



PLANT A TREE!

Your Mini-Guide to Tree Planting



PHS
PLANTING SEEDS. GROWING LIVES.



treeVitalize
A partnership to mature tree cover in Southeast PA

The Pennsylvania Horticultural Society
presents

PLANT A TREE!

Your Mini-Guide to Tree Planting

INTRODUCTION

Dear Gardener,

Like all living things, trees require care to ensure lasting health and beauty. Within this *Plant a Tree!* guide, you will find the essential information you need to get started caring for trees. Whenever you plant a tree, you are making a delightful improvement to your own surroundings and also contributing to a healthier environment in our area.

The Pennsylvania Horticultural Society is partnering with the Pennsylvania Department of Conservation & Natural Resources in TREEVITALIZE, a program designed to encourage residents throughout Southeastern Pennsylvania to plant more trees. By participating, you can help restore the area's much-depleted tree canopy. For more information on this program, please go to www.treevitalize.net.

Happy Planting!



Jane G. Pepper, President
The Pennsylvania Horticultural Society



Michael DiBerardinis, Secretary
Department of Conservation and
Natural Resources

TREEVITALIZE PARTNERS



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HOW TREES HELP THE ENVIRONMENT

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 the city of Philadelphia, trees provide the equivalent of \$5,400,000 in air-pollution removal annually.

–R. McPherson, Journal of Arboriculture

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 air conditioners, releasing cooling moisture into the air.

–Tree values, International Society of Arboriculture

Increase the value of your home.

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

–Susan Wachter, Wharton School, University of Pennsylvania

HOW TREES GROW

Tree Basics

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

A tree is a woody perennial (a plant designed to live 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. 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, the cells of the root need oxygen to transform food into energy. Most tree roots will die in water-saturated or compacted soil.

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.

HOW TREES GROW

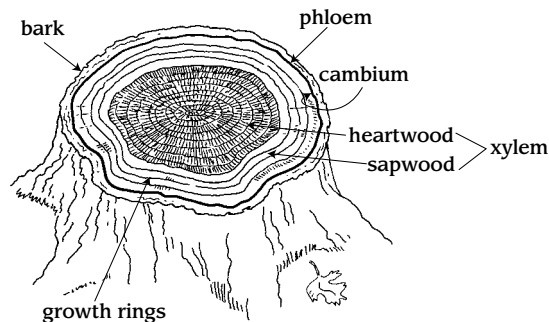
Phloem: This inner bark is made up of cells that carry sugars (manufactured by the leaves) called glucose to the rest of the tree.

Cambium: The thin growth layer that produces the phloem (outward towards the bark) and the xylem (inward towards the center). The cambium is where growth in diameter occurs with the formation of new annual rings inside and new bark outside.

Xylem: 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 dark inner rings of a tree are called *heartwood*.

Branches

- Transport water and nutrients
- Produce leaves, flowers, and fruits
- Provide structural support



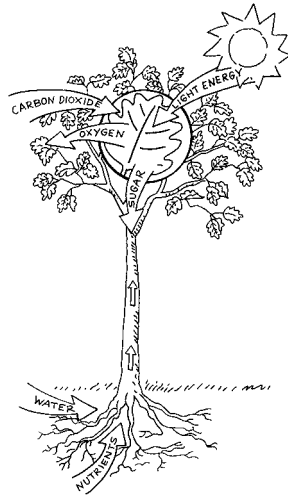
HOW TREES GROW

Leaves

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 such as maples and oaks. As leaves start to die, the green chlorophyll fades, allowing yellow and red pigments to show through. In winter, these leafless trees live on food stored in the roots, trunk, and branches until spring when 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.



HOW TREES GROW

Flowers and Fruit

Flowers attract insects and birds, and distribute pollen. 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.



dogwood bloom



acorn



cone



double samara



drupe



capsule

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 are details to 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 (not pictured).

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 small yard or garden, or on a streetscape.

