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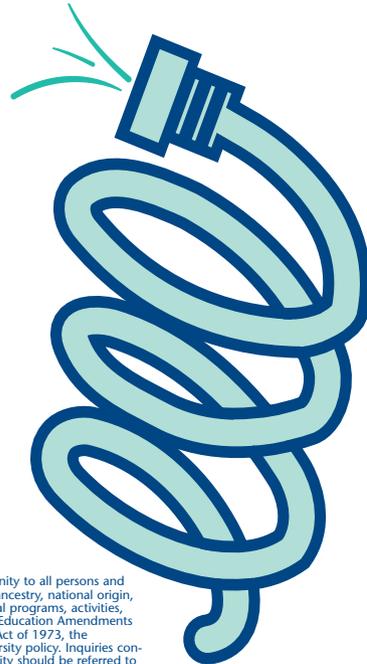
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TREES ARE IMPORTANT TO PEOPLE

Trees are important to people. Research shows that access to nature plays a significant role in life satisfaction. The most preferred scenes are ones in which nature is dominant, where there is a smooth ground texture and where trees help define the depth of the scene. Patients recover more quickly when the view from their hospital window includes trees, and trees in apartment courtyards promote social interaction.

Trees also improve the physical environment. They improve air quality by trapping dust particles and replenishing oxygen. Trees save energy by cooling during summer and providing wind breaks in winter. Trees can reduce air

conditioning needs by 30 percent and save 20 to 50 percent on fuel costs for heating. Trees improve water quality by reducing the impact of raindrops—resulting in less runoff and erosion.

Trees provide habitat for animals and birds add beauty to the environment and soften the harsh lines of the urban and suburban world.

Ecosystem refers to all of the organisms in a given place (including people) and their interactions with each other and the environment. Ecosystem-based management is new to urban and community forestry, shifting the focus from individual street trees to entire communities. With an ecosystem-based management approach, we can appreciate how trees reduce storm water runoff.

Plant trees to:

- Provide oxygen and help settle dust and other air pollutants
- Screen undesirable views
- Frame attractive views
- Reduce noise pollution
- Control storm water and reduce erosion
- Cool the environment
- Reduce energy use
- Enhance wildlife diversity

Crown Dieback

Search for dead twigs or branches dying back from the tips to the trunk in the tree crown. Dead twigs and branches may mean old age, insect or disease infestation, or root injury. Crown dieback may indicate too much or too little moisture, or too much competition.

Abnormal Leaf Size

A tree that has leaves smaller than the normal size may have a root injury. Leaves that are larger than normal, especially on root suckers, can also indicate root damage.

Trunk Scars

Partially “healed” wounds on trunks may be signs of hidden decay. Look for ragged scars on the trunk that are not callused over. To speed callusing, remove damaged, ragged tissue carefully with a sharp knife. Coating wounds with preparations has not been proven to promote healing, and coatings can trap water and provide habitat for insects and diseases that cause damage and decay.

Disruption of Root System

Root systems grow primarily in the top 3 feet of soil; the small absorbing roots are mostly in the top 6 inches. The roots are easy to damage. Sidewalks and streets paved over roots can severely compact the soils around fine roots. Trenches cut to install underground utility lines can remove all roots alongside of a tree. The impact of such root damage may not show up in the tree crown for two to five years.

Yellow Foliage

The general yellowing of a leaf, often called chlorosis, can be caused by a variety of factors, including insects, disease, too much moisture, cold weather, air and soil pollution, excess minerals in the soil, nutrient deficiencies, or a pH imbalance.

Sticky Substance Dripping From the Tree

Insect honeydew is usually the waste product of insects such as aphids, lace bugs, or scale. While this aggravating problem can be controlled with insecticides, insects causing the honeydew seldom harm the health of the tree.

Insects

Large populations of insects may or may not damage a tree. Inspect your trees on a regular basis. Look for signs of reduced tree health. Some adult insect populations last only a few days and some can last for eight weeks. An impulsive control measure will destroy the natural predators that could control the pest without any intervention. If you suspect an insect pest, collect the pest and the symptoms and take them to your local Cooperative Extension office for identification and control recommendations.

a haven for insects and can cause girdling. Remove all twine and tree wrap at planting and remove supports after one growing season.

Lawn Amendments and Chemicals

Some fertilizers, amendments and weed killers that are beneficial to lawns may be taken up by tree roots and can harm or kill a tree. Do not use chemicals such as Dicamba near desirable trees known to be sensitive to that chemical. Trees that require acidic soil such as pin oaks may not be compatible with a lawn area. Consider a compatible ground cover treatment such as mulch for the root zone of an acid-loving tree.

Dog urine

Urine is highly acidic. It causes root injury and reduces nutrient uptake. Discourage pet owners from allowing their dogs to repeatedly target trees.

Salt Damage

Salt used on roads and sidewalks for de-icing will cause tree root damage. De-ice sidewalks with sand, ash or calcium chloride instead of sodium chloride or rock salt.

Soil Grade Changes

Adding or removing even a small amount of soil at the surface of the tree's root zone will damage the tree. Excess soil on top of the roots reduces the oxygen available. Since most of a tree's roots are in the top 6 inches, removal of soil also means removal of roots. Avoid grade changes greater than 2 inches. Be aware that the root system may spread far beyond the furthest branches (drip line) of the tree, typically two to three times or more.

Wounds

When a tree is wounded or pruned, do not treat with a wound dressing. The tree is best able to recover from a wound when left to its own protective mechanisms. Carefully remove only damaged and loose bark that might be torn later and may inhibit callus growth.

DIAGNOSING PROBLEMS

Several signs can help pinpoint tree problems while they are still treatable.

Root Flare

Does the tree enter the ground with a natural flare or swelling? No flare may mean soil has been filled around the tree and roots are suffocating. No flare may also mean there is a girdling root restricting food, nutrients, and water.

- Increase property value
- Provide four-season beauty with flowers, leaves, fruit and bark
- Reduce mental fatigue
- Build community values
- Improve life satisfaction

TREES AND CITIZEN RESPONSIBILITIES

Tree ordinances exist to define the authority for the care of public trees. Tree legislation can formalize the relationship between citizens and municipalities to implement tree care in the best interest of the community.

The reasons to enact a tree ordinance are many, including to:

- Ensure appropriate trees are planted in appropriate areas
- Increase safety of the community
- Minimize