young Tree Tenders feel very strongly about improving their own communities. In addition, you can take advantage of their unlimited stamina and limber backs. In short, put them to work! Make sure to make it fun and give them plenty of positive reinforcement.

"There he began thrusting his iron rod into the earth, making a hole in which he planted an acorn; then he refilled the hole. He was planting Oak trees. I asked him if the land belonged to him. He answered no. Did he know whose it was? He did not. He supposed it was community property, or perhaps belonged to people who cared nothing about it. He was not interested in finding out whose it was. He planted his hundred acorns with the greatest care."

- JEAN GIONO,

THE MAN WHO
PLANTED TREES



Schools

Tree Tenders who are interested in working with schools will find many opportunities to interact with budding environmentalists. There are likely trees already growing on school property that you can help a classroom “adopt.” You can also show the students how to identify, care for, and observe the trees. Here are some suggestions for other activities that you might want to try with schools:

- Read one of the many excellent children’s books about trees to a class. *[See Appendix for our children’s recommended reading list.]*
- Sponsor a class of children on a field trip to a nearby arboretum or park, or on a “walking field trip” to see neighborhood street trees
- Assist with the planning and implementation of an Arbor Day celebration.

In addition, many teachers are currently searching for activities to satisfy district requirements mandating that students must complete a “community-based service learning” project, in order to advance to grades 5 and 9 and to graduate from grade 12. An ideal service learning experience combines academic content with hands-on activity, and many tasks relating to tree care readily fit the bill. Some suggestions for long-term service learning projects include involving older students in a neighborhood tree inventory project, or using student help to research, plan, and implement the planting of new trees on a nearby street.

After-school programs

Contact your neighborhood schools about enriching their after-school program with some of these same activities. Establishing a Youth Tree Tenders group during this period has the advantage of not competing with a

day. Consider enlisting student help to patrol their schoolyard and pick up litter, for example.

Support

Take advantage of the resources of organizations that already have extensive experience working with youth, such as Philadelphia Green, Boy Scouts, Girl Scouts, and 4-H. ▼



II. HOW TREES WORK

Tree Basics

All plants require sunlight, water, air, and nutrients to survive.

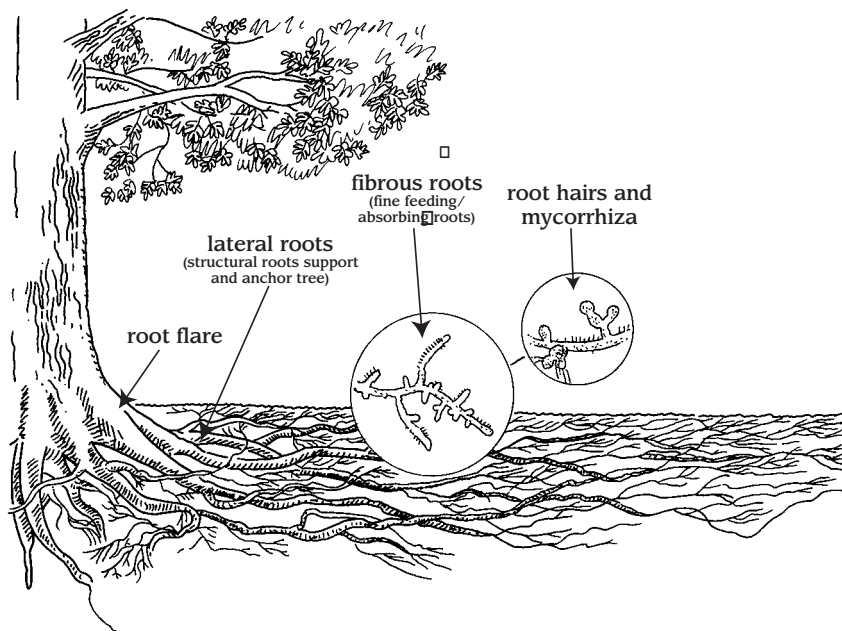
A tree is a woody perennial (a plant that lives for many years) with one or more main trunks to support its leafy crown.

To understand how to care for a tree, let's look at a tree's parts and how they function. A tree consists of five main components: **roots, trunk, branches, leaves, and reproductive parts (flowers and fruits or cones).**

Roots

- Anchor the tree
- Absorb and transport water, nutrients, and oxygen
- Store food

Tree roots grow where there is **oxygen**, water, favorable temperatures, and nutrients. Most tree roots can be found in the top three feet of soil, with the majority in the top foot. Tree roots can be divided into two categories: **absorbing roots and structural roots.**



Structural roots support the tree. They are large, heavy, and woody.

Absorbing, fibrous roots take in water and nutrients through small "root hairs." Most absorbing roots grow in the top 12 inches of soil, and can extend more than three times the width of the tree canopy (beyond the drip line). Tree roots often form a symbiotic association with fungi in the soil. This association, called *mycorrhiza*, can help plants absorb nutrients and water.

Some trees have long, downward growing "taproots" when they are young. In most cases, the taproot disappears as the tree grows. Exceptions are pecans and oaks, which keep their taproots. These trees are especially difficult to transplant.

A tree's roots should be well watered, yet well drained. A root's function is to absorb water along with dissolved nutrients for plant growth. Meanwhile, root cells need oxygen to transform food into energy. Most tree roots will die in water-saturated or compacted soil.

In a forest, fallen leaves decaying on the forest floor nourish tree roots. In the city, however, tree roots are cramped into small tree pits or surrounded by concrete. They grow under sidewalks and between buildings to find water and nutrients. As roots struggle to survive, the result can be sidewalk and curb upheaval, if their planting pits are too small.

When choosing street trees for small tree pits, consider small-sized species such as hedge maple, Japanese tree lilac, and Winter King Hawthorn. Larger species that tolerate compacted soil are London plane, red maple, and ginkgo.



Trunk

- Transports water, nutrients, and food between leaves and roots
- Provides structural support
- Stores food

A tree trunk consists of **bark**, **phloem**, **cambium**, and **xylem**.

Bark: The tree's protective outer layer, or "skin," protects the tree from insects, diseases, injury, and water loss.

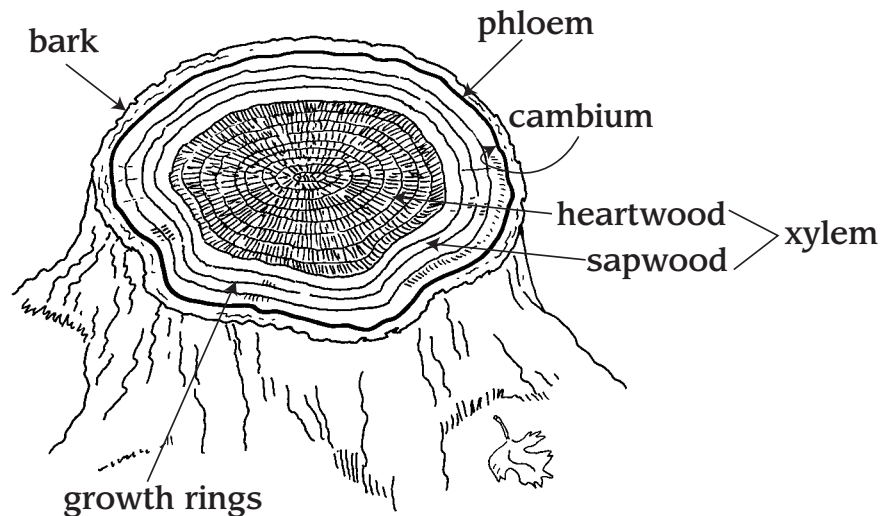
Phloem: This inner bark is made up of cells that carry sugars (manufactured by the leaves) called *glucose* to the rest of the tree.

Cambium: The thin growth layer that produces the phloem (outward towards the bark) and the xylem (inward towards the center). Damage to the cambium can weaken or kill a tree because new phloem and xylem will not be produced, preventing food and water transport. Common forms of damage are wounds by cars and carved initials. The cambium is where growth in diameter occurs with the formation of new annual rings inside and new bark outside.

Xylem (or sapwood): Cells that carry sap (water and nutrients) from the roots to the branches and leaves. The outer layers of functioning xylem are called sapwood. The inner layers, stained a dark color by chemicals that prevent decay, are non-functioning and are called heartwood.

Branches

- Transport water and nutrients
- Produce leaves, flowers, and fruits
- Provide structural support
- Are often called a tree within a tree. Branch growth occurs at the branch tip where terminal buds produce new leaves, twigs, and flowers.



Trees (Forgive me Mr. Kilmer)

*I think that I shall
never see*

*A stranger creature
than a tree.*

*In summer months it
wears warm clothes,
Then stands stripped
naked when it
snows.*

*I understand most
things I see,
But only God can dig
a tree.*

- DANIEL A. JENKINS

HOW TREES WORK

Leaves

- Produce food for the tree through photosynthesis
- Are the site for gas exchange (carbon dioxide [CO₂] and oxygen [O₂]), and water loss in transpiration

Transpiration, the release of water vapor into the air, causes trees to act like mini-air conditioners in the summer. This process enables the tree to pull water as much as hundreds of feet up from the roots to its leaves.

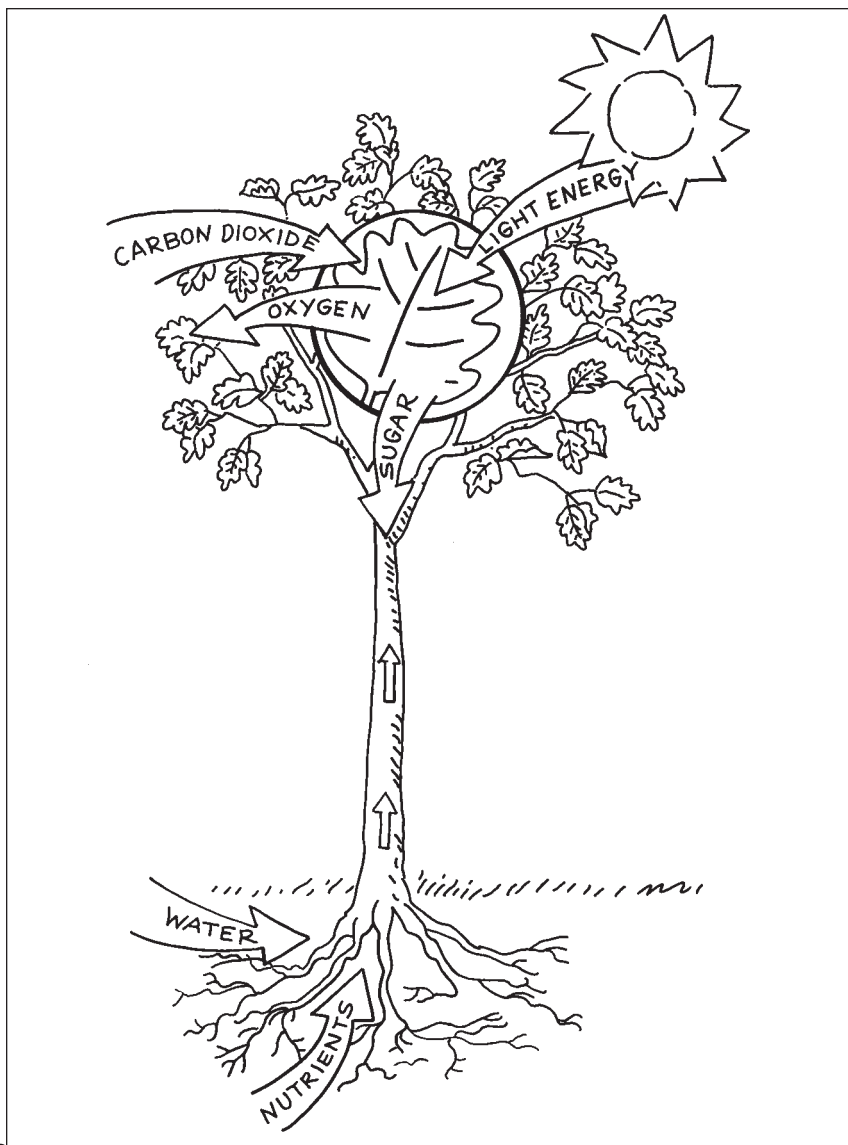
Each leaf is an amazing food factory. Through the process of **photosynthesis**, plants produce their own food and release oxygen, making life on earth possible. In photosynthesis, plants use the green pigment in their leaves (chlorophyll) to absorb the sun's energy and combine it with CO₂ from the air, plus water and nutrients from the soil. *Presto*—the tree produces the glucose it needs and the oxygen we breathe. Plants and mammals depend on each other. Plants absorb our waste product, CO₂, and release O₂ to us, which we return as CO₂ to plants.

A leaf may be waxy, fuzzy, or lighter in color to prevent water loss. **Stomates** are pores on the leaf's underside that control gas exchange and water loss. Stomates open daily for CO₂ and O₂ exchange during photosynthesis; they close at night and during hot weather to prevent water loss.

A leaf is comprised of a **blade** or needle that captures light for photosynthesis and a **petiole** (leaf stalk) that positions the leaf for photosynthesis. A **bud**, next year's leaf or flower, grows at the petiole's base. **Sessile** leaves, lacking a petiole, attach directly to the stem.

We enjoy the colorful, seasonal drama of **deciduous trees**, which drop their leaves in the fall. In the fall, food production slows in trees like maples and oaks. As leaves start to die, the green chlorophyll fades, allowing yellows and reds (carotene and xanthophyll pigment, which are always present in the leaf) to show through. In winter, these leafless trees live on food stored in the roots, trunk, and branches until spring, when new leaves emerge.

Evergreen trees, such as pine and spruce, drop their needles or leaves, but not all at once. Their leaves or needles live for more than a year. While older leaves or needles die and drop, younger ones continue to grow, so the tree is never bare. Not all needled **trees** are





evergreen and not all broad-leaf trees are deciduous. Exceptions are the dawn redwood (*Metasequoia glyptostroboides*, a deciduous conifer), or the Southern magnolia and holly, both of which have broad leaves and are evergreen.

Reproductive parts

Flowers attract insects and birds and are sites of pollen distribution. A fertilized flower develops into a **fruit** that may be dispersed by the wind; carried in an animal's mouth, digestive system, or furry coat; and/or transported by water. The fruits include nuts, samaras, legumes, capsules, and fleshy fruits. Fruits hold seeds that, under the right conditions, germinate and grow into tree seedlings.

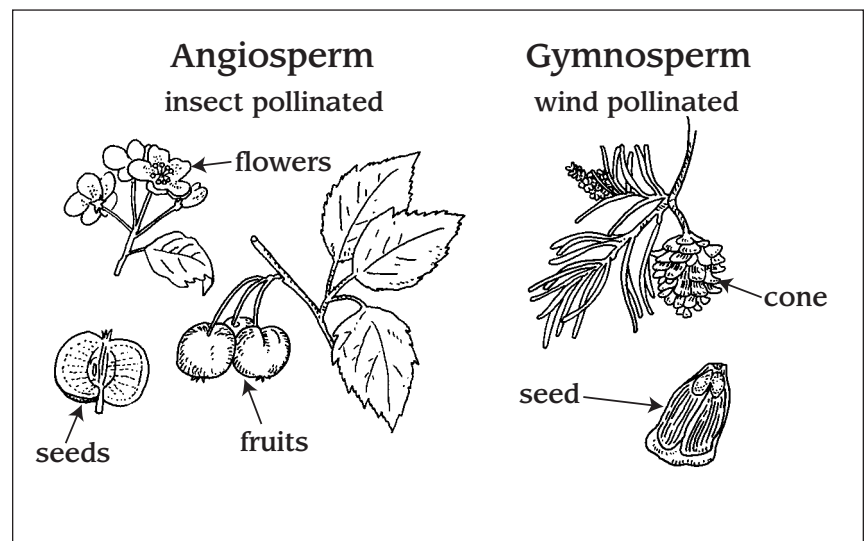
Some flower clusters, such as the crabapple (*Malus species*) and the golden rain tree (*Koelreuteria paniculata*), are quite attractive. Fertilized crabapple flowers become ornamental summer and fall fruits. Fertilized golden rain tree flowers become colorful, triangular fruit capsules in autumn.

Other flowering trees such as the ash (*Fraxinus americans*) and zelkova (*Zelkova serrata*) have small, even petal-less, flower clusters. A cluster of fertilized ash flowers becomes "samaras," which are winged and easily dispersed through the air. Zelkova flowers develop into small, round fruits. These insignificant flowers are wind-pollinated and are responsible for some of our seasonal allergies.

Trees can be divided into **angiosperms** (seed inside fruit) or **gymnosperms** (naked seed).

A pollinated flower's ovaries develop fruits containing seeds, or **angiosperms**. Angiosperms include flowering trees such as the crabapple and golden rain tree. "Angio" refers to vessel; "sperm" refers to seed.

Gymnosperms are non-flowering trees. The gymnosperm reproduces via wind-carried pollen (which is also allergy producing) and exposed ovules that become seeds. Gymnosperms include all conifers (cone-bearing trees), such as pine, spruce, and fir. ▼



III. TREE IDENTIFICATION

Every tree offers a variety of clues to identify it. A tree's **form, leaves, bark, buds and twigs, flower, fruit, and site or cultural requirements** are characteristics unique to a species, variety, and cultivar. The following details can help with the identification process. Consult a field guide with a botanical key (dichotomous key) for more information

Form

Tree forms fall into six basic categories: *columnar*, *rounded*, *ovate*, *pyramidal*, *vase-shaped*, and *weeping*. The weeping form, such as weeping cherry, is not an appropriate street tree.

Even within the same species such as the maple, some tree varieties will take varied forms. A tree's tendency toward form is genetic, but other factors affect growth and structure: location, soil characteristics, wind, water, and light.

Columnar form:

The upright, columnar form of the 'Freeman' maple, 'Princeton Sentry' ginkgo, and the European hornbeam makes a nice tree for a tight space or a small city street.

Rounded form:

The American sycamore, London plane tree, oaks, maples, and beech trees tend to be round. Large species are appropriate for wide streets and lawns. Smaller varieties, like hedge maple, work well on city streets.

Ovate form:

Ovate form is narrow at the bottom, wide in the middle, narrow at the top. Ashes tend to be ovate. A small ovate tree, like the 'Washington' hawthorn, works well on most city streets.

Pyramidal form:

Pine, cedar, and spruce are pyramidal conifers. The deciduous littleleaf linden is also pyramidal. The ashes are pyramidal in form when young.

Vase-shaped form:

Shaped like an inverted triangle, zelkova, evodia, and some elms have the vase-like form.

Leaves

Leaves all grow in different shapes, each according to its tree species. A leaf's form, arrangement, blade shape, margin and vein pattern are means of identification.

Leaf form

Simple leaf: one leaf blade per petiole (leaf stalk) with bud.

Compound leaf: many small blades (leaflets) on one petiole with bud.

Broad leaf: broad flat leaves usually deciduous but not always as in the Holly or Southern magnolia.

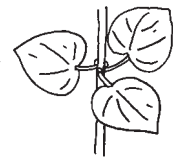
Needlelike leaves: mostly found on evergreens, although some found on deciduous trees like the dawn redwood (*Metasequoia*) and larch.