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.

Ovate form

Ovate form is narrow at the bottom, wide in the middle, narrow at the top. Ashes tend to be ovate.

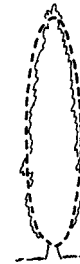
Pyramidal form

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

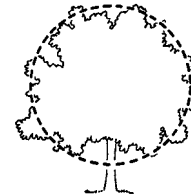
TREE IDENTIFICATION

Vase-shaped form

Shaped like an inverted triangle, Zelkova, Evodia, and some elms have the vase-like form.



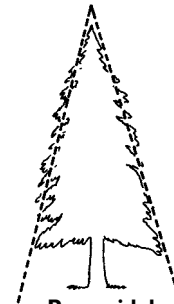
Columnar



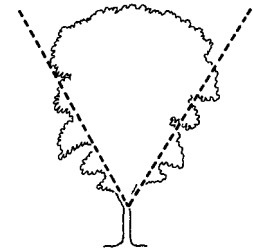
Rounded



Ovate



Pyramidal



Vase-shaped

TREE PLANTING

Getting permission

If you are planting a tree in a public sidewalk or other public area, be sure to contact your municipality for current regulations.

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 hole 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 environmental stresses like salt and compacted soil. Knowing your site will help you choose a tree that will thrive.

What tree characteristics do you want?

Spring flowers and fall color may 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. In the Mid-Atlantic states, the ideal planting season for deciduous trees is in the fall and the spring.

For the best quality trees, shop when the nursery is well stocked. Trees are sold in containers, balled-and-burlapped, or bare-root.

TREE PLANTING

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, crisscrossing branches, 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 it discolored, swollen, scarred, or 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 rootball 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

TREE PLANTING

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 rootball large enough for the trunk diameter? Because each plant type develops a different root system, rootball size will vary. Deciduous trees tend to have larger rootballs 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:

<i>A tree with a:</i>	<i>should be:</i>	<i>and have a root ball:</i>
3/4 inch diameter trunk	6 to 10 feet tall	14 inches in diameter
1-1/2 inch diameter trunk	10 to 14 feet tall	20 inches (or larger)
2 inch diameter trunk	12 to 16 feet tall	24 inches (or larger)
3 inch diameter trunk	14 to 18 feet tall	32 inches (or larger)

PHS GOLD MEDAL WINNERS

Since 1978, the Gold Medal Plant Award program of the Pennsylvania Horticultural Society has recognized trees, shrubs and woody vines of outstanding merit. These plants are evaluated and chosen for their superb eye-appeal, performance, and hardiness in the growing region of Zones 5-7. Many of the plants are hardy in a much broader geographic range.

When a gardener acquires a plant designated a Gold Medal winner, he or she can be assured the plant will exhibit standards of excellence for pest and disease resistance, as well as ease of growing, when planted and maintained by recommended methods. Gold Medal Plants are also chosen for their beauty through many seasons, whether it be foliage, flower, form or bark. For more information, visit www.goldmedalplants.org.



Okame cherry (*Prunus 'Okame'*)

PHS GOLD MEDAL WINNERS



Crabapple 'Donald Wyman' (*Malus sp.*)



'Hally Jolivette' Cherry (*Prunus sp.*)



Persian ironwood (*Parrotia persica*)

PHS GOLD MEDAL WINNERS



Eastern Red Cedar (*Juniperus virginiana* 'Corcoror' Emerald Sentinel™)



'Winter King' hawthorn (*Crataegus viridis*)



Golden rain tree (*Koelreuteria paniculata* 'Rose Lantern')

PHS GOLD MEDAL WINNERS



Japanese umbrella pine
(*Sciadopitys verticillata*)



Magnolia 'Galaxy'



Paperbark maple
(*Acer griseum*)



Nordmann fir
(*Abies nordmanniana*)



Three Flower Maple
(*Acer triflorum*)



Oriental spruce
(*Picea orientalis*)

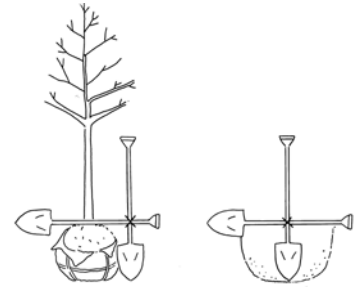
TREE PLANTING

Prepare the site

Before you dig, find out if there are any underground pipes (water, natural gas) or wires (electric, cable TV) in the vicinity. You'll want to ensure your safety when digging and planting a tree. If you are unsure, call PA One-Call System (1-800-248-1786) at least a week before you intend to dig and they will help you determine if there are underground pipes or wires.

Prepare the Planting Hole

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.



Gauging the width and depth of the hole.

Locate the tree's root flare. A tree's trunk usually flares out slightly, widening before it enters the soil. The root flare should be at or just above the soil line after planting (don't bury it).

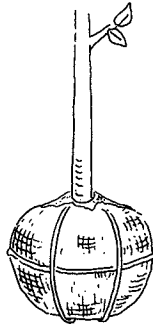
TREE PLANTING

Remove soil from the tree hole. To gauge the right depth and width, use a measuring stick or shovel to estimate the height of the rootball. Make sure to measure from the bottom of the rootball 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.

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 hole. Take care not to drop the tree. A sudden drop can fracture the rootball and break up the root system, causing tree injury and potential death.



TREE PLANTING

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 tree's roots.

For plastic or synthetic materials, remove everything from the rootball by carefully cutting the 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 hole

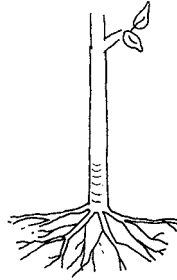
Using the same soil that you removed from the hole, fill in and around the rootball. It is not recommended to add any soil amendments when backfilling. You don't want to create such a pleasing environment that the roots grow quickly and then hit the hard hole wall. This could stress the tree, so just 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 gently to settle the soil and eliminate air pockets. Add soil and water again as necessary to have a level planting.

TREE PLANTING

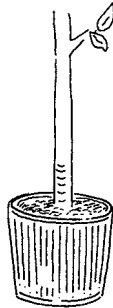
Planting a bare-root tree

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.



treevitalize.net

TREE PLANTING

Optional staking for protection

Staking is optional. Recent research indicates that unstaked trees, compared to staked trees, grow into stronger, healthier, and more flexible mature trees. If you stake, be sure to keep the supporting wires loose so the sapling can sway in the breeze and won't be girdled. Remove stakes within one year of planting.



“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. 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

TREE CARE

Watering, Weeding, Cultivating, Mulching and much More

Water weekly and deeply

Water deeply and at least weekly throughout the first two growing seasons until the ground freezes. At each watering, allow 10 to 15 gallons to seep slowly into the tree hole soil.

Weeding

Unlike the annuals we plant around our trees, weeds and grass have such strong root systems that they 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 allow the roots better access to water and air.

Mulching

After weeding and cultivating a tree, 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.

Do not over-mulch! It is fashionable these days to heap mountains of mulch around the base of tree, but this is actually unhealthy, inviting pests and disease. Moderation is the key.

TREE CARE

Another alternative is to plant a "living mulch" of shallow-rooted annuals, impatiens, marigolds or petunias. This will encourage more frequent watering.

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 weedwackers from wounding tree trunks.

Amending soil

Amending the soil is not recommended unless the entire planting area can be amended, as in trench plantings or containerized plantings. Amending the soil in a planting hole will help the tree initially, but when the roots reach the unamended soil, they will go no further, 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 observe for visible foliage symptoms to see if fertilizers are needed.

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 hole will determine the fertilizers needed. Tests are available for a fee from your county's

TREE CARE

Cooperative Extension (see the Resource page at the back of this booklet for contact information).