Leaf arrangement on stem

Alternate: leaves and buds alternately spaced along stem.



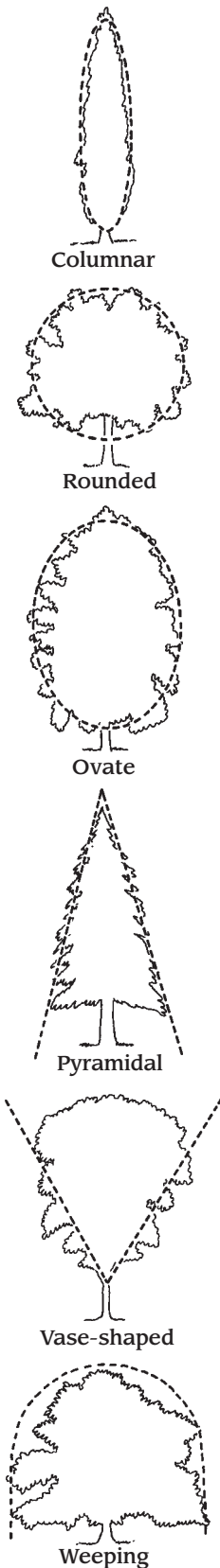
Whorled: three leaves and buds growing from same node, evenly around the stem.



Opposite: leaves and buds across from each other on stem.

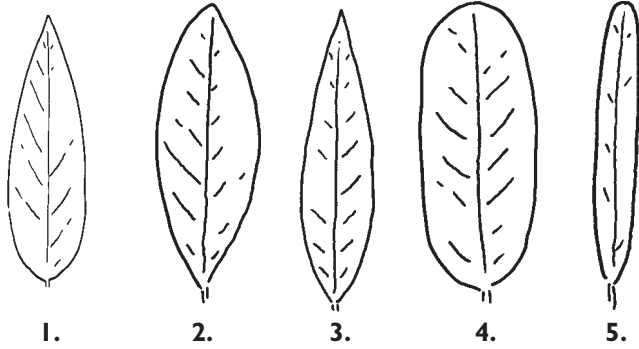


There are only four common opposite-branching trees in our area. They are maple, ash, dogwood, and horse chestnut (use the phrase "M-A-D-Horse" as a reminder).



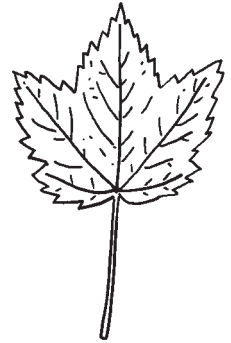


Common blade shapes



- 1. Ovate
- 2. Elliptic
- 3. Lanceolate
- 4. Oblong
- 5. Linear

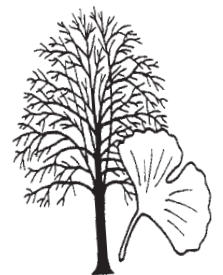
Vein pattern



Maple
 Palmate Veination
 Rounded Shape
 Serrated Margin

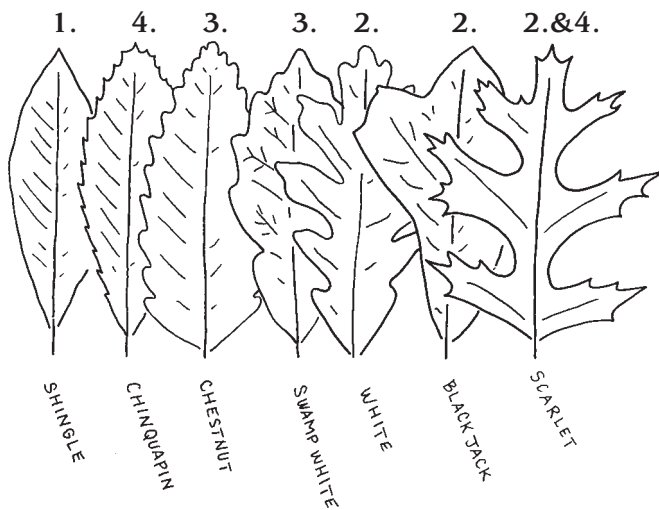


Oak
 Pinnate Veination
 Ovate Shape
 Lobed Margin



Ginkgo
 Parallel Veination
 Fan-shaped
 Sinuate Margin

Leaf margins on a variety of oaks



- 1. Entire: smooth-edged
- 2. Lobed: round-edged
- 3. Sinuate: wavy
- 4. Serrate: toothed

TREE IDENTIFICATION

Bark

Bark, or the tree's outer protective layer, is a year-round identifier.

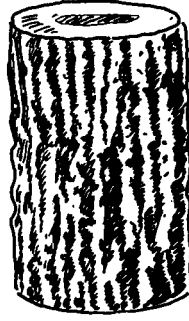
Color: brown, black, gray, or multi-colored

Pattern: solid, mottled, or spotted

Texture: smooth, fissured, shaggy or exfoliating buds and twigs



Smooth:
Beech



Fissured:
Black Oak



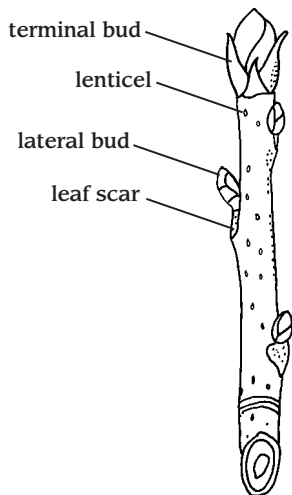
Shaggy:
Hickory



Exfoliating:
London plane

Buds and twigs

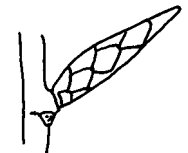
Buds and twigs are evident all year. They are distinguished by branching pattern; color, size and shape of buds; and presence of hairy, winged, or corky twigs. Twigs are also identifiable by leaf scars and lenticels.



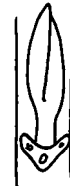
Common buds



stalked



narrowly
conical



rounded



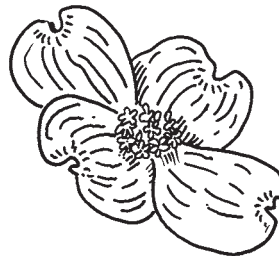
ovoid



Flowers and fruits

When in bloom, flowers are helpful in tree identification. They vary in bloom time, shape, size, color, number of petals, and smell.

Fruits come in many different forms. They hold the seeds for future trees. ▼



Fruits



capsule



samara



acorn



drupe



double
samara



cone

Living Christmas Tree

Celebrate an environmental Christmas this year by purchasing and planting a live Christmas Tree.

Here is how to do it: In the fall, before the ground freezes, dig a hole, being careful to save the soil for future backfilling. You should store the soil in a garage, unheated porch or shed so that it does not freeze. Purchase a potted or "balled and burlapped" evergreen and store it in a protected area, out of the wind and away from extreme cold temperatures. Cover the tree roots with mulch to protect it from drying out or freezing.

A week before Christmas, bring the tree indoors, making sure to mist and water it. Right after the holiday take the tree out and store it again in a protected area to harden it off. In a week the tree will be ready for planting. Retrieve the saved soil to fill in around the tree. Water well and mulch for warmth.

The key to success with keeping Christmas trees alive is to limit their time indoors and keep them moist. Trees have a hard time acclimating to winter temperatures if left in a warm house for more than 10 days.

IV. TREE PLANTING

Street Tree Planting

The six steps to successful tree planting in Philadelphia

Get city approval

Get a planting permit from the Fairmount Park Commission (FPC) arborist to plant a tree in your district. The FPC arborist must approve each tree site and issue the planting permit before you can plant trees along the street and on city property. The arborist will also recommend the type of tree you should plant.

Locate your district arborist through:

The Fairmount Park Commission
Phone: 215-685-4363
Fax: 215-685-4364
www.fairmountpark.org/StreetTree.asp

You may decide to hire a contractor (the FPC has a listing of approved street-tree contractors) to do all the upfront work, such as obtaining a planting permit and contacting PA One-Call System. Then plant the tree yourself. After securing the planting permit or hiring a contractor, choose a reputable nursery and begin your tree selection.

Choose the right tree

Before purchasing a tree, consider what kind of tree is most appropriate for the site. Consider overhead wires, amount of sunlight, how large the planting pit is, how far the site is from the building, the soil pH, and how well the soil drains. Each tree species has specific requirements, and some are more tolerant of city stresses like salt and compacted soil. Knowing your site will help you choose a tree that will thrive.

*Remember, use an FPC-recommended species and an FPC arborist can help with selection. The *Street Tree Fact Sheet* book published by Penn State University lists trees' characteristics, which can be very helpful.*

What tree characteristics do you want?

Spring flowers and fall color are what come to mind first, but it's important to consider all the pros and cons of a tree species.

Will the tree be compatible with your spot in 25 years?

Imagine your planting site in the future with a mature tree planted there. Can it accommodate a large tree? Would a columnar tree or a wide-spreading tree suit the site best?

Purchase the tree

Many area nurseries belong to the Pennsylvania Landscape & Nursery Association and will provide a one-year guarantee on their trees. When pricing trees, ask if a guarantee is included and if it stipulates that the nursery must plant the tree. [See Appendix, "Tree Sources and Resources".]

In the Mid-Atlantic states, the ideal planting seasons for deciduous trees are fall and spring.

For the best-quality trees, shop when the nursery is well stocked. Trees are sold in containers, balled-and-burlapped, or bare-root. At this point, they are susceptible to stress, because there are often stored above ground, have insufficient water, and can be adversely affected by wind, freezing temperatures, sun, and heat. All of these can affect the tree's overall health.

When buying a tree, also consider the following:

Choose a tree with an appealing overall structure

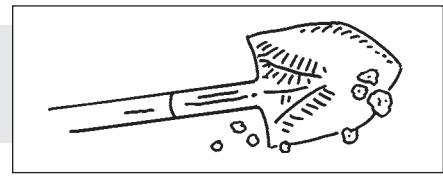
When buying a tree, make sure its structure is suited for the proposed site at the time of planting and as it matures.

Check to see if the tree is healthy

During the growing season, a tree should have a full canopy of leaves. Avoid trees with dead branches and branch tips,

Celebratory Trees

A great way to celebrate a birth, marriage, anniversary, or a person's life is to plant a tree for them. A tree can serve as a memorial as well. The tree could even be planted in the yard of your friend or relative's house. (Obviously, you would need permission first and a promise to water and care for the tree). Planting a tree at the cemetery, or in a favorite park or at a survivor's home can provide a living reminder of the deceased.



deteriorated and/or insect-damaged foliage. Also, check for wilt, insect damage, and brown leaves.

Note the tree's structure

Look for a full, evenly branched crown. Choose a tree with one strong central leader. A tree with a double leader or v-shaped crotch may break and be susceptible to disease. Check the branching habit. Would loss of a limb destroy its shape? Are branches crossing, rubbing, or growing too close together?

Examine the trunk

Is it damaged? Is the trunk straight and strong? Is the trunk discolored, swollen, scarred, or does it have sunken areas that could indicate poor health, disease, or damage? Check under the wrapping for wounds. Don't accept a tree with unhealed pruning cuts, flush cuts, or wounds. The trunk should not move within the container or ball.

Check the roots

Examine the overall appearance of the root ball or container. If the roots are balled-and-burlapped, the ball should be firm and unbroken. A broken ball may mean that the tree has been dropped, in which case the roots may be damaged. Shabbiness or damage to the ball could indicate poor care. Also, look for or feel for the roots. Girdling roots growing around the root ball or container could strangle the plant.

If the tree is small enough, pull it from the container to see if the roots are well established. Look for a fibrous root system rather than a pot-bound plant with circling roots. A pot-bound plant that's been packaged too long is less vigorous and more prone to stress and shock during transplanting than a plant with a fibrous root system.

Is the root ball large enough for the trunk diameter? Because each plant type develops a different root system, root ball size will vary. Deciduous trees tend to have larger root balls than conifers.

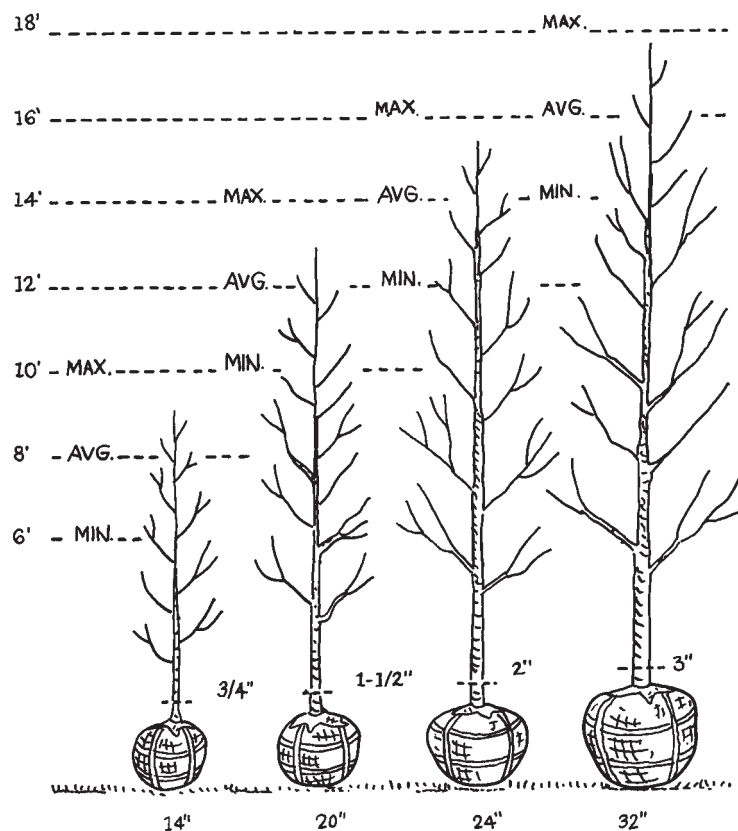
Before buying, step back and examine the entire tree

Has the plant been growing properly?
Are the proportions correct?

Here are some basic standards:
These are rough estimates. Check the American Nurseryman Standards Book for more species-specific guidelines.

Basic Tree Proportions

A tree with a:	should be:	and have a root ball...
3/4" diameter trunk	6 - 10' tall	14" in diameter
1-1/2" diameter trunk	10 - 14' tall	20" (or more)
2" diameter trunk	12 - 16' tall	24" (or more)



TREE PLANTING

Prepare the site

The law requires that all utility lines under the sidewalk be located and marked. This is to ensure your safety when digging and planting a tree. Call the PA One-Call System (1-800-242-1776) at least a week before you intend to dig. The utility companies require three days notice, but it's best to allow for more time.

When calling, have the following information ready:

- House number, street, and specific location (front, side, etc.) of planting site.
- The name of the nearest cross street.
- The type of work you are doing, such as planting a tree on the sidewalk.
- Who you are doing the work for: Yourself, Ms./Mr. _____, etc.
- The day you plan to begin digging.

At the end of the call, you will be assigned a proof of notification number. Write it down.

Make sure that the PA One-Call System has sent a utilities representative out to mark the sidewalk. Colored arrows will be spray-painted on the sidewalk to show you where the utility is and the direction the pipes are going. The day before planting, mark on the sidewalk with chalk or white paint where you plan to cut.

The Fairmount Park Commission provides these guidelines for marking street tree pits.

Pit sizes

- Minimum: 3' x 3'
- Preferred: 4' x 4' for small trees, or 5' x 5' for larger trees
- Variations: 3' x 5' and others, including a property-wide "planting strip."

Locations

- Not in front of steps, doorways, or alleyways
- 15' from light poles, utility poles, and fire hydrants
- 20' from stop signs and street signs
- 15'- 30' from other trees (depending on mature size and form)
- 30' from street corners
- 5' from driveways
- 5' from manhole covers, storm drains, and main utility lines
- Edge of tree pit 18" from residential utility lines (or soil must be hand dug)
- Edge of tree pit 5' from steps, stoops, or walls to allow 5' of unobstructed sidewalk (unless area is covered with tree grate or paving)

After you have marked the sidewalk, use a concrete saw to make even, straight cuts. You can rent a saw from a tool rental company or the contractor you choose to do the work may provide one. Wear safety goggles and steel-tipped boots. Use a sledgehammer with caution to break up and remove the concrete.

If you encounter something that looks like a utility line while digging, call PA One-Call System again. The operator will then notify the appropriate utilities representative.

Prepare the tree pit

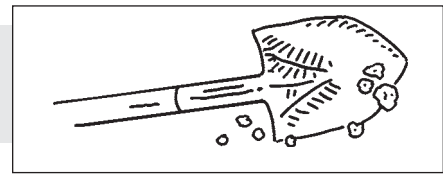
Dig a sample hole to check drainage. Shovel about 12 inches of soil from a small area. Fill the hole with water. If the soil is loose, easy to dig, and drains well, it will be a good environment for healthy tree roots. If the water remains in the hole for an hour or more, the drainage is poor. There are two alternatives for a site with poor drainage: select another planting site or choose a tree tolerant of wet soils, such as red maple.

Locate the tree's root flare. A tree's trunk usually flares out slightly, widening

"Trees promote meditation."

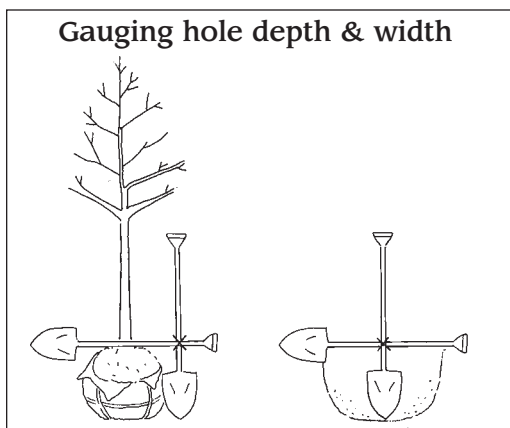
- JOHN STEWART COLLIS,

THE TRIUMPH OF THE TREE



before it enters the soil. It is important to plant the tree at the same depth as it grew in the nursery.

Remove soil from the tree pit. To gauge the right depth and width, use a measuring stick or shovel to estimate the height of the root ball. Make sure to measure from the bottom of the root ball only to the root flare. (Some trees may have soil above the root flare that needs to be removed before planting.) When the planting hole is the right size, roughen the sides and bottom with a pickaxe or shovel so the roots will more easily move out from the planting hole.



Never leave an open pit unattended. If you can't finish the job in one day, cover the pit with heavy plywood and mark the site with caution tape or signs. Remember that the sidewalk is a public right-of-way and safety should always come first.

Planting a balled and burlapped tree

Prepare the transplant by removing all dead, broken, and rubbing branches.

By laying the tree on its side, you can easily reach these branches, as well as any twine or tags in the branches. Pruning of healthy branches must be minimal at planting time.

Gently roll the tree into position by pushing and turning the rootball.