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 consisting of a variety of major and micro-nutrients.

Turn 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.

During Droughts

When a summer drought arrives, you have several options for keeping your young tree healthy.

- During a drought, trees become stressed. It's important **not to prune** the tree at this time. With the exception of dead, diseased or damaged branches, pruning during a severe drought should be limited.

TREE CARE

- **Do not fertilize!** When a tree is stressed during a drought, sometimes gardeners think it needs to be fertilized. Actually, fertilizers can contain high salt concentrations and cause further harm to the tree.



RESOURCE GUIDE

The Pennsylvania Horticultural Society (PHS)*

100 North 20th Street – 5th floor
Philadelphia, PA 19103-1495
215-988-8800
PHSonline.org

Other PHS Services

Ask-A-Gardener

Monday through Friday, 9:30 am to 12 noon (closed in December)
215-988-8777
Email: askgardener@pennhort.org

Gold Medal Plant Award Program

215-988-8824
Email: goldmedal@pennhort.org
Web: goldmedalplants.com

McLean Library

215-988-8772
Email: mcleanlibrary@pennhort.org

Philadelphia Green

215-988-8862
Email: pginfo@pennhort.org

TreeVitalize Program

Web: pennsylvaniahorticulturalsociety.org/phlgreen/tree-pledge.html

Tree Tenders

Email: treetenders@pennhort.org

RESOURCE GUIDE

Aqua Pennsylvania*

610-525-1400
Web: aquaamerica.com

Bucks County Cooperative Extension

215-345-3283
Web: bucks.extension.psu.edu

Chester County Cooperative Extension

610-696-3500
Web: chester.extension.psu.edu

Delaware County Cooperative Extension/Smedley Park

610-690-2655
Web: delaware.extension.psu.edu

Montgomery County Cooperative Extension

610-489-4315
Web: montgomery.extension.psu.edu

Morris Arboretum of the University of Pennsylvania*

Official Arboretum of the Commonwealth of Pennsylvania
215-247-5777
Web: morrisarboretum.org

National Arbor Day Foundation

Web: arborday.org

RESOURCE GUIDE

PECO*

800-494-4000

Web: www.peco.com

Pennsylvania Urban & Community Forestry Council

717-787-2105

Web: www.dcnr.state.pa.us/forestry/pucfc

Pennsylvania Landscape & Nursery Association*

800-898-3411

Web: www.plna.com

Pennsylvania Department of Environmental Protection*

717-783-8926

Web: www.dep.state.pa.us

Pennsylvania Department of Conservation and Natural Resources*

888-PA-PARKS

Web: www.dcnr.state.pa.us

Philadelphia County Extension

215-471-2200

Web: <http://philadelphia.extension.psu.edu>

Philadelphia Eagles*

Web: www.philadelphiaeagles.com

TreeLink

Web: www.treelink.org

TreeVitalize*

215-988-8874

Web: www.treevitalize.net

USDA Forest Service*

202-205-8333

Web: www.fs.fed.us

William Penn Foundation*

215-988-1830

Web: www.williampennfoundation.org

* *TreeVitalize* partners



The Pennsylvania Horticultural Society

President: Jane G. Pepper

Executive Vice President: J. Blaine Bonham Jr.

Friendship, community, and glorious gardens all describe the Pennsylvania Horticultural Society (PHS). Become a **PHS member** and enjoy free tickets to the Philadelphia Flower Show along with many other benefits, such as the award-winning *Green Scene* gardening magazine, free plants, discounts at local garden centers, year-round garden tours and field trips. All this, plus numerous workshops and lectures by the nation's top horticulture experts are offered to members. Visit our website for more information.

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PHSonline.org



On the cover, left to right: Japanese Maple (*Acer palmatum* 'Dissectum Omatum'),
Three Flower Maple (*Acer triflorum*), Magnolia 'Bracken's Brown Beauty'