Don't handle a tree by the trunk; moving the tree around by the trunk may cause separation from the rootball. Consider which way the tree should face before putting it in the hole. Now carefully lower the rootball into the pit. Take care not to drop the tree. A sudden drop can fracture the rootball and break up the root system causing tree injury and eventual death.

Prepare the rootball.

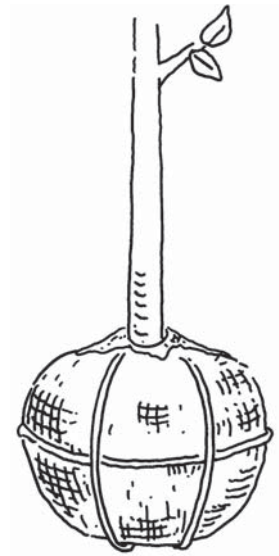
With the tree properly positioned, untie the twine and burlap from the tree's trunk to expose the top half of the rootball. *Natural fiber burlap* will decompose. Fold down the burlap, cutting away excess fabric that might get in the way as you backfill with soil. Remove as much burlap as possible so it doesn't wick water from a transplant's roots.

For plastic or synthetic materials, remove everything from the rootball by carefully cutting material free. Non-degradable materials will keep water from reaching roots and hinder root growth. Finally, if the rootball is in a *wire basket*, cut and remove the top six inches of the basket so the wire is below the soil surface. The basket provides support to the rootball and must be left on during planting.

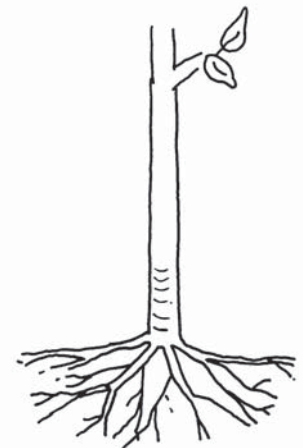
Refill the planting pit.

Using the same soil that you removed from the pit, fill in and around the root ball. It is not recommended to add any soil amendments when backfilling. You don't want to create such a pleasing environment that the roots grow quickly and then hit the hard pit wall. This could stress the tree, so just backfill with the same soil you originally dug out.

Gently press the soil down to prevent air pockets, but do not compact it. Backfill until the surrounding soil is level with the tree's root flare. Water



balled and burlapped



bare-root



container-grown

TREE PLANTING

gently to settle the soil and eliminate air pockets. Add soil and water again as necessary to have a level planting.

Planting a bare-root tree

As with a balled and burlapped tree, dig the planting hole the same depth as the existing root system, so as not to bury it too deep. The hole should be twice as wide as the root system to allow for spreading. Bare-root trees are very susceptible to the elements, especially severe cold or heat. They can easily dry out and must be protected; covering with mulch will help. Inspect the roots before putting the tree in the ground. Any torn roots should be pruned back to healthy tissue. When digging the planting hole, create a firm, cone-shaped mound in the center of the planting hole, and spread the roots out evenly around the mound. Backfill gently, working the soil around the roots. When filled with soil, water and allow to settle. Finish backfilling and water again.

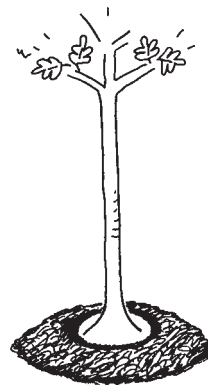
Planting a container-grown tree

Dig planting hole the same depth as the tree's container. Make the diameter of the planting hole at least a foot wider than the container. Planting container trees is very similar to planting balled and burlapped trees. The major difference is that with a container-grown tree you can see if the roots are girdling and can gently loosen and straighten them as needed.

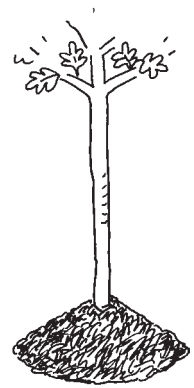
Mulch for a healthy tree

Mulching helps a tree grow strong and healthy. Mulch retains moisture, reduces weeds, and helps keep lawnmowers and weed whackers away from tree trunks. It can also increase root growth by 10 times and may reduce soil compaction and increase root aeration. The organic matter breaks down into useful nutrients.

To mulch, spread an even three-inch layer of organic material such as wood chips, composted leaves, bark nuggets, or pine needles on the tree pit. Do not use plastic, stone, sawdust, or grass clippings. Place the mulch at least four to six inches beyond the trunk so moisture and insects do not touch the bark.



correct
mulching



incorrect
mulching

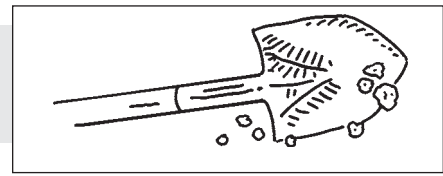
Optional staking for protection.

Staking is optional. It is useful in the city to protect vulnerable transplants from vandalism and vehicular damage. Recent research indicates that un-staked trees compared to staked trees grow into stronger, healthier, and more flexible mature trees. If you stake, be sure to keep the guy wires loose so the sapling can sway in the breeze and won't be girdled. Remove stakes within one year of planting.

To stake:

Two pieces of lumber (2' x 3' x 8') will support an average street tree. At planting time, drive stakes about 12 to 18 inches into the undisturbed soil at the pit's bottom.

Secure the tree trunk to the stakes with loose, flexible loops of non-abrasive material such as elastic or canvas webbing, rubber cording, polyethylene tape, or wire covered with garden hose. The tie material should support the tree loosely, allowing wind movement, which

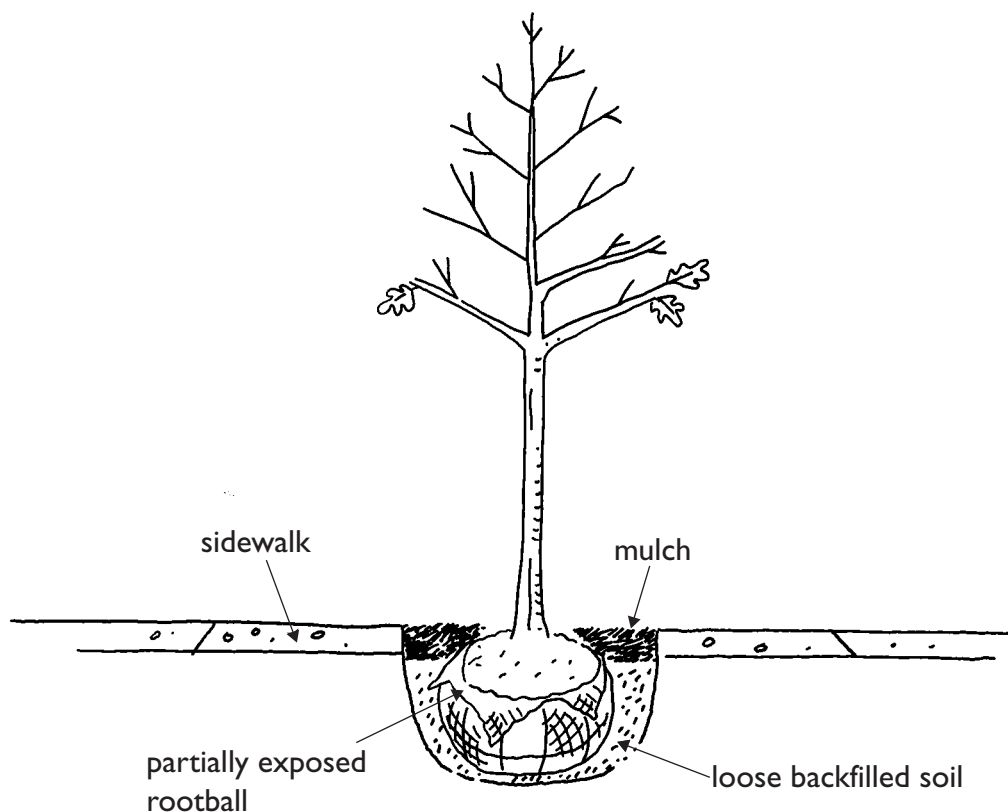


promotes a sturdy trunk and a strong root system.

Remove wires and stakes about one year after planting. The tree should be sturdy enough to stand on its own by then. ▼

Trees for the Birds
Planting the right species of tree can attract birds and other wildlife to your home. Each species of bird or other animal has a preferred habitat and specific dietary needs. By providing food and shelter, you can target the kind of wildlife you want to attract.

A Properly Planted Street Tree



V.TREE CARE

Watering, Weeding, Cultivating, Mulching, and Much More

Water weekly and deeply

Water deeply and at least weekly throughout the growing season until the ground freezes. At each watering, allow 10 to 15 gallons to seep slowly into the tree pit. It's best to use a trickling hose, bubble device, five-gallon bucket with holes, or Clark Park Tree Tenders' "Water Buffalo" (described below). Discontinue watering when the ground freezes. Start again in the spring when tree buds swell and sprout new leaves.

Weeding

Weeds and grass have very strong root systems that compete with trees for nutrients, water, and air in the soil.

Cultivating

Soil that is compacted by foot traffic or vehicles does not allow water or air to get to the tree's root system. Compressed soil makes it tough for tree roots to grow. Cultivating or loosening the top couple inches of soil will give the roots better access to water and air.

Mulching

After weeding and cultivating a tree pit, applying mulch can prolong the good effects. Mulch conserves water, releases nutrients into the soil, controls weeds and grass, prevents soil compaction, and buffers the trunk from lawn mowers. Apply an even, three-inch layer of organic mulch such as wood chips, licorice root, or leaf mold evenly around the tree. *Keep mulch away from tree trunk.* Replenish annually..

Plant a "living mulch" of shallow-rooted annuals like impatiens, marigolds or

petunias. This will encourage more frequent watering.

Keeping the tree pit clean

Weeds, litter, and debris may keep water and oxygen from reaching tree roots. Substances like motor oil, de-icing salt, detergents, urine, and soda injure trees.

Protecting the tree

Bark is the most important part of a tree's protection. Erect barriers and install tree guards to keep cars, doors, dogs, bicycles, lawn mowers, and weed whackers from wounding tree trunks.

Amending soil

Amending the soil in tree pits is not recommended unless the entire planting area can be amended, as in trench plantings or containerized plantings. Amending the soil in a planting pit will help the tree initially, but when the roots reach the unamended soil, they will go no farther, as if hitting a wall.

Fertilizing

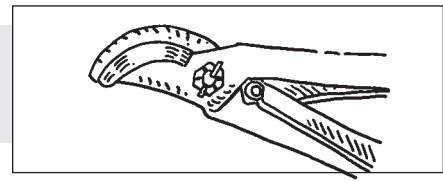
Fertilizer is not tree food. It is more like a prescription drug. Fertilizing will not solve problems caused by inadequate sunlight or water, air pollution, plant diseases, or insect attack. Before deciding to fertilize, determine the tree's needs and do a soil test. The young sapling, the mature healthy tree, the declining tree, or the tree with yellowing leaves all have different needs. Here are some essential tips:

- Never fertilize a newly planted tree. Wait at least one year for the tree to become established. Then look for visible foliage symptoms to see if fertilizers are needed.
- Follow directions on the product label and never exceed the recommended dosage.
- Fertilize in early spring before leaves are visible.

Make Your Own Watering bucket:

Round up a five-gallon plastic bucket, a hammer, and an average-sized nail.

Hammer the nail into the side of the bucket about an inch from the bottom. Place the bucket in the tree pit. Fill the bucket with water. Pull out the nail and direct the trickle of water into the root zone. Refill as needed.



- Water thoroughly and immediately after fertilizing to move fertilizer into the soil.
- Never fertilize during dry, hot weather. The fertilizer will draw all remaining moisture out of the tree, causing toxicity and death.

To determine if the tree needs fertilizer, observe the leaf color. Unusual yellowing, especially between the veins, may indicate a specific nutritional deficiency. Notice if the old or new leaves are affected.

Only fertilize your tree if indicated by a soil test or leaf analysis. Consult an arborist regarding a mature tree in trouble. A soil test from the tree pit will determine the fertilizers needed. Tests are available for a fee from Pennsylvania State University's Cooperative Extension at 215-560-4167. Follow the instructions and when submitting a sample, note that it was taken from a street-tree pit. The test results will recommend the type and proportion of fertilizer.

Major nutrients in fertilizers

There are three major nutrients for plant growth: nitrogen, phosphorus, and potassium. *Nitrogen* is essential for leaf growth. *Phosphorus* promotes flower and fruit production and root growth. *Potassium* promotes root growth, increases disease resistance, and balances other plant nutrients.

Fertilizers tend to be either organic, slow-release granules or chemical, quick-release liquids and water-soluble granules. Kelp meal or liquid concentrate is an organic alternative containing a variety of macro and micro-nutrients.

Leaves into compost

Leaves make quick and easy compost. Chop into smaller pieces with the lawnmower and heap into a pile. Turn once or twice a month. The mix will be ready to use as a soil conditioner next spring and summer.

Most leaves when decomposed are alkaline; exceptions are pine needles, oak, and beech leaves, which are acidic and can be used on acid-loving plants such as evergreens and rhododendrons.

Pruning

Pruning trees preserves their health and appearance and may prevent damage to human life and property. Along city streets, pruning is done to control and direct growth and maintain tree health.

Minor and major tree pruning

Pruning falls into two categories:

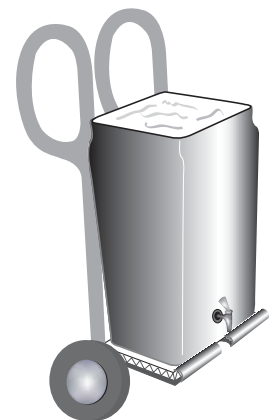
Minor tree pruning is removing dead, damaged, and diseased branches, suckers, and branches less than four inches in diameter. Tree Tenders can do minor pruning while standing comfortably with both feet on the ground. Hand pruners, pruning saws, and loppers are some of the common tools used for minor pruning.

Major tree pruning involves removing large branches from mature trees. Pruning tree branches beyond the reach of a pole pruner requires a professional, not a Tree Tender with a ladder. Major pruning should be done by a state-certified arborist who belongs to the International Society of Arboriculture or is on the Fairmount Park Commission's list of qualified contractors.

Build Your Own Clark Park Water Buffalo

By Clark Park, Tree Tender Lewis Mellman

- **Purchase** hand-truck (\$35), 35-gallon trash bin, lashing straps, and high-volume beer tap (\$5).
- **Bolt** a piece of 3/4 inch plywood to the tongue of the hand-truck.
- **Cut** a notch in plywood to protect tap.
- **Nail** two pieces of garden hose, split lengthwise, to the front of the plywood as a buffer to protect tree trunks.
- **Strap** on the trash container.
- **Install** the tap near the bottom of the container.
- **Add** water until container is half full.
- **Travel from tree to tree, opening tap and watering so each tree gets 10 to 15 gallons.**



TREE CARE

Before contracting for major pruning or tree removal work, obtain several estimates, because work methods and charges can vary. Carefully evaluate the bids; the least expensive estimate may cost more in the long run. Ask for credentials, insurance verification, and references. Choose the contractor in whom you have the most confidence. Make sure the contractor has obtained a pruning permit from the Fairmount Park Commission.

Pruning Precautions

Don't allow an arborist to climb a tree with spikes to prune. The technique can spread disease.

Don't allow an arborist to top a tree. Topping (removing the top branches) weakens a tree.

Clean all tools with 10% chlorine bleach solution, alcohol, or household disinfectant between each cut to avoid spreading disease and insects.

Before picking up the pruners or saw, evaluate the tree and site using the following guidelines.

Why prune

- For safety: to remove low limbs in the pedestrian right-of-way or those growing into power lines
- Appearance: to enhance tree shape, only advisable for young trees
- Health: to remove dead, diseased, and damaged branches

When to prune

- Anytime there are dead, diseased, and damaged branches (winter is a good time to check trees and locate problems)
- Late winter: before leaf buds open
- Fall to spring: when there are no leaves
- Midsummer: once new shoot growth becomes woody

When not to prune

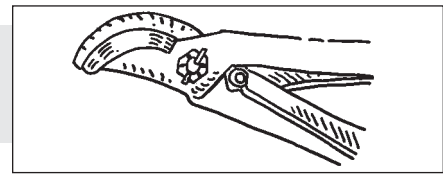
- Avoid pruning healthy branches just after new leaves emerge until they harden off in midsummer
- Do not prune when a tree has been recently transplanted

What to prune

- Always prune the 3Ds: dead, diseased, and damaged branches. Prune these branches anytime to prevent unwanted injuries and property damage, as well as maintain tree health. Any of the 3Ds may indicate disease or insect damage. Pruning will prevent disease from spreading throughout the tree and to neighboring trees.
- Dead branches are brittle and brown, not green, under the bark. They have no green leaves in the summer and the buds are shriveled.
- Damaged branches are green and alive, but are broken, fractured, or stripped.
- Diseased branches may be blackened, swollen, misshapen, have shriveled bark, mushrooms, cankers, galls, or dead leaves that indicate fungi or bacterial infection. Prune diseased limbs immediately to the closest healthy side branch or branch collar.
- Basal sprouts or suckers (thin upright branches) that emerge at the tree base. Suckers often indicate stress. They may reappear and require more pruning. Water sprouts (thin upright branches) that appear on branches, draw energy from the tree and should be pruned.
- The weaker of any crossing or rubbing branches should be removed in winter before bud break.

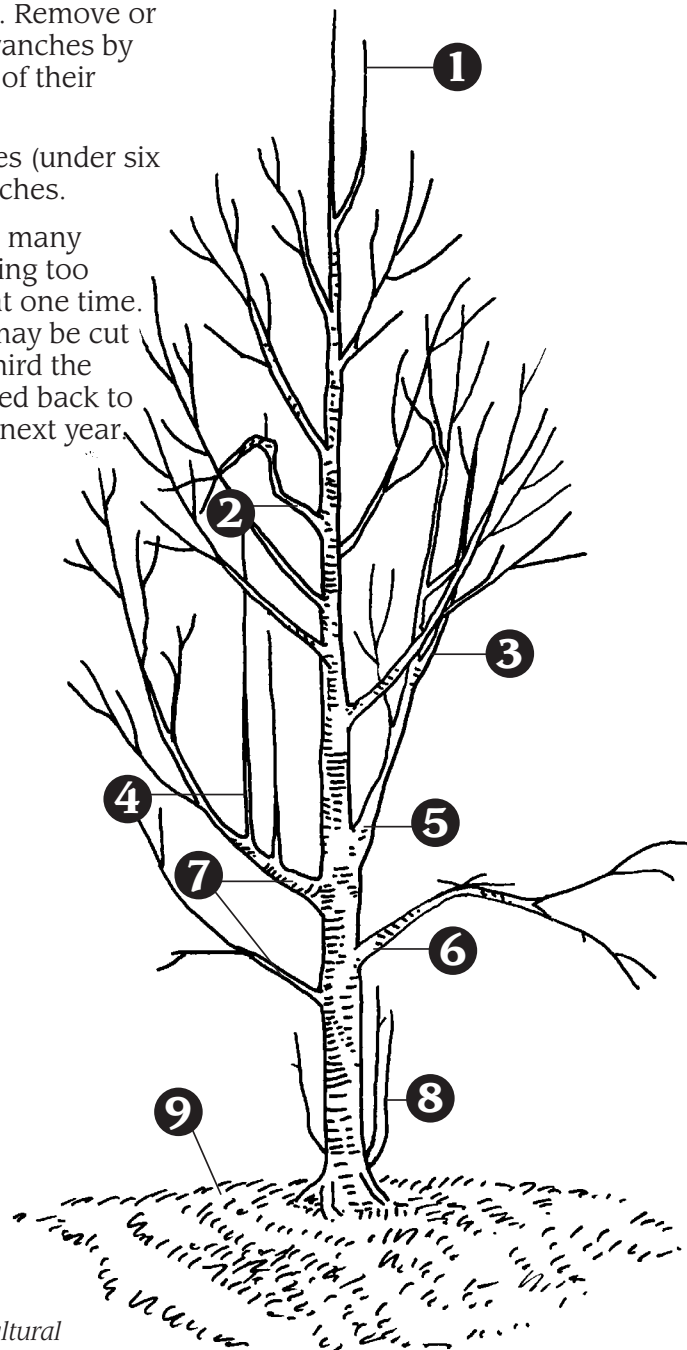
*“Holding these trees,
my hands reach
into the darkness,
the unknown, the
source of wisdom.
As I touch this soil,
I become part of the
energy circuit that
connects me across
generations to the
future of this forest-
to-be.”*

— STEPHANIE KAZA,
THE ATTENTIVE HEART



- Stubs or branch parts remaining after breakage or improper pruning. Remove these to the branch collar.
- When more than one central, similarly sized branch compete as the main trunk, select the strongest, most central branch to be the main leader. Remove or shorten competing branches by one-half to one-third of their length.
- Low-hanging branches (under six feet) and unsafe branches.
- For a young tree with many branches, avoid pruning too much healthy wood at one time. Individual branches may be cut back one-half to one-third the first year, then removed back to the branch collar the next year.

- Branches with narrow crotch angles. When the upper angle between the branch and the trunk is less than 20 degrees (see illustration), the narrow branch attachments are weak. Branches may break due to heavy ice or high winds.



1. Prune a competing leader. Prune back the less vigorous branch to prevent the development of two leaders, which could cause the fork to split as the top grows larger.
2. Prune any malformed branch.
3. Remove any crossing branch, which will affect the other branch's growth and create an undesirable form.
4. Remove water sprouts.
5. Remove any branch growing at a sharp or unusual angle. When this branch becomes larger it might rub another branch, split, or rot giving water a chance to collect at the fork.
6. Prune any broken or badly damaged branch.
7. Prune temporary branches over time. These branches should be removed during the first few years to provide clearance for vehicles and pedestrians.
8. Remove suckers, which take energy away from desirable growth.
9. Apply 3 to 4 inches of composted mulch at the base of the tree. Mulch should be kept 2 to 3 inches away from the trunk of the tree.

Illustration adapted from
Pruning Landscape Trees,
 Penn State College of Agricultural
 Sciences.

How to prune

To prune a tree properly, consider the tree's natural growth habit. Tree branches grow from the trunk at a point known as the branch collar. Always prune to the branch collar and healthy wood.

Pruning tips

Be alert and think about safety. Evaluate first, prune second. Do not remove more than one quarter of the tree's living branches at one time.

Use a hand pruner to cut small branches

For branches one-half inch or smaller in diameter, bypass hand pruners will do the job. Cut on a diagonal, less than one-quarter inch above an outward facing bud or branch. Place the cutting blade next to the stem to make the closest, cleanest cut.

Prune large branches with a hand saw

Use the three-cut method.

Make the first cut on the underside of the branch, several inches from the trunk. Cut upwards one third of the way through the branch (see 1. in diagram). This upward cut will prevent the limb from ripping tree bark as it falls.

Start the second cut on the upper side of the limb. Saw through to the first cut.

(See 2. in diagram.) This through-cut will remove the branch's weight.

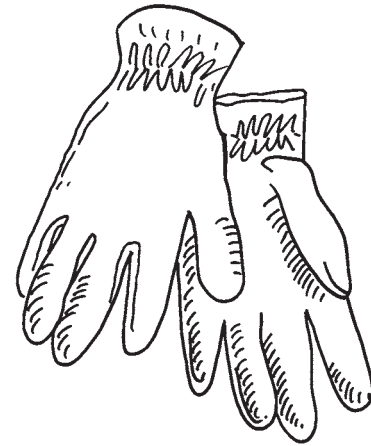
Locate the branch collar or branch bark ridge close to the trunk. Carefully cut just beyond the collar. (See 3. in diagram.) The branch collar is the swollen area at the base of the branch. Do not

cut into the branch collar; it provides a natural barrier against decay and speeds formation of a callous over the wound.

Pruning equipment

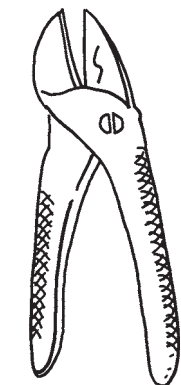
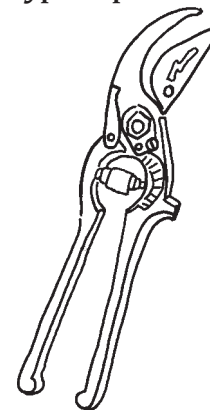
- Use the right tool for the job.
- Use sharp tools with disinfected blades.

Gloves (washable): for protecting hands from scratches.

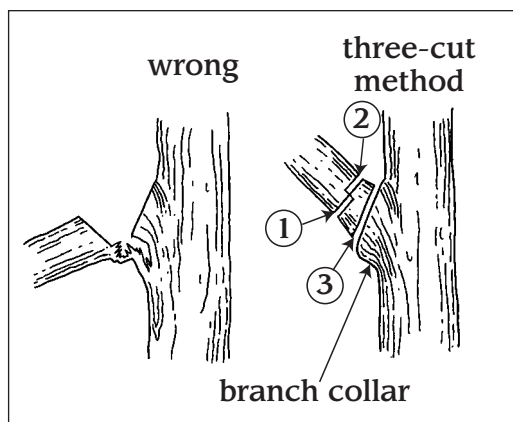


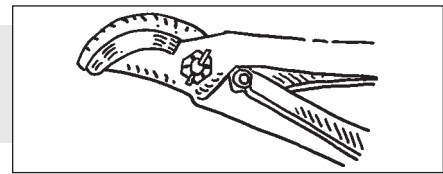
Hand pruners: for removing branches 1/2 inch or less in diameter. By-pass pruners are recommended because they provide a clean cut and do not damage woody stems. Anvil pruners are not recommended because they crush the woody tissue.

bypass pruner

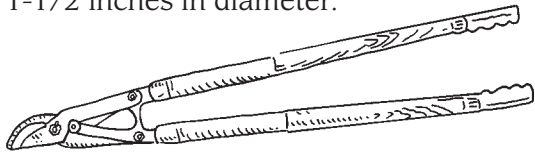


anvil pruner

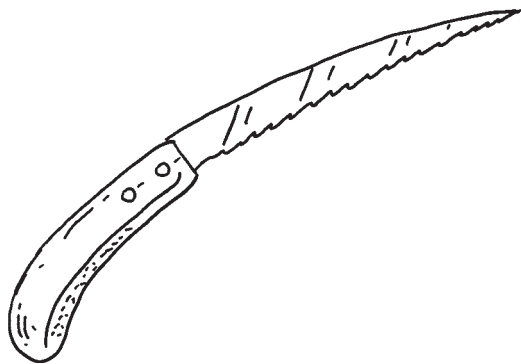




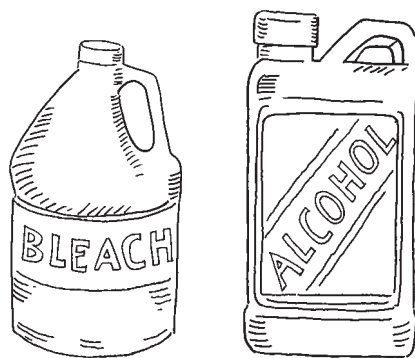
Loppers: for removing branches 1/2 to 1-1/2 inches in diameter.



Folding saw: for removing branches 1 inch or larger in diameter.



Alcohol or household disinfectant: used to clean cutting blades or any pruning tool after cutting diseased branches.

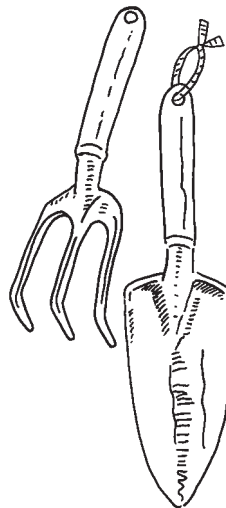


Goggles: for protecting eyes from branches and sawdust when pruning over your head.

Head protection such as a bicycle helmet or hard hat for overhead work.

Metal snips/wire cutters: for removing wires and straps.

Hand cultivator or trowel: for loosening soil in the tree pit.



Rake, dustpan, and broom: for cleaning the tree pit and sidewalk.

Tool Care

Clean blades with 10% bleach solution, alcohol, or household disinfectant after every use. When pruning disease- and insect-infested branches, clean tools between each cut.

Sharpen blades periodically for sharp clean cuts. Healing occurs much quicker with clean cuts.

Oil to prevent rust.

Store in safe, dry location out of the reach of children.

TREE CARE

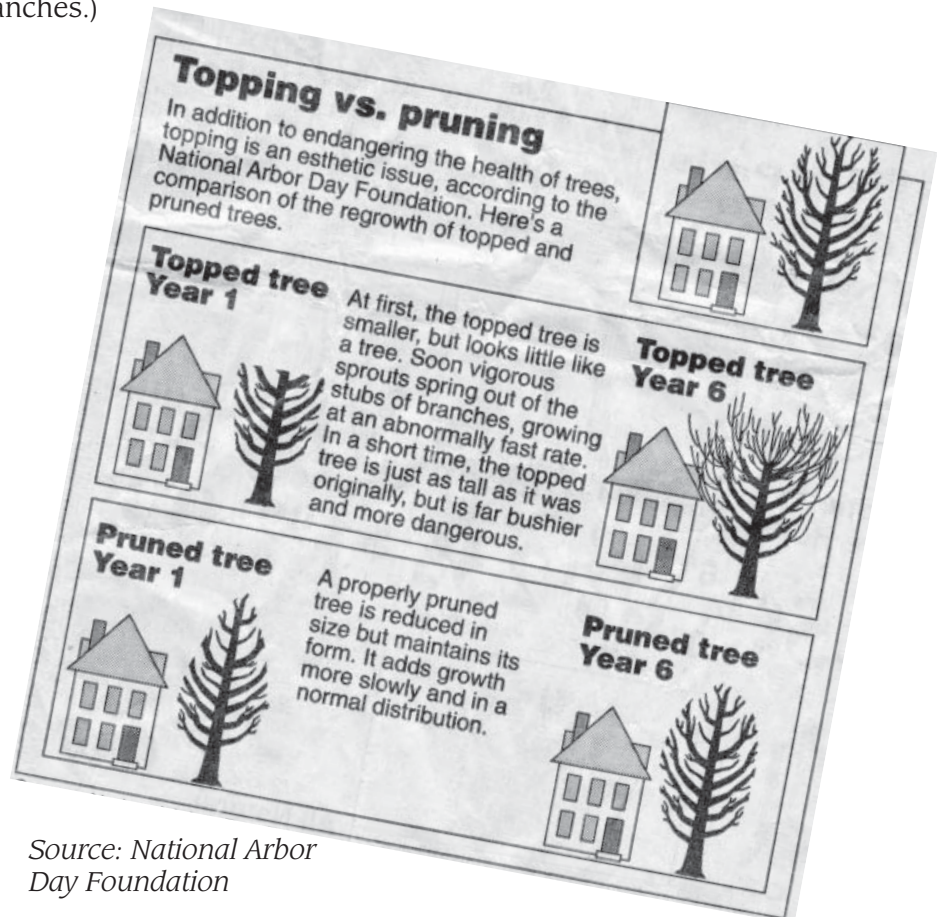
Love Takes Root in Andean Village

In most parts of the world, lovers say it with flowers. In the village of El Tambo in the Peruvian Andes, they say it through trees. Inspired by a national drive to protect Peru's spectacular mountains and jungles, El Tambo requires couples to plant one or more sapling to obtain marriage certificates. And for each baby that follows, birth certificates come at a similar cost. One that adds new meaning to the term "Family Tree".

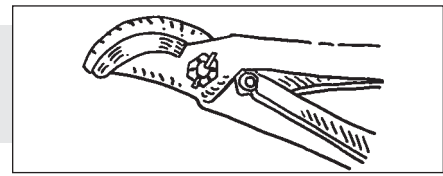
- THOMAS J. BRADLEY
FROM THE INQUIRER
WIRE SERVICE

Pruning safety

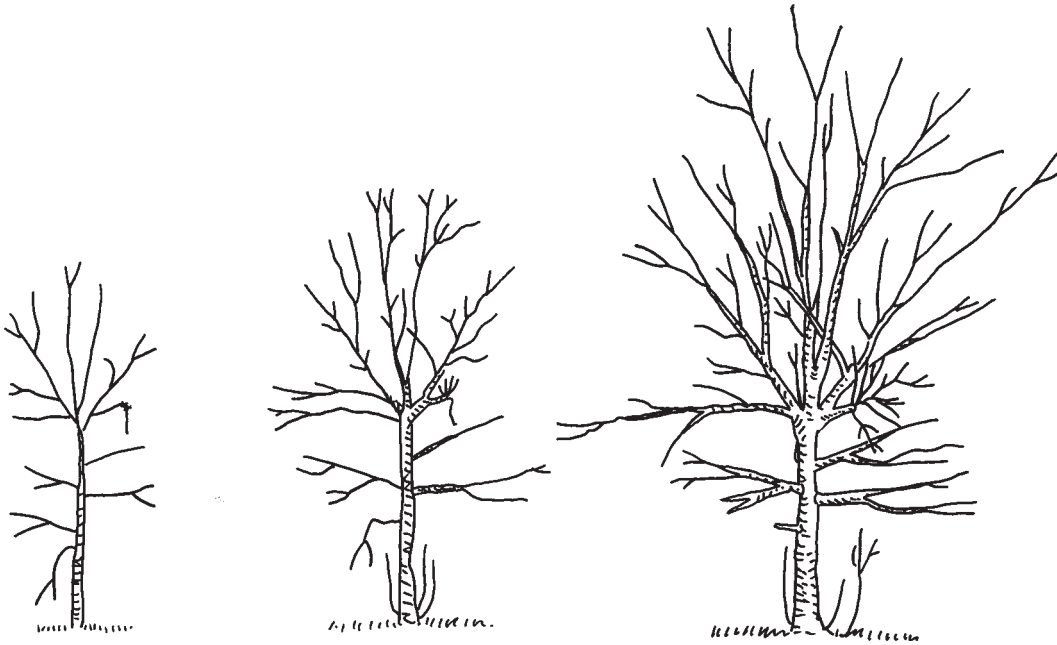
- Work when you're alert, not tired.
- Wear gloves, and wash both hands and gloves after the job.
- Only one person should prune a tree at a time. No one should be working beneath or above one another.
- Keep tools out of people's way; not on the sidewalk, the ground, or on cars. Sharp and pointy edges should be turned toward the ground.
- Keep tools sharp and clean. Before using a hand saw, check to be sure that the blade is secure, not loose. (Glass cleaner with ammonia or a weak solution of bleach should be used to clean tools, especially when removing diseased branches.)
- Keep hand pruners and folding saws in the locked position when they're not in use.
- Keep hands and arms away from all cutting edges.
- Always keep both feet firmly on the ground. Do not stand on a ladder or trash can, or climb a tree.
- Wear a hard hat (or bicycle helmet) and goggles when pruning overhead branches.
- Branches may fall when pruning. Make sure the area below is clear of people and objects, especially cars. Even a small branch could cause injury or damage property.
- Place each pruned branch carefully on the sidewalk. Cut up branches. Dispose of them by composting or bundling for trash pick-up.



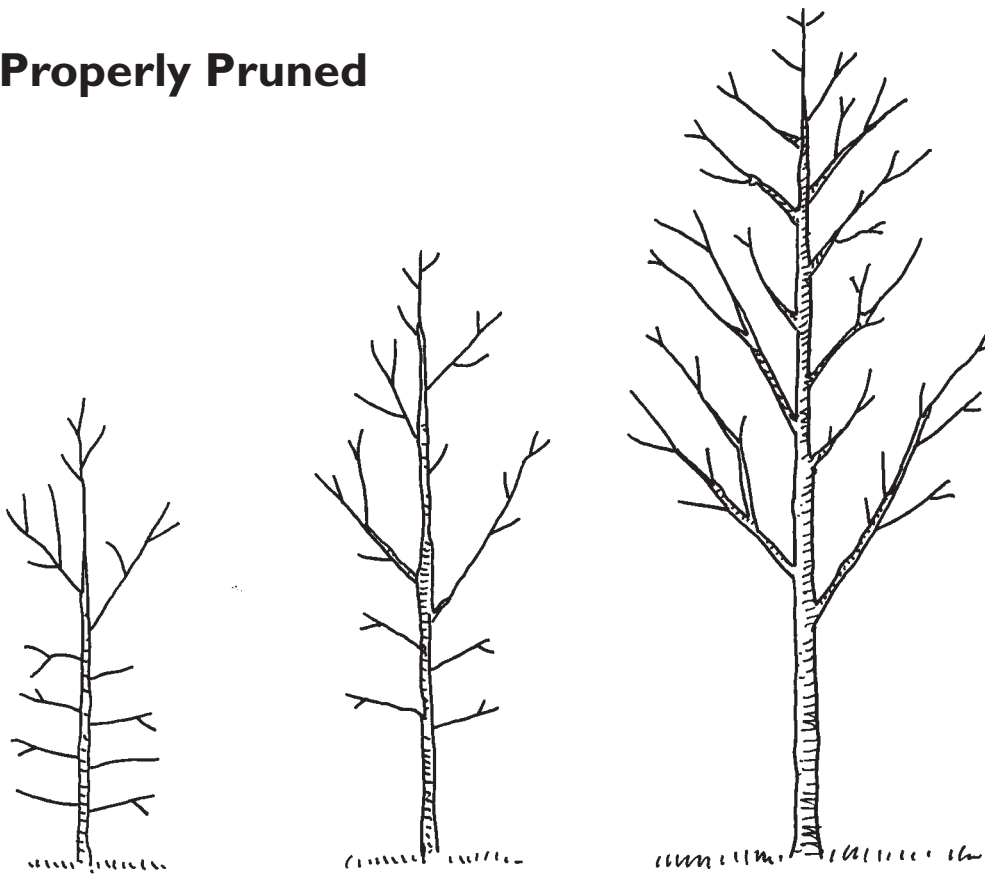
Source: National Arbor Day Foundation



Never Pruned



Properly Pruned



Caring for Older Trees

A tree's life span varies according to species and environmental conditions, such as location, pollution, compaction, moisture, and nutrients. Urban street trees often grow under severe conditions: insects, disease, pollution, drought, soil compaction, and vandalism, to name a few. These conditions usually cause early decline.

Older trees have large, complex systems to maintain. They don't adapt well to environmental stresses. A tree's stored energy is taxed during emergencies like severe wounding, insect attack, and drought. Fighting diseases and insects diverts energy from food production and other life-sustaining processes. A mature tree, under stress, also sheds leaves and branches to conserve energy. Repeated stresses push trees into decline.

Aging is natural, but Tree Tenders can address some environmental conditions that accelerate the process. Older tree populations benefit from regular inspections of branches, trunk, foliage, and soil.

Monitor for damage

Tree Tenders can monitor for obvious damage, injury, and disease in older trees. **Leaf-off** season, in late fall and winter, is the best time to see structural defects. **Leaf-on** season is the time to evaluate conditions and locate dead branches.

Watch for excessive branch loss and for mushroom growth on the tree. These are signs of internal decay. Be especially vigilant in pruning practices if tree branches overhang walkways and buildings. Tall trees, which are more likely to cause serious damage, should be monitored closely for internal decay. [See *Tree Hazards and Common Tree Problems* to help evaluate a tree's condition.]

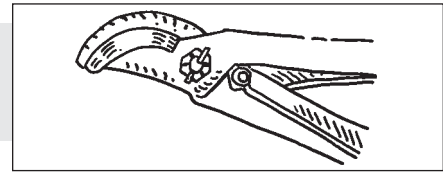
Professional services

If you're in doubt about the seriousness of a tree problem, it's best to consult a tree care professional. Timely diagnosis can prevent costly removal or replacement. Every three years, older trees should be evaluated by a professional arborist for conditions such as: storm damage, weak limbs, diseases and other symptoms.

Older Tree Care

Tree Tenders can help mature trees by:

- **Mulching** to inhibit soil compaction, increase moisture retention, reduce soil erosion, improve soil condition, and protect surface roots.
- **Pruning** only dead, diseased, and damaged branches. Leaving living branches with healthy, green leaves to produce food.
- **Monitoring** regularly for pests and diseases, so that you can control small infestations before they become serious problems.
- **Watering** trees according to the species' needs, tree location, weather conditions, and time of year. If in doubt, water regularly and in large quantities during the growing season, especially when the soil is dry below the surface.
- **Fertilizing** to provide nutrients that have become depleted over time. Compost, aged manure, and kelp are good organic amendments. Do a soil test before applying a chemical fertilizer. Follow fertilizing instructions closely and apply only to wet soil. Improper application can be harmful.



Dead Trees

Some trees die because of car crashes, vandalism, bulldozers, lawnmowers, and weed whackers. Others die from less obvious insults: insufficient water, small tree pits, compacted soil, de-icing salts, air pollution, tight guy wires, improper pruning (including topping), and road or sidewalk work that accidentally cuts the roots.

The symptoms of stress may take years to show. Drought and excessive heat will injure healthy trees and will kill trees already under stress from old age, physical damage, disease, or insect infestation.

Insects stress trees, but are often not the cause of tree death. Many insects and diseases are opportunistic; they will take advantage of a tree weakened already by another stress. For example, during prolonged dry spells, aphids will attack newly emerging growth. Commonly it's not one stress that will kill the tree, but a combination of many unchecked stresses that together cause death.

Investigate

Investigate the dead tree. Sometimes only a professional arborist can tell the cause of death. Tree Tenders can do some deduction, too. *Is there evidence of something obvious like a wounded trunk, recent construction, decline of surrounding trees, or fungus growth? Did the tree die overnight?*

Check the tree base. Gas leaks (which emit an odor) in the sidewalk can cause a fully leafed tree to turn completely brown and crisp in less than 24 hours. If you suspect a gas leak, call Philadelphia Gas Works at 215-235-1212. Lightening strikes can cause a similar death.

Tree removal

It's best to remove a dead tree. Homeowners are liable for damage caused by falling limbs. Philadelphia requires a removal permit available through the Fairmount Park Commission (FPC) at 215-685-4363. The FPC's district arborist can help with the permit process.

With a permit, a property owner may remove a small tree (less than 2 1/2 to 3 inches in diameter). For anything larger, call a professionally certified arborist. Ask FPC for a list of approved, insured arborists. Make sure the arborist removes or grinds the stump to a depth of at least 2 feet if you want to replace a tree in the same pit.

If the tree died of a disease, do not replace it with the same or related species. Whatever killed the first tree may kill the second, too. The FPC district arborist will recommend tree species acceptable for a particular location, especially if the old tree died from environmental factors.

If you decide not to replace a dead tree, you are responsible for filling in the pit, either with pavers or concrete level with the sidewalk.

Tree Hazards

Trees can be hazardous to people as well as property, so check street trees for hazardous conditions before problems occur. Common potential tree hazards are listed below. Deal with problems early by calling a certified arborist or tree care professional. *[Consult Appendix: Tree Care Professionals, for more information.]*



Potentially hazardous conditions:

Branch loss: Falling branches may indicate a tree in distress and may cause injury to people, property, and other branches within the tree.

Canker: This wounding occurs on surface area of dead bark and cambium, caused by fungi, weather, insects, and mechanical damage that may penetrate and weaken underlying wood.

Cavities or hollows in trunk or branches: A tree with little or no healthy woody tissue inside is vulnerable to wind damage, insect infestation, and the spread of decay.

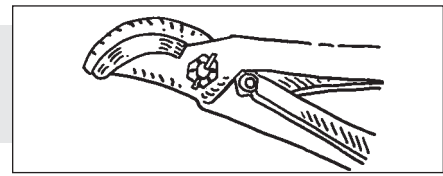
Crack: Cracks may appear in several ways, as a fissure, wood separation, and/or deep split in wood or bark. These are all signs that a tree may be unhealthy or in failing condition.

V-crotch crack: Formed by two competing leaders, joined at a narrow angle. This creates a weak joint that can enlarge and cause tree sections to fall suddenly.

Decay: This is evident in old wounds and occurs where sloppy pruning cuts have been made. Decomposing woody tissue is susceptible to insects and diseases and generally weakens the tree.

Fungus from decay: Fungal decomposition of woody tissue (rotting wood) reduces the tree's structural soundness and stability. Fungus or mushrooms appear on the tree trunk or roots when decay has already progressed throughout the tree body or roots. This indicates a serious potential for tree decline. Trunk of the tree may be so infested with fungus colonies that there will be little support, causing the tree to fall.

Gall (burl): Swollen masses of abnormal tissue that may be caused by insects, fungi, or bacteria.



Leaning tree: If the lean is a result of the tree seeking light, it might not be problematic. If the roots are being lifted out of the ground due to the lean, the potential for tree decline is high.

Lightning scar: An injured tree is a weakened tree. Wounds provide entry for pests and diseases.

Storm damage: Look for broken limbs that could fall any time. Make clean cuts where branches have snapped off.

A tree too large for the site interferes with overhead wires: During a storm, broken branches could interrupt power and telephone lines.

Common Tree Problems

Insects and diseases, as well as mechanical and environmental damage, are common problems for trees, especially in a city. In hot summer weather, aphids, multiplying by the hundredfold in hot summer weather, can cover a stand of trees.

To help keep trees healthy, the first line of defense is using effective horticultural practices to discourage pests and diseases. Homemade concoctions and organic products are alternatives to toxic pesticides. Integrated Pest Management is an environmental approach to pest control. *[See Diseases and Remedies and Insects and Controls, for details.]*

Environmental damage

Salt

Used to melt icy sidewalks and streets, salt (sodium chloride) can accumulate to toxic levels in the soil causing excessive drying of foliage and roots, stunting growth, killing emerging buds, and causing early leaf drop. Washing the foliage and flooding the soil several times with water helps wash away salts. Applying gypsum neutralizes salt-damaged soil.

Calcium chloride and magnesium chloride (sand, cinders, and light gravel are alternatives) effectively thaw ice, and are better for the environment. They even add nutrients to the soil. Applying sand for traction is another alternative.

Urine

Irregular white, yellow, or brown spots in plants around trees may be caused by animal urine. Cats like newly cultivated soil. Once a dog or cat has marked a spot, it is difficult to control further urination there. Animal repellent products such as dried blood, mothballs, and chemicals are available but none guarantees results. Apply chemicals according to directions; reapply as needed, especially after rain.

To revitalize the tree pit, gently remove dead plants. Apply a few handfuls of acidic compost or mushroom soil to counteract the alkaline urine. Cultivate amendments gently into the patch. Water thoroughly to dilute urine and blend in the amendments. Fencing the planting area may control dogs, but not cats.

Drought

Plant cells collapse when they don't get water. In a water-stressed tree, the leaves often look wilted, puckered, flat, and flaccid. A series of deep waterings will likely revitalize a young tree. Brown leaf edges may also indicate water stress. In prolonged drought, tree leaves wilt, turn brown, shrivel, and fall. In this case, the tree may go prematurely dormant. Drought prevention is the best approach. Water plants regularly. Apply mulch to conserve moisture and control weeds.

Mechanical damage

Lawnmowers and weed whackers are often the "serial killers" of trees. Cuts and scraps to the bark and cambium weaken and may eventually kill a tree. Damaged bark allows insects

and diseases into the woody tissue. Damaged cambium can hinder and even stop food and water transport, and diseases into the woody tissue.

Prevention is best. Extend the tree pit and apply a mulch layer, putting the tree beyond the lawnmower or weed whacker's reach. If the damage is done, remove rough bark edges with a sharp, clean, disinfected knife. Keep area dry and free of insects, too. Using tar or paint is not recommended for covering the wound.

Preventing Diseases and Insects

Plant diseases, caused by organisms such as bacteria, fungi, and viruses, are always present and waiting for a susceptible host. Stressed or damaged trees are easy targets. Insect infestations weaken plants, which is why early detection and treatment are important. [The sections, "Diseases and Remedies," and "Insects and Controls," include organic treatments that are more effective in the early stages of disease or insect problems.]

Prevention

Prevention is the best cure. Good planning and thoughtful maintenance can help prevent problems from starting.

- Select trees appropriate for existing light, moisture, soil conditions, and environmental factors.
- Use different, disease-resistant cultivars if one tree species has contracted diseases in the past. Do not plant the same species in that pit.
- Be gentle. Diseases look for plants that are injured or easily affected. Try not to bruise or break plant material when transplanting or doing tree maintenance. A leaf or stem injury gives disease a way to enter the plant.

- Good air circulation can help reduce the incidence of diseases such as mildew and anthracnose.

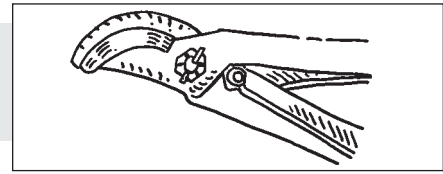
- Water is vital to plant survival but the droplets can spread disease from tree to tree. Direct water onto soil rather than foliage. Water early in the day so the moisture dries before nightfall, depriving fungi of their preferred warm and moist environment.

Pesticides

- *Toxic chemicals and pesticides are only recommended when infestations are so severe that there is no other choice.*
- *Pesticides often kill birds directly, or through the insects and other things that they eat.*
- *Pesticides also kill beneficial insects that may be feasting on the same pests you're trying to eliminate.*
- *Pesticide spraying on public land can only be done by a person certified by the state. Consult a professional for service.*
- *Dormant oil treatment is an alternative and is a less toxic control method used by tree care professionals.*

"I am the Lorax. I speak for the trees, for the trees have no tongues. And I'm asking you, sir, at the top of my lungs... plant a new Truffula. Treat it with care. Give it clean water. And feed it fresh air. Grow a forest. Protect it from axes that hack. Then the Lorax and all of his friends may come back."

- DR. SEUSS,
THE LORAX



Pests can be a nuisance or a very serious problem. Before calling for professional service, ask yourself:

1. Have you properly identified the pest? Do you know exactly what you're battling? Are you sure it's harmful and not a beneficial insect?
2. Have you tried other control methods such as handpicking, hosing, or scrubbing with soapy water to dislodge the pests?
3. Is the damage severe enough to require professional service? A few leaf holes or bug sightings are not reasons to spray.

To Reduce Diseases and Pests

Weed tree pits regularly to keep insects from nesting in the weeds. Remove infested or diseased plants and fallen leaves as soon as possible. Weeding and grass removal also encourages tree growth by reducing competition for nutrients and water.

Prune, remove, and destroy infected branches. Disinfect pruning tools between plants and cuts. Un-sanitized pruning tools spread diseases and insects, so disinfect saws and pruners between each and every cut. Use alcohol, household disinfectant, or 10% chlorine bleach solution.

Mulch for general tree health.

Encourage birds, which eat insects, to nest by feeding them during the winter. Teach children not to chase or harm birds.

Diseases and Remedies

Anthracnose

Symptoms: Vary. Generally, sunken, circular or irregular lesions surrounded by a pale outline develop on leaves and stems. Cankering of twigs can occur. The disease attacks new growth.

Cause: Airborne fungus. Wet weather and high humidity help spread the disease.

Controls: Remove infected debris in fall when weather is dry. Dispose of properly and do not add to compost piles. Provide good air circulation. Treat with organic fungicide.

Host plants: Ash, elm, London plane tree, maple, sycamore, walnut.



Anthracnose

Canker

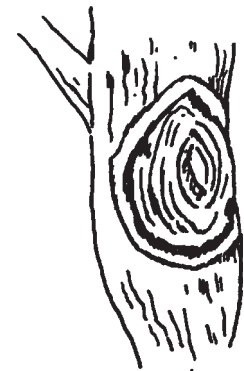
(group of stem diseases that range from single-season to long-term infection)

Symptoms: Dead bark areas and sunken or swollen lesions on branches and trunks. One-season (annual) types will recover and form callous. Long-term (perennial) types may girdle and kill branches and trees.

Cause: Fungus, frost, sun-scald.

Controls: Prune and destroy infected twigs, leaves, and branches. Disinfect saws and pruners between each cut.

Host plants: Japanese pagoda tree gets twig blight from nectria canker. London plane tree is susceptible to canker stain, which is a fungal cousin of Dutch elm disease.



Canker

Fireblight

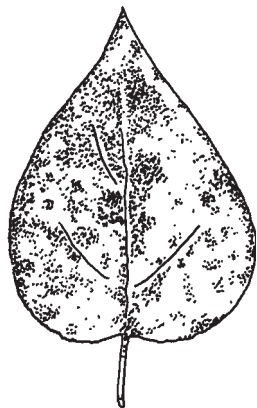
Symptoms: Leaves, stems, and flowers turn brown or black (resembling fire damage), shrivel, turn crispy or limp, and die. If damaged or dead leaves stay on branches, the whole tree may die.

Cause: Bacteria *Erwinia amylovora* produced from cankers, and carried by wind, rain, and insects. Bacteria enter through the growing tips and may travel to roots, killing tree.



Fireblight

TREE CARE



Powdery Mildew

Controls: Prune two feet below diseased area. Dip saw blade in 10% chlorine bleach, isopropyl alcohol, or disinfectant between each cut. Prune away cankers before late spring when they are active.

Host plants: Callery pear, crabapple, hawthorn.

Powdery Mildew

Symptoms: White powder on leaves.

Cause: Fungi thrive in cool, hot, or humid conditions. Seldom fatal.

Controls: Grow resistant varieties. Provide good sun exposure and air circulation. Treat with a fungicide or simply tolerate the mildew.

Host plants: English oak, London plane tree, crabapple.

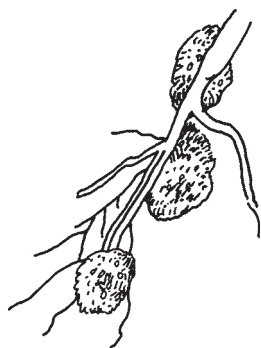
Galls

Symptoms: Swollen, tumor-like growths on trunk, branches, roots, or leaves. Fungal gall infects American elm, maple, oak.

Cause: Crown gall and some canker galls caused by bacteria. Insect-caused galls develop from midges, mites, and wasps.

Controls: Prune and destroy galls, and diseased or damaged growth.

Host plants: Birch, cherry, crabapple, maple, oak, various conifers.



Galls

Insects and Controls

Aphid

Adult: Approx.

1/8-inch long, soft-bodied, pear-shaped.

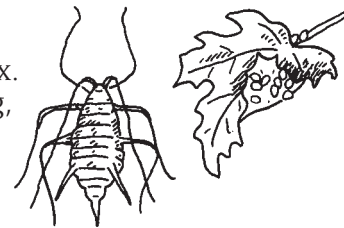
Winged and wingless.

Colors include green, pink, black, dusty gray, translucent; white fluffy coating.

Life cycle: Eggs overwinter on woody stems. Colonies develop quickly. Winged forms appear when they become crowded. Females can give birth to live nymphs without mating. Nymphs mature in one to two weeks.

Feeding habits: Sucking can damage foliage and cause leaf, bud, and flower distortion. Aphids secrete honeydew that supports sooty mold on leaves and fruit.

Controls: Power hose young trees. Spritz young, recently planted trees with a soapy solution of grated brown soap (Fels Naphta) and warm water. Spray frequently with insecticidal soap to kill on direct contact. For mature trees, contact a tree care professional. Susceptible trees: Linden, tulip poplar.



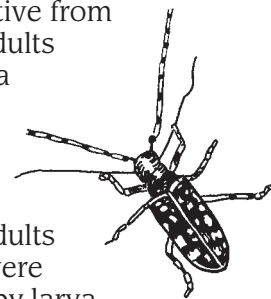
Asian Longhorn Beetle

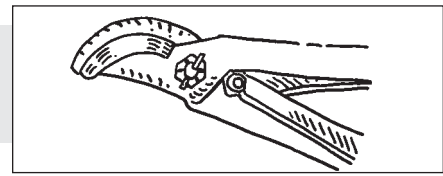
Life cycle: One generation per year. Adults are active from June to October. Adults emerge by cutting a 3/8 to 1/2-inch hole from the cambium layer through the bark.

Feeding habits: Adults eat twigs. Most severe damage is caused by larva that feeds on the cambium tissue.

Controls: Cut down tree, remove, and burn.

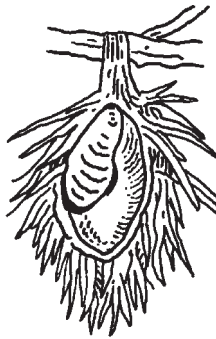
Susceptible trees: Maple, elm, willow, poplar, horse chestnut





Bagworm

Life cycle: The bagworm overwinters as eggs within a bag-like structure. The insect spends most of its life within the well-camouflaged bag. Eggs hatch from May to June, releasing feeding larvae.



Feeding habits: Bagworm caterpillars eat tree foliage. As a result, the tree will have a ragged appearance. In cases where there is heavy infestation, defoliation may occur.

Controls: Handpick bag in winter. Cut away with a knife to avoid leaving a girdling band of silk on the tree.

Susceptible trees: Conifers.

Life Cycle: Larvae, white to cream-colored, reach a length of 1 to 1 1/2 inches. Larvae have a 10-segmented abdomen, with a brown head and a pair of brown, pincer-like appendages on the last segment. Adults leave a D shaped exit hole when they emerge in spring.

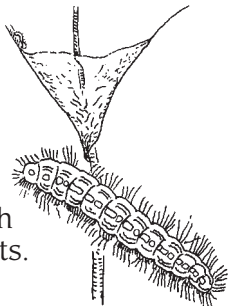
Feeding Habits: Larvae feed in the cambium between the bark and wood. They produce galleries that eventually girdle and kill the branches and entire tree.

Controls: Quarantine. Destroy trees. Firewood cannot be removed from infested areas.

Susceptible trees: Ash

Eastern Tent Caterpillar

Adult: Two inches, reddish-brown with stripes on wings. Shiny, hard eggs are laid in rings around twigs. Larvae are black with white stripes, and hairy with brown and yellow dots.



Life cycle: One generation per year.

Feeding habits: Larvae feed in tents made in forks or crotches of trees.

Controls: Remove infested twig at night when the caterpillars are out, or power hose.

Susceptible trees: Apple, crabapple, cherry.

Lacebug

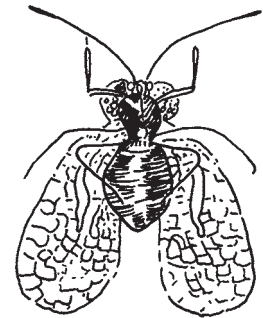
Adult: Oval or rectangular, 1/8 inch, lacy-patterned body

Nymph: Dark body with spines

Feeding habits: Adults and nymphs found on underside of leaf. They suck juices from leaves. Leave dark, varnish-like excrement. Cause chlorotic flecks, giving the leaves a speckled and blotchy appearance. By August, leaves may have no food-producing tissue left.

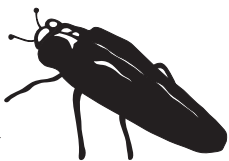
Controls: Consult a tree care professional.

Susceptible trees: London plane tree, sycamore, elm, hawthorn, oak, birch, alder.



Emerald Ash Borer

Adult: Slender, 1/2 inch long and generally larger and a brighter green than the native North American species.



Adults are usually bronze or golden green overall, with darker, metallic, emerald green wing covers.

Leafhopper

Adult: Wedge-shaped, 1/10 to 1/2 inch long, green or brown. Jumps rapidly when disturbed.

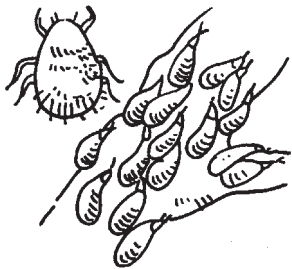
Feeding habits: Sucks juices from stems and plants. Causes tipburn and yellowed, curled leaves. Heavy populations can cause early defoliation. Spreads viral diseases.

Controls: Wash with strong, stiff sprays of water and then spray with insecticidal soap or pyrethrin. For heavy infestations, consult a tree care professional.

Susceptible trees: Honeylocust.



TREE CARE



Hard Scale (Oystershell Scale)

Adult: Circular or oval-shaped hard bumps less than 1/10 inch in diameter, sometimes dimpled. Colors include gray, yellow, white, and reddish or purplish brown. All secrete a waxy armor in a circular or oyster-shell pattern.

Life cycle: One to two generations per year. Nymphs and eggs overwinter in bark.

Feeding habits: Sucks plant juices and some can inject toxic saliva into plant tissue.

Controls: Prune. Remove infected branches from site. Clean pruning tools with 10% chlorine bleach solution. Dormant oil sprays on eggs and nymphs.

Susceptible trees: Tulip poplar, magnolia sweet gum, fruit trees.

Soft Scale, (Black Scale, Brown Soft Scale, Cottony Maple Scale, Cottony Cushion Scale, Hemispherical Scale)

Females: Oval or round, soft, legless bumps, 1/10 to 1/5 inch in diameter.

Males: Minute, yellow-winged insects. Larvae resemble tiny mealybugs. Black, brown, white, reddish brown.

Life cycle: One to two generations per year. Nymphs or eggs overwinter in bark.

Feeding habits: Sucks plant juices and some can inject toxic saliva into plant tissues.

Controls: Prune. Remove infected branches from site. Clean pruning tools with 10% chlorine bleach solution. Dormant oil sprays smother eggs and nymphs. For light infestations, scrub away scale with a brush dipped in warm water and brown soap.

Susceptible trees: Maple, oak, hemlock, holly.

Spider Mite

Adult: Wingless, microscopic, reddish-brown, yellow, or pale green spider-like. Most spin fine webs.

Life cycle:

Adults and eggs emerge in spring after overwintering in crevices and debris.

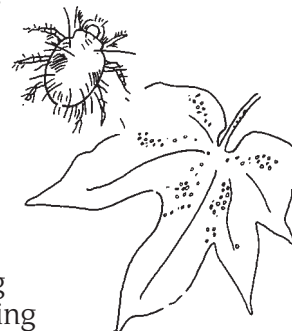
Mature in several days. Many generations per season.

Feeding habits: Suck juice from underside of plant leaves. Leaves become speckled, yellowish, and drop. When severely damaged, leaves turn bronze, white, or yellow with brown edges. Webs may cover leaves and growing tips.

Controls: Very difficult to control.

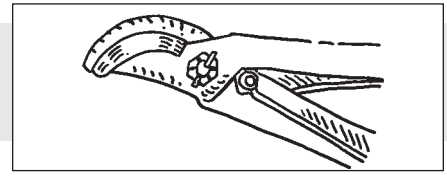
Hose plants daily with strong streams of water. Spray often with insecticidal soap.

Susceptible trees: Conifers (such as fir, spruce, hemlock); all trees during drought. ▼



How to Dispose of Infested Branches Properly

- *Put in black plastic bag*
- *Leave in sun*
- *Then put out with trash*



“For me, trees have always been the most penetrating preachers. I revere them when they live in tribes and families, in forests and groves. And even more I revere them when they stand alone—In their highest boughs the world rustles, their roots rest in infinity.”

— HERMANN HESSE

VI. BEST TREES

Street Trees Appropriate for Philadelphia

The Tree Tenders program recommends the following varieties for street tree planting in Philadelphia. Besides being attractive, they're able to withstand urban stresses. A good street tree has a straight trunk and a uniform branching habit; thrives in poor, alkaline soil; tolerates drought and salt; and can withstand moderate mechanical injury.

The recommended trees are divided into two categories. Small, underwire trees are short enough to be planted safely under utility wires. Large trees are tall and require larger planting pits. Using the botanical name when purchasing trees will help ensure that you and the nursery staff are referring to the same tree.

Botanical Names

All plants and trees are classified into Latin botanical names. A plant's full botanical name includes family, genus, species, subspecies, variety and forma, and 'cultivar.' It is useful for a Tree Tender to at least know the tree's genus, species, and 'cultivar,' where applicable, as well as common name.

Example:

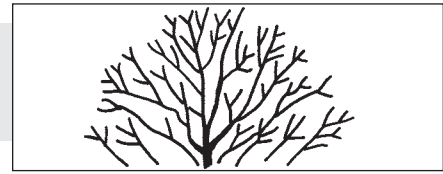
Acer palmatum 'Waterfall'
(Japanese maple)

Acer = genus

palmatum = species

'Waterfall' = cultivar

Japanese maple = common name



Small trees, underwire, 15 to 35 feet:

CRABAPPLE (*Malus species*)

'Spring Snow'

Height: 25 to 30 feet

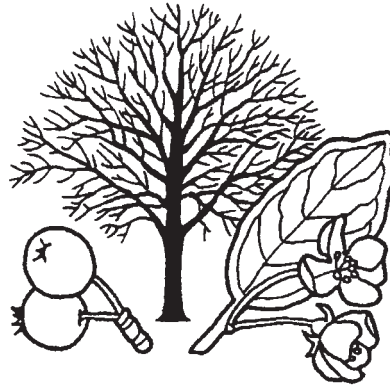
Width: 20 to 30 feet

Form: Round

Leaf: Simple and bright green

Flowers: Fruitless; produces little litter

- Full sun
- Tolerates many soil types
- Plant in spring
- Prune lower branches in the first few years for the safety of pedestrians and cars



CRABAPPLE

HAWTHORN (*Crataegus viridis*)

'Winter King'

Height: 25 to 30 feet

Width: 20 to 30 feet

Form: Ovate to vase-like

Leaf: Simple, ovate, alternate, serrate

Flowers: White flowers in spring

- Red drupe fruits in fall
- Purple to scarlet fall foliage
- Thorny branches
- Tolerates adverse conditions, wet or dry habitat, acid to alkaline pH, clay to sandy soil
- Less rust-susceptible than other varieties
- Staking required for young trees



HAWTHORN

HEDGE MAPLE (*Acer campestre*)

Height: 15 to 40 feet

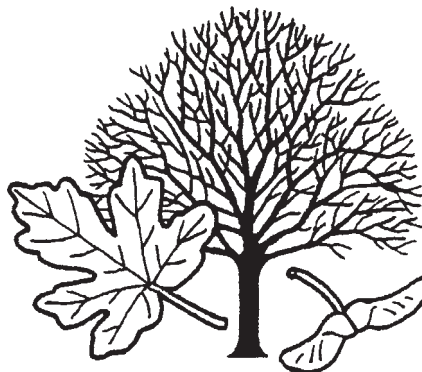
Width: 25 to 40 feet

Form: Rounded

Leaf: Simple, opposite, three to five rounded lobes, 2 to 4 inches

Flowers: Small green flowers in spring (samaras)

- Full sun or partial shade
- Prefers rich, well-drained soil; tolerates dry, compact, alkaline soil
- Tolerates pollution
- No serious insect or disease problems
- Low branching habit requires pruning bottom limbs from a young tree trunk
- Withstands severe pruning
- Plant in spring and fall



HEDGE MAPLE

BEST TREES

Medium to large trees, 40 to 70 feet range:

GINKGO (*Ginkgo biloba*)
'Princeton Sentry' or 'PNI 2720'

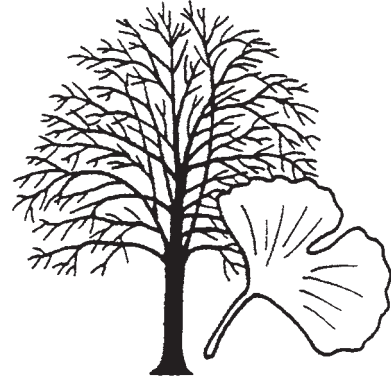
Height: 55 to 65 feet

Width: 25 to 30 feet

Form: Pyramidal form when young; irregular shape when mature

Leaf: Simple, fan-shaped, alternate, three inches

- Fruitless; sterile
- Tolerates salt, drought, pollution, urban stress, wide range of soils
- Minimal maintenance; some pruning
- Plant in spring and fall



GINKGO

HONEY LOCUST (*Gleditsia triacanthos*)

'Shademaster' or 'PNI2835'

Height: 60 to 70 feet

Width: 50 to 60 feet

Form: Globular

Leaf: Compound, 6 to 8 inch leaflets, alternate

- Foliage provides light shade in open areas
- Insignificant green, fragrant flowers in June
- Reddish brown pods with hard, oval seeds
- Thornless
- Prefers full sun
- Tolerates wide range of soils, drought, heat, salt, and soil compaction
- Susceptible to insect damage and powdery mildew



HONEY LOCUST

JAPANESE ZELKOVA (*Zelkova serrata*)
'Village Green'

Height: 60 to 80 feet

Width: 50 to 60 feet

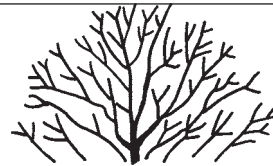
Form: Vase-shaped

Leaf: Simple, ovate to oblong-ovate, serrate, alternate, 2 inches

- Full sun or partial shade
- Tolerates pollution and most soils
- Prefers moist soil but tolerates drought once established
- Cultivar resistant to Japanese beetles
- Susceptible to canker stain and elm leaf beetle



ZELKOVA



- Narrow branching habit may cause trunk split
- Plant in spring

LONDON PLANE TREE (*Platanus x acerifolia* 'Bloodgood')

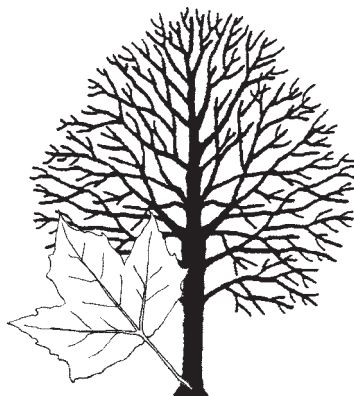
Height: 70 to 80 feet

Spread: 50 to 70 feet

Form: Broadly Ovate

Leaf: Simple, star-shaped, pinnate, palmate, alternate

- Proven durable cross between American sycamore & Oriental plane
- World's most widely planted urban tree
- Tolerates compacted soil, drought, urban conditions
- Showy trunk, exfoliating bark
- Requires little corrective pruning
- Susceptible to canker stain
- Requires sufficient room for root and crown expansion



LONDON PLANE TREE

RED MAPLE (*Acer rubrum* 'October Glory')

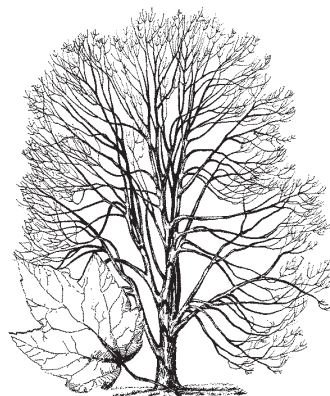
Height: 40'-50'

Width: 25'-35'

Form: Ovate, rounded

Leaf: Simple, lobed, ovate, palmate, opposite

- Vigorous growth; dependable, long lasting red fall color
- Easily transplanted in spring
- Tolerates clay, acidic, moderate drought
- Bark is thin and easily damaged



RED MAPLE

SAWTOOTH OAK (*Quercus acutissima*)

Height: 40 to 50 feet

Width: 35 to 55 feet

Form: Broad, ovate form at maturity

Leaf: Simple, oblong, serrate, alternate, 4 to 7 inches

- Full sun
- Prefers acidic, well-drained soil; tolerates dry, alkaline soil
- Alkaline conditions cause leaves to yellow
- Provide adequate space for wide branching
- Plant in spring



SAWTOOTH OAK

BEST TREES

Optional street-tree varieties

Because urban trees grow in small spaces with limited water, varieties that stand less than 35 feet tall at maturity are recommended for planting areas measuring less than 16 square feet. Small areas don't hold sufficient water to meet the transpirational demands of larger trees. Consequences range from roots heaving sidewalks to trees dying from drought.

Recommended small trees, less than 35 feet tall:

American hop hornbeam
(*Ostrya virginiana*)

American hornbeam
(*Carpinus caroliniana*)

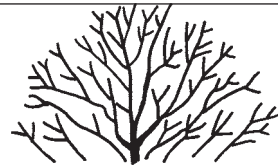
Amur corktree
(*Phellodendron amurense*)

Amur maple
(*Acer amurense*)

Crabapple 'Strawberry Parfait'
(*Malus hybrid*)

Tatarian maple
(*Acer tataricum*)

Trident maple
(*Acer buergerianum*)



*Unseen buds, infinite,
hidden well,
Under the snow and ice,
under the darkness, in
every square or cubic inch,
Germinal, exquisite, in
delicate lace, microscopic,
unborn,
Like babes in wombs,
latent, folded, compact,
sleeping;
Billions of billions, and
trillions of trillions of them
waiting,
(On earth and on sea—the
universe—the stars there
in the heavens,)
Urging slowly, surely
forward, forming endless,
and waiting ever more,
forever more behind.*

- WALT WHITMAN

VII. APPENDIX

Volunteers in Urban Forestry

by Sally McCabe A 1992 Gallup Survey indicated that 51 percent of the American population (or 94.2 million adults) volunteers in some form or another. Volunteers donated an average of 4.2 hours per week or an estimated 20.5 billion hours of formal and informal work in 1991. This represents the equivalent of about nine million full-time employees or 12 times as many people as worked for General Motors that same year.

Administrators of urban forestry programs should keep these trends in mind and take advantage of them. In today's world, forest survival and growth requirements must include the community of people as well as water, air, light and soil. Use of community resources is essential to the success of urban forestry. There is simply too much at stake to think that a handful of paid staff can do the work of even a small percentage of those nine million full-time employee equivalents.

A Tradition of Volunteerism

The forestry movement has always involved volunteers. Traditional volunteer roles include local tree boards and commissions, advisory committees, state councils and warm bodies for planting events. Long-time partnerships have always existed between forestry and the Boy Scouts, the Extension Service, the Soil Conservation Corps, the Department of Transportation and other related governmental, educational and professional groups.

Moving forestry out of the traditional forest and into the community provides new opportunities for innovative partnerships with individual volunteers and with volunteer organizations. These nontraditional partners can include TownWatch groups, the police, the local department of health, the NAACP and similar minority public advocacy groups, churches, political coalitions, local volunteer centers or social groups. Urban forestry volunteers don't have to be tree people.

The involvement of volunteers from the community has many benefits. In addition to labor, tools and equipment, these benefits include donated material like trees, plants and soil; increased public awareness and good will; and added stability for projects as local people become vested in plantings and other activities.

Just about everyone involved in planting trees in urban areas sees the same problem: city governments plant trees in tough neighborhoods and within two years, as much as 90 percent are dead through carelessness and vandalism. Because the trees are a part of the "system," disenfranchised citizens feel no need to care about or for them.

On the other hand, that same community can be a model place for trees to grow. Creating an opportunity for neighbors to become involved will produce a totally different picture. Improving the city environment is a social as well as a physical process when people in a neighborhood begin to adopt the environment and have some control over their surroundings. In city after city, tree plantings have become one way for citizens to exercise this control.

Finding Volunteers for Your Projects

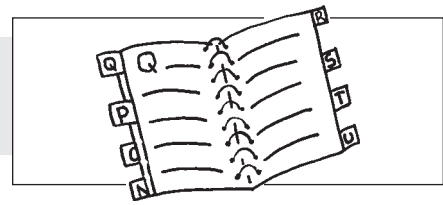
Get specific. Make a job description before you start looking for volunteers. Chances are, if the job can't be described in writing you're not ready for a volunteer.

Piggyback. Tap into existing programs. Other greening groups as well as nonrelated corporations often look for "cause for a day" events to promote.

Bark up the right trees. Urban forestry volunteers don't have to be tree people. Maybe the right person to work on a Street Tree Inventory is a statistician or accountant. The neighborhood social butterfly could be ideal to organize the Arbor Day festival.

Look locally. People are much more likely to take care of trees if they were involved in the planning and planting stages.

Ask. People volunteer for many different reasons but are much more apt to find reasons if they are sought after personally.



Motivations

Who is most likely to volunteer, what are their motivations, and how do these new community resources affect the urban forestry movement?

The pool of people donating time, advice and supplies has changed drastically in recent years. According to the 1992 Gallup Survey on Volunteering, of those surveyed, baby-boomers volunteer more than any other age group (62 percent); the majority of volunteers are working people (60 percent); volunteering by minorities is very much on the rise; 58 percent of teenagers 14-17 years old volunteer; and the fastest growing pool of volunteers comes from the business community.

People volunteer for many different reasons; some motives are idealistic or spiritual and involve a desire to help others. But equally important and valid are those which used to be considered “self-serving”—exploring a new field for job opportunities, learning new skills, repaying a debt, acting out a fantasy, seeking a therapeutic experience, making new friends, or getting exercise and having fun.

Promoting Ethnic Diversity

An important point brought out by the Gallup survey is that people are three times more likely to volunteer if they are asked. While 51 percent of adult Americans volunteer an average of 4.2 hours a week, the same survey showed that 41 percent of minority adults volunteer (and only 32 percent of adults with an annual income under \$10,000).

Minorities and the poor often don't volunteer on a par with other groups simply because they aren't asked. Those least likely to be asked to volunteer are African-Americans, Hispanics, youth, seniors and those with low incomes. Among the small populations of these groups who were asked, the proportion of those who did volunteer was nearly four times higher than those not asked, a much higher percentage than within the general population.

Minority and poor neighborhoods often have little power when it comes to combating deteriorating streets and schools, poor police protection and the placement of landfills, incinerators and factories within their borders. People volunteering from these

communities themselves stand to benefit as much as they have to offer.

Volunteerism empowers people. A tree planting can lead to a lot reclamation, which can be the catalyst behind the formation of a neighborhood town watch or a civic association and the general strengthening of a neighborhood.

People volunteer because they are asked but also because they feel an affinity toward the people or group doing the asking or the issue being addressed. In a Hispanic neighborhood, people might respond readily to a flyer in Spanish. However, if they then call the office putting out the flyer and find no one who can speak to them in Spanish, they are apt to be lost.

Like other populations, minority recruits are faced with mixed emotions when taking on new situations. Fear and self-doubt can often accompany enthusiasm and anticipation. It helps to spell out tasks clearly, allow for the social element and provide thank-yous and perks whenever possible.

Expanding Our Reach - The Philadelphia Story

Training volunteers to become trainers themselves increases the reach of paid staff tenfold or more.

An example of this is the Youth Tree Corps sponsored by the Pennsylvania Horticultural Society in Philadelphia. In the program's first year, one staff person, Mindy Maslin, initially trained four groups of 10 children each in basic tree care. For one week during the summer she trained each group in basic botany, tree physiology and troubleshooting and then worked with them in their neighborhood. Tree Corps kids served as “Tree Ambassadors,” knocking on doors to explain the situations to adults, cleaning pits, feeding and watering trees and doing very basic pruning. The kids were given a small stipend at the end of the sessions. Although it was a tremendous success, it was also a very labor-intensive process that took one staff person 160 hours to train about 40 kids and impact about 500 trees.

The second year, Maslin offered the course to 10 teachers and youth-group leaders.

APPENDIX

Participants received the same basic training as the kids had the year before but were also taught how to train their own groups of kids. After completing the course, leaders were given tools for their groups and set loose on their own turf to train and supervise youth groups over the summer. The net result affected more than 150 kids and 1,000 to 1,500 trees, at a staff expenditure of under 50 hours. Group leaders served as role models within the community, and instead of a stipend, the groups received the sets of tools to keep with them in the community.

More Successes

Treemendous Maryland, headed by Wally Ortinsky, has another approach for community involvement and training. "As a practical matter, we keep on trying to force communities, schools, people to get involved in tree planting." They offer courses throughout the year on tree planting, care and maintenance. Each individual who completes the initial tree planting course gets a "Tree Supervisor" certificate which means they will be periodically called upon to come out and help supervise others during plantings. The second course on tree care and maintenance qualifies the participant to become a "Green Gorilla" and get a tee shirt, a patch and a certificate signed by the governor.

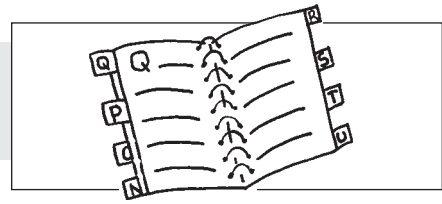
Once a person completes this training, he or she becomes a member of PLANT: People Loving and Nurturing Trees, a community-based Tree City-type program. To qualify for awards under the program, a neighborhood has to complete 24 steps including tree planting, tree care and maintenance, surveying trees and getting the community involved. Completing the first eight steps qualifies a neighborhood for a Bronze Medal. The next eight steps wins the Silver Medal. The final eight makes the neighborhood eligible for—you guessed it—the highly coveted Green Medal. This calls for local celebrations and is a very effective way to keep a neighborhood aware of its Tree Supervisors and Green Gorillas as community resources.

"Everything we do is an effort to find something that will turn on almost anybody," says Orlinsky. "Teachers periodically get a mandate to teach an environmental course.

Our job is to make that easy for them in the form of course material, a way to get them and their kids involved in learning about trees that are theirs and, most importantly, get them, their kids, their school actively planting trees that are theirs."

Conclusion

Any plan to use volunteers in urban forestry programs needs to relate a volunteer's work back to the community and keep each volunteer motivated throughout the project, whether it is short- or long-term. Volunteers in urban forestry are a virtually untapped gold mine, there to be found by those with the right tools and the right motivations.



Resources

The following list is far from complete. It is meant only as a starting point in the search for more information about volunteerism, recruitment and management.

Association for Volunteer Administration (AVA)

P.O. Box 32092
Richmond, VA 23294
877-675-3353
www.avaintl.org
Journal of Volunteer Administration

United Way

Contact the United Way in your area through your local Blue Pages for information about local volunteer action councils, board training, volunteer recruitment and placement and funding opportunities. Their national website is www.unitedway.org.

National Arbor Day Foundation

100 Arbor Ave.
Nebraska City, NE 68410
888-448-7337
www.arborday.org/programs/volunteers
The web site includes information on volunteer tree planting projects, including their "Tree Planting Resource Kit for Volunteers."

*(Article appeared in the
January 1994*

***The Public Garden.**)*

*Sally McCabe works
for the Pennsylvania
Horticultural Society's
Philadelphia Green
program.*

*Author's Note: This article
is based in part on a
three-day Community
Involvement Workshop
sponsored jointly by
USDA Forest Service,
Northeastern Area, and the
Center for Urban Forestry
at the Morris Arboretum
of the University of
Pennsylvania. Special
thanks to Susan Ellis
of Energize, Inc., who
literally wrote the book
on volunteer recruitment
and management and
who conducted most
of the training at the
workshop, and to Mindy
Maslin for information on
promoting diversity and for
photographs.*

APPENDIX

Checklist for Planning a Workday

One month ahead

1. Be clear about what your goals are

- What do you want to accomplish? _____
- Where do you want to hold the workday? _____
- How many volunteers will be needed? Adults? Children? _____
- What supplies are needed? _____
- How to make the workday fun? _____

2. Clearly define:

• Write job descriptions

Example: Hole Digger: must have work boots, a strong back, and be available 9-12pm on Saturday

Example: Phone Banker: must be comfortable with answering numerous questions, have an understanding of the project, and be available 6- 8pm weeknights

• Design tasks for all kinds of people

Down and dirty (dig holes, move trees, build fences)

Dainty and dirty (weed, plant flowers, prune, mulch)

Don't get dirty (face paint kids, answer phone calls, organize food preparations, door knocking, water delivery)

3. Seek support from local groups and organizations

Churches, schools, and non-profit groups can provide support including volunteers and meeting space.

4. Involve government agencies and politicians

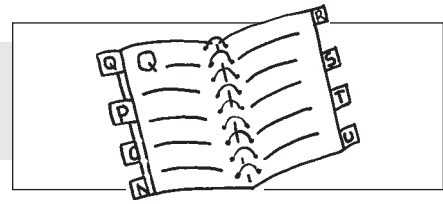
Identify and contact state legislators, City Council, relevant City staff and departments. These are good sources of funding, provide physical assistance, and attract the media.

5. Solicit donations from local business

Identify patrons and ask local restaurants, bakeries, print shops, stationery stores, gardening centers, for supplies and services.

6. Contact your community paper

Be brief and clear. Play up the event as fun and action packed.



One week ahead

1. Contact regional papers and TV
2. Update community paper
3. Confirm volunteers
4. Check on equipment
5. Get the word out
 - **Distribute flyers**
 - Be brief and to the point
 - Focus on the 4 Ws: who, what, where, and when
 - Use photos, graphics, and colorful paper to attract attention
 - Post flyers in places where people gather
 - **Knock door-to-door**
 - Distribute flyers and invitations door-to-door
 - People are likely to volunteer when asked by someone they know or recognize
 - You may want to start by writing a letter to everyone on your street, making copies, and hand-delivering them
 - **What to say when people answer the door**
 - Introduce yourself and apologize for disturbing him/her
 - Explain what it is your doing (i.e., fixing up a lot, cleanup, organizing an event)
 - Ask if they would like to get involved
 - Start a list of names, addresses, and phone numbers of interested neighbors
 - If they seem preoccupied, ask to come back at a more convenient time

The day of the event



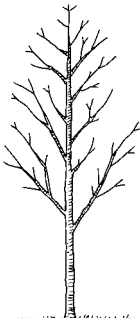
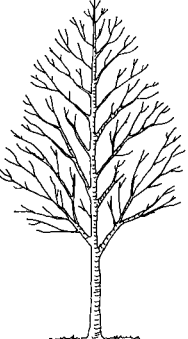
1. Offer basic training and overview
2. Have a raffle as a way to get everyone's name, address, and phone number
3. Call key people
4. Confirm with the media
5. Have refreshments
6. Have tools marked with tape labeling to identify what belongs to whom
7. Be ready early
8. Provide gloves
9. Thank volunteers, sponsors, supporters, politicians, and donators

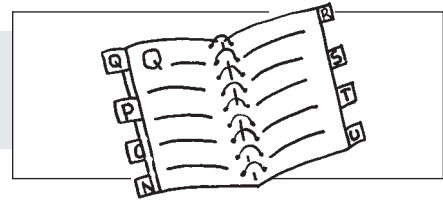
After the event

1. Send out thank you notes to everyone
2. Maintain contacts with volunteers for future events
3. Plan next event

APPENDIX

Basic Tree Care

AGE OF TREE	WATER	FEEDING	PRUNING	PIT CARE	OTHER
<p>newly planted through first year</p> 	<p>5 - 8 gallons per week until ground freezes. Resume watering at thaw. Increase to 5 - 8 gallons twice a week during extreme hot or dry periods.</p>	<p>Add 5 year slow-release fertilizer.</p>	<p>Prune out dead, damaged and diseased branches.</p>	<p>Put up tree guards anytime. Mulch. Plant shallow-rooted annuals (marigolds, vinca, begonias, petunias, portulaca, etc.).</p>	<p>Stake & wire to prevent damage in high traffic areas. Check wires often to prevent choking tree. Remove after one year. Check root flare; excavate if buried.</p>
<p>after 2nd year</p> 	<p>5 - 8 gallons per week until ground freezes. Resume watering at thaw.</p>	<p>If a 5 year slow-release fertilizer was used at planting, no need to fertilize for 5 years. Do a soil test to establish need.</p>	<p>Prune out dead, damaged and diseased branches and begin limbing up to 6'. Never remove more than 1/4 of tree's live branches in one year.</p>	<p>Weed and lightly cultivate the top 2 - 3" of soil. Renew mulch. Clear trash and debris.</p>	<p>Check root flare for visibility. Excavate if buried.</p>
<p>adolescent</p> 	<p>Water as needed during dry spells.</p>	<p>None needed if mulched with compost each year. Do a soil test to establish need.</p>	<p>Prune out dead, damaged and diseased branches. Train or prune branches away from porches and utilities.</p>	<p>Weed and lightly cultivate the top 2 - 3" of soil. Renew mulch. Clear trash and debris.</p>	<p>Check root flare for visibility. Excavate if buried. Enjoy your shade!</p>
<p>older</p> 	<p>Water as needed during dry spells.</p>	<p>None needed if mulched with compost each year. Do a soil test to establish need.</p>	<p>Limited pruning; prune out dead wood, prune branches away from porches and utilities if necessary. (Should be done by a professional).</p>	<p>Weed and lightly cultivate the top 2 - 3" of soil. Renew mulch. Clear trash and debris.</p>	<p>Check root flare for visibility. Excavate if buried. Enjoy your shade!</p>



Tree Care Flyer

What can you do?

Good tree health is achieved generally through common sense, especially in summer.

Water the tree, slowly and deeply. Tree roots get most of their moisture from the small 3' x 3' pit cut in the sidewalk. It's best to let water trickle very slowly into the pit, so that it doesn't create a puddle or run onto the sidewalk. Use a watering bucket or bubble hose. If using a hose, water for an hour if possible.

Clean up the tree pit. Remove weeds, grass, and trash. Gently loosen the soil to allow more water and oxygen to penetrate through the top three inches of soil. This is where most of the root hairs are.

Keep dogs and cats from relieving themselves in the tree pit. Dog and cat urine and feces are very alkaline and can damage roots. Dog feces also attract insects, rodents, and other dogs.

Remove stakes and wires from newly planted trees after one year. Tight wires are leading killers of young trees.

Mulch your tree. Using woodchips, licorice root, or leaf mold, create a ring two to three inches high and as wide as the dripline, if possible. Remember not to pile mulch up against the trunk.

DON'T feed your newly planted tree or fertilize during a drought. Forcing a water-stressed tree to grow will only cause further stress. Also, granular chemical fertilizer is a salt that could dehydrate the tree.

DON'T put trash bags or cans out around the tree. Trash compacts soil and leaks potentially toxic substances onto the roots.

DON'T prune heavily except to remove dead, diseased, or damaged branches. Removing more than one third of healthy branches will substantially weaken the tree. Never "top" your tree.

Protect the tree. Install tree pit guards, bollards, or other obstacles to keep tree from being damaged by car doors, bicycles, dogs, etc.

Tree Pit Care

Remove weeds, trash, basal shoots, and suckers from tree pit and tree.

Cultivate soil gently and periodically.

Mulch the pit with 3 to 4 inches of organic mulch such as leaf mold, licorice root, woodchips. Place mulch at least 6 inches from the tree trunk. This prevents moisture and insects from accumulating around the bark.

Keep the tree pit level, no more than 1 or 2 inches below the sidewalk edge. This will prevent water from spilling out and people from falling in.

Protect the bark, which is the most important part of a tree's protection.

Water slowly and deeply with 10 to 15 gallons each soaking.

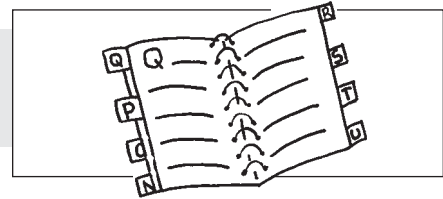
DO NOT...

Compact the soil by walking on it.
Pile bags around the tree on trash day.
Allow animals to urinate in the tree pit.
Park motorcycles or cars in the tree pit.
Change oil anywhere near the tree pit.

APPENDIX

Tree Tender Monthly Planner

	Jan	Feb	Mar	Apr	May	June	July	Aug	Sept	Oct	Nov	Dec
Planting			X	X	X					X	X	X
Planting fruit trees, zelkova, oak, birch, Japanese maple & hawthorne (& others not recommended for fall planting)			X	X	X							
Pruning for form	X	X	X			X	X	X			X	X
Pruning dead, diseased & damaged branches	X	X	X	X	X	X	X	X	X	X	X	X
Pruning flowering trees						X						
Pruning elms & red oaks	X	X	X	X								
Soil testing				X	X	X	X	X	X	X	X	
Weeding, cultivating and mulching			X	X	X	X	X	X	X	X	X	
Planting annuals around your tree					X	X	X	X	X			
Celebrate Arbor Day and Earth Day				X	X							
Watering			X	X	X	X	X	X	X	X	X	X



Recommended Reading List

General Information

- Christopher Brickell, Elvin McDonald, *The American Horticultural Society Encyclopedia of Gardening* (1993).
- Brian Capon, *Botany for Gardeners* (1990).
- William Cullina, *Native Trees, Shrubs, and Vines: A Guide to Using, Growing, and Propagating Native North American Woody Plants* (2002).
- Michael Dirr, *Dirr's Hardy Trees and Shrubs: An Illustrated Encyclopedia* (1997).
- Michael Dirr, *Manual of Woody Landscape Plants: Their Identification, Ornamental Characteristics, Culture, Propagation and Uses* (1990).
- Henry D. Gerhold, et. al., *Street Tree Factsheets* (2001).
- Andy and Katie Lipkis, *The Simple Act of Planting a Tree* (1990).
- Ann Fowler Rhoads, *Trees of Pennsylvania: A Complete Reference Guide* (2005).
- Alex H. Shigo, *A New Tree Biology: Facts, Photos and Philosophies on Trees and Their Problems and Proper Care* (1986).
- Alex H. Shigo, *Tree Biology and Tree Care Photo Guide* (1987).
- Alex H. Shigo, *Modern Arboriculture: A Systems Approach to the Care of Trees and Their Associates* (1991).
- George W. D. Symonds, *The Tree Identification Book: A New Method for the Practical Identification and Recognition of Trees* (1958).
- D. M. Van Gelderen, *Conifers: The Illustrated Encyclopedia* (1996).

Pests and Diseases

- Whitney Cranshaw, *Garden Insects of North America* (2004).
- Warren T. Johnson, *Insects That Feed on Trees and Shrubs* (1991).
- Wayne A. Sinclair, et. al., *Diseases of Trees and Shrubs* (1987). Second edition to be published November 2005.
- Terry A. Tattar, *Diseases of Shade Trees* (1989).

Pruning

- Christopher Brickell, *American Horticultural Society Pruning and Training* (1996).
- Alex H. Shigo, *Modern Arboriculture: A Systems Approach to the Care of Trees and Their Associates* (1991).
- Alex H. Shigo, *Tree Pruning: A Worldwide Photo Guide* (1989).

Trees in the City

- Edward F. Gilman, *Trees for Urban and Suburban Landscapes* (1997).
- Jack Petit, *Building Greener Neighborhoods: Trees as Part of the Plan* (1995).
- Arthur Plotnik, *The Urban Tree Book: An Uncommon Field Guide for City and Town* (2000).
- Peter Trowbridge and Nina Bassuk, *Trees in the Urban Landscape: Site Assessment, Design, and Installation* (2004).

All of these titles are available for viewing at The PHS McLean Library, 100 N. 20th Street, Philadelphia, PA. PHS members have borrowing privileges.

THE WIRED GARDENER

A free monthly email newsletter featuring capsule reviews of gardening and greening websites, reviews of new gardening and horticultural books, tips on how to find gardening information on the Internet, and announcements of gardening events at the Pennsylvania Horticultural Society and other area horticultural organizations. To sign up, send an email to wiredgardener@pennhort.org

APPENDIX

Children's Titles

Fiction

- Lois Ehlert, *Red Leaf, Yellow Leaf* (1972).
- Arthur A. Levine, *Pearl Moscowitz's Last Stand* (1993).
- Carol Reed-Jones, *The Tree in the Ancient Forest* (1995).
- Natalia Romanova, *Once There Was a Tree* (1985).
- Dr. Seuss, *The Lorax* (1971).

Non-fiction

- Diane L. Burns, *Trees, Leaves and Bark* (1995).
- Anita Ganeri, *Focus on Trees* (1992).
- Gaillimard Jeunesse, *The Tree* (1992).
- Richard Lewington and David Streeter, *The Natural History of the Oak Tree* (1993).
- Donald M. Silver, *One Small Square Woods* (1995).

Websites About Trees

www.pennsylvaniahorticulturalsociety.org

The Pennsylvania Horticultural Society (PHS), a nonprofit membership organization founded in 1827, motivates people to improve the quality of life and create a sense of community through horticulture.

www.communitygardening.org

The American Community Gardening Association (ACGA) homepage points to many websites dealing with urban gardening and community stewardship.

www.americanforests.org

American Forests is the nation's oldest nonprofit citizen conservation organization, founded in 1875. Through programs such as Global ReLeaf, and publications such as the National Historic Tree Register, American Forests advocates the benefits of rural and urban trees, good science, and sound policy.

www.arborday.org

National Arbor Day Foundation helps to promote tree care and conservation and to educate people on tree issues, offering nine nationally recognized programs such as Tree City USA that promote responsible tree stewardship in communities, on farms and open space, and in the rain forests.

www.isa-arbor.com

www.treesaregood.com

International Society of Arboriculture (ISA), a professional organization for arborists, fosters a better understanding of trees and tree care through research and education. This site includes a list of certified arborists by city.

www.nationaltreetrust.org

National tree trust is a private, nonprofit organization created to serve as resource for groups and individuals interested in trees. Grants and educational assistance are available.

www.treelink.org

TreeLink's mission is to provide information, research and networking for people working in urban and community forestry. For the research, the arborist, the community group leader and the volunteer.

www.ucgreen.org

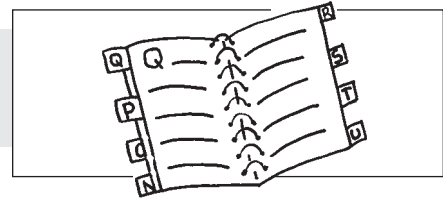
UC Green, Cooperative Community Gardening in University City, Philadelphia, offers a wide range of local resources for planning, planting, and maintaining trees.

www.phila.gov/fairpark/trees/index.html

The Fairmount Park Commission has jurisdiction over all park and street trees in the city of Philadelphia. This site includes guidelines for obtaining permits and a list of approved street trees for Philadelphia.

www.nascc.org/intlinks.html

The National Association of Service and Conservation Corps has assembled a page of "Internet Tools for Environmental Service" that links to community greening websites.



Tree Sources and Resources

Albrecht's Flowers and Nursery

Montgomery Ave. & Meetinghouse Ln.
Narberth, PA 19072
610-664-4300
Fax: 610-664-4491

Holod's Home & Garden Center

700 Ridge Pike
Lafayette Hill, PA 19444
610-828-4505

Laurel Hill Gardens

8125 Germantown Ave.
Chestnut Hill, PA 19118
215-247-9490
Fax: 215-247-0217
www.laurelhillgardens.com

Moon Nurseries

1955 Quarry Road
Yardley, PA 19067
215-968-6141
Fax: 215-579-0147
www.moonnurseries.com

Natural Landscapes

James Irvin Plyler
354 N. Jennersville Road
West Grove, PA 19390
610-869-3788

The Ponds & Gardens of Limekiln

200 Limekiln Pike
Glenside, PA 19038
215-884-5928
Fax: 215-884-5907

Primex Garden Center

435 Glenside Ave. West, PO Box 1199
Glenside, PA 19038
215-887-7500
Fax: 215-887-7509
www.primexgardencenter.com

Princeton Nurseries

Ellisdale Road, PO Box 185
Allentown, NJ 08501
800-916-1776
609-259-1260
www.princetonnurseries.com

Shemin Nurseries

100 Green Tree Road
P.O. Box 649
Oaks, PA 19456-0649
610-666-0595
Fax: 610-666-1550
www.sheminnurseries.com

J. Franklin Styer Nurseries, Inc.

914 Baltimore Pike, P.O. Box 98
Concordville, PA 19331
215-459-2400
Fax: 215-459-3982
www.styers.com

Tuckahoe Nurseries

P.O. Box 576
Tuckahoe, NJ 08250
609-861-0533
Fax: 609-861-0383
Email: lindsaytni@comcast.net

Joseph Wick Nurseries

3902 Brenford Road
Smyrna, DE 19977
302-653-9000
Fax: 302-653-0746

Fairmount Park Recycling Center

Reached by Ford Road off of
Strawberry Mansion Bridge or
Chamonix Drive in
West Fairmount Park
215-685-0109
Open: 7:30am-3:00pm, Monday
through Friday
*Free woodchips, mulch, scrap lumber,
firewood. Bring proof of Philadelphia
residency (driver's license or utility bill).*

ALSO CONSULT YOUR LOCAL
YELLOW PAGES UNDER "NURSERIES."

Tree Care Professionals

Commonly used terms for tree care professionals:

Arborist refers to anyone specializing in tree care and maintenance. A certified arborist (C.A.) is a professional who has earned formal recognition from the International Society of Arboriculture (ISA).

A certified arborist is qualified to do expert pruning, diagnose and treat disease and insect damage, and will also do tree removal and stump grinding. Check to verify insurance coverage.

Landscape contractor is a generic term referring to a person who does general maintenance such as cutting grass, installing plants, preparing planting beds, and general cleanup.

Tree care professional refers to a person who does tree care and maintenance. She or he may be a certified arborist or a person with a lawn care business. Check credentials and references. An uncertified tree care professional usually is qualified to do projects such as simple tree removal and stump grinding. Check to verify insurance coverage.

When pruning, tree removal, stump grinding, or fertilizing is required, consult a certified arborist and/or tree care professional. Contact several companies or individuals for cost estimates. When interviewing tree care professionals, consider quality of service, your comfort level, and cost. Ask for references, verification of certification and/or licensure, and insurance coverage. Remember the best bid is not necessarily the lowest, especially when caring for a live tree. Professionals should also be certified arborists and insured.

Other Resources

American Forests
PO Box 2000
Washington, DC 20013
202-737-1944
www.americanforests.org

Earth Force, Delaware Valley
100 Greenwood Ave.
Wyncote, PA 19095
215-884-9888
Fax: 215-884-9895
www.earthforce.org

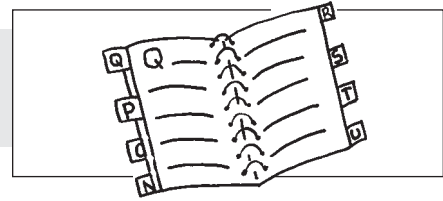
Environmental teacher training to promote youth environmental projects.

The Fairmount Park Commission
One Parkway, 10th Floor
1515 Arch St.
Philadelphia, PA 19102
215-685-4363
www.fairmountpark.org
Street trees permits for plantings, prunings, and removals. Reporting hazardous trees.

International Society of Arboriculture
P.O. Box 3129
Champaign, IL 61826-3129
800-ISA-TREE
Fax: 217-355-9516
www.isa-arbor.com

Morris Arboretum of the University of Pennsylvania Plant Clinic
100 Northwestern Ave.
Philadelphia, PA 19118
215-247-5777 ext. 141
www.pqflora.org/plantclinic
Specializing in trees, Monday through Friday, 1 pm to 3 pm

The National Arbor Day Foundation
100 Arbor Ave.
Nebraska City, NE 68410
402-474-5655; 888-448-7337
Fax: 402-474-0820
www.arboday.org
Tree ID guide: What Tree is That?
Information on trees and Arbor Day.



National Tree Trust

1120 G. St. NW
Suite 770
Washington, DC 20005
800-846-8733
Tree grants, speakers and trees.

PA One-Call-System

1 800-242-1776
www.pahomes.org/paonecall
To check for utility line locations

The Pennsylvania Horticultural Society

100 N. 20th Street
Philadelphia, PA 19103-1495
Monday to Friday, 9 am to 5 pm
215-988-8800
Fax: 215-988-8810
McLean Library: 215-988-8772
Ask-a Gardener Hotline: 215-988-8777
(Monday through Friday 9:30am-noon)
www.pennsylvaniahorticulturalsociety.org

Pennsylvania State University, Cooperative Extension Service, Philadelphia County

Garden Phone: 215-471-2200
Information about soil testing, fertilizers,
pesticides, and insects, Monday to
Friday, 9 am to 5 pm

Pennsylvania State University School of Forest Resources

Urban Forester
1015 Bridge St., Suite H
Collegeville, PA 19426
610-489-4315
montcoext@psu.edu
Comprehensive information about trees
including funding sources.

Nonprofit Organizations in Philadelphia

Citizen's Alliance

1137 Wharton St.
Philadelphia, PA 19147
215-551-5111
Fax: 215-465-6598
www.citizensalliance.us

Frank DiCicco, President
Roseann Anthony, Administrator
Nonprofit organization that supplies
or loans cleaning supplies, personnel,
and equipment to civic groups for
community and neighborhood cleanups
and graffiti removal.

Clean Air Council

135 S. 19th St.
Philadelphia, PA 19103
215-567-4004
Fax: 215-567-5791
www.cleanair.org

A nonprofit organization that works
on behalf of the public to reduce air
pollution. The Council acts through
education, advocacy, and government
oversight.

Committee of Seventy

215-557-3600
Fax: 215-557-3608
www.seventy.org
Provides up-to-date address and phone
information about elected officials.

Greater Philadelphia Cultural Alliance

1616 Walnut St., Suite 600
Philadelphia, PA 19103
215-557-7811
Fax: 215-557-7823
www.philaculture.org
Provides information services including
a monthly newsletter; informational
directories; community resources;
media contacts; and advocacy for
public arts funding at the local, state
and federal levels.

Neighborhood Gardens Association

100 N. 20th Street, 3rd Floor
Philadelphia, PA 19103
215-988-8797
Fax: 215-564-5572
www.ngalandtrust.org

A nonprofit land trust that saves
community gardens and open space in
low and moderate income communities,
by helping garden groups acquire their
garden property.

APPENDIX

Pennsylvania Environmental Council

123 Chestnut St., Suite 401

Philadelphia, PA 19106

215-592-7020

Fax: 215-592-7026

www.pecpa.org

Private, nonprofit organization providing education, advocacy, and action projects for the betterment of Pennsylvania's environment.

Philadelphia More Beautiful

215-685-3988

www.phila.gov/streets/pmbc.html

Fights illegal dumping. Loans gloves, rakes, brooms, and shovels, as well as provides trash bags for neighborhood street cleanups. To request assistance, mail or fax three weeks ahead: 1) date of cleanup, 2) contact information including address and phone, 3) how many volunteers to participate, and 4) what items and how many of each is needed.

Philadelphia Recycling Office

780 Municipal Services Building

1401 JFK Blvd.

Philadelphia, PA 19102

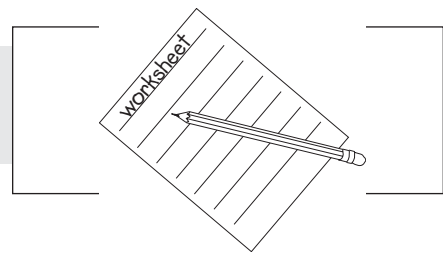
215-686-5444

Fax: 215-686-5455

www.phila.gov/streets

The city agency responsible for planning and administering a citywide recycling program, including a composting program.

VIII. WORKSHEETS



Worksheet #1: Planning an Arbor Day Event

1. What kind of event do you and your group want (school event, public event, park cleanup or tree planting event)?

2. How many participants do you want? _____

Number of children _____ Number of adults _____

3. Event location (including rain location): _____

4. Event date (including rain date): _____

5. Activities (speakers, music, awards, tree plantings, educational stations, student presentations, etc.):

6. Donated activities: _____

7. Activities at group's expense: _____

8. Potential partners (businesses, civic groups, schools, PTA, high schools, students, community centers, churches, libraries, etc.):

9. Potential volunteers: _____

10. Materials needed (PA system, tools, seeds, mulch, trees, recycled goods, beverages, snacks, poster and flyer paper, etc.):

11. To purchase: _____

WORKSHEETS

12. Possible city and non-profit contributions: _____

13. Possible business and community donations: _____

11. Services needed (printing, poster and flyer distribution, answering calls, presenters):

12. Volunteers: _____

13. Schedule:

For example, by March 25th, we will have a location

By _____ , we will _____

By _____ , we will _____

By _____ , we will _____

By _____ , we will _____

By _____ , we will _____

By _____ , we will _____

By _____ , we will _____

By _____ , we will _____

IX. Glossary

Alternate: leaves alternating along the stem.

Amending (soil): the practice of adding compost, mulch, or nutrient-rich soil to the existing soil in a tree pit.

Angiosperm: flowering trees. A pollinated flower's ovaries develop fruits containing seeds or angiosperm. "Angio" refers to vessel; "sperm" refers to seed.

Arborist: a person who specializes in tree care and maintenance. A certified arborist (C.A.) is a professional who has passed a certificate examination.

Backfill: to return soil to a planting area from which it was originally taken.

Balled and burlapped (B & B): method of preparing a tree for transplanting. The tree is dug with soil left around its roots. The soil and roots are wrapped in burlap or plastic until time of planting.

Bare-root: a transplanting method. Dormant trees are dug, and its roots washed, trimmed, and kept moist until replanting.

Bark: the outer protective tissue of woody plants.

Blade: flat part of leaf or leaflet.

Broad-leaf: Broad, flat leaves, usually deciduous but not always, as is the case with the evergreen holly or southern magnolia trees.

Bud: a structure of tissue that will become a leaf, flower, or a new shoot.

Cambium: the thin growth layer of the tree that produces the phloem (outward layer) and the xylem (inward layer).

Chlorophyll: the green pigment in leaves which absorbs the sun's energy enabling photosynthesis.

Community/urban forestry: the planning, design, planting, and management of vegetation on public lands in and around a community. These forests maximize the visual, social, economic, and environmental contributions to the well-being of the community.

Compost: the art and science of combining organic materials (such as food or yard waste) and transforming them into humus.

Compound leaf: a leaf of two or more leaflets.

Conifer: a deciduous or evergreen tree bearing cones, as a pine, spruce, or fir. Foliage is needle-like.

Contractor: a person who performs services (such as cutting the grass or installing plants) at a specified price.

Crown: the canopy or leafy part of a tree.

Cultivate: to loosen the top two to three inches of soil, allowing roots better access to water and air.

Deciduous: tree that sheds leaves annually and simultaneously.

Drain sump: a pipe that helps to drain excess water from a planting hole.

Entire: a smooth leaf margin.

Evergreen: tree with needles or leaves that remain through winter, but drop intermittently year-round.

Fairmount Park Commission (FPC): the City agency governing all street trees in Philadelphia. A permit must be acquired from FPC to plant, prune, or remove a street tree.

Flowers: attracts insects and birds to assist in pollen distribution. A fertilized flower develops into a fruit.

Fibrous roots: absorbing roots which take in water and nutrients through small root hairs. Most fibrous roots grow in the top few inches of soil.

Fruit: carries the seeds for future trees. Fruits are dispersed by wind, animals, water, etc. They include nuts, samaras, legumes, capsules, and fleshy fruits.

Girdling roots: frequently found in container-grown trees (and pot-bound house plants). Roots are deflected from their normal course by limited or unpenetrable surroundings. By growing circularly around the trunk, girdling roots in time will strangle the tree. At planting time, girdling tree roots should be spread out as evenly as possible in the planting area.

Glucose: The sugar food product of photosynthesis.

Gymnosperm: non-flowering trees. Reproduces through wind-carried pollen and exposed ovules that become seeds. All conifers are gymnosperms.

GLOSSARY:
a collection of
specialized terms
and their meanings

Lobed: rounded leaf edges.

Margin: leaf edge.

Mulch: protective covering of various substances, usually organic, placed on top of the soil around plants to retard weed growth, prevent moisture loss, moderate temperatures, and release nutrients into the soil. Popular mulches are wood chips, bark chips, compost, and leaf mold.

Mycorrhiza: a symbiotic association formed between root hairs and fungi in the soil which helps roots absorb nutrients and water.

Needle-like leaf: mostly found on evergreens, but not always, as is the case with the deciduous dawn redwood or larch.

Opposite: two or three leaves directly across from each other on the same stem.

Ovary: the typically enlarged basal portion of the pistil that encloses the ovule(s).

PA One-Call System (1-800-242-1776): the number to call before you dig in Philadelphia. They will locate all underground utilities and spray paint your sidewalk to indicate where it is safe to dig without hitting a utility line.

Palmate: several leaves radiating from one point.

Perennial: a plant that lives for multiple years.

Petiole: the stalk of a leaf.

Phloem: the inner bark made up of cells that carry glucose (sugar made in the leaves) to the rest of the tree.

Photosynthesis: the process by which plants produce their own glucose. Plants absorb carbon dioxide and water, and in the presence of sunlight, produce glucose and release oxygen.

Pinnate: leaflets arranged like a feather upon one main axis.

Pollen: the spores or grains produced by flowering plants, and functions as the male element in fertilization.

Root ball: the clump of soil and tree roots dug with the tree, and covered with burlap and twine or a wire basket, awaiting planting.

Rototiller: a power-driven machine that uses metal teeth to chop up and mix soil.

Samara: winged fruit.

Sapling: a young tree that measures two-to-four inches in diameter.

Serrate: toothed or notched leaf edge.

Sessile: a leaf without a stalk attached directly to the stem.

Sidewalk pit: small patch of soil found around urban sidewalks. Pits are designed as a type of street planter for trees or other greenery.

Simple leaf: single leaf.

Soil pH: the level of soil acidity

or alkalinity. The level of pH affects the plant's ability to uptake nutrients from the soil. pH is expressed numerically with 1 being extremely acidic (the pH of lemon juice) and 12 being extremely alkaline (the pH of ammonia).

Stoma: a small pore on the underside of the leaf.

Structural roots: the support roots of the tree. They grow to be large, heavy, and woody.

Sucker: a shoot that originates from the root area, which often is a sign of tree stress.

Topping: involves chopping branches off in the middle, leaving large branch stubs. This practice of reducing tree height is not recommended. It weakens the tree and opens it up to insects and decay.

Transpiration: release of water vapor into the air. The process involves the tree pulling water from its roots up to its leaves.

Water sprouts: an upright shoot originating from the trunk or a main branch. Often a sign of tree stress.

Whorled: three leaves or buds growing from the same node, evenly around the tree.

Xylem: cells that carry sap (water and nutrients) from the roots to the branches and leaves. The outer layers of xylem are called sapwood. The inner layers become non-functioning heartwood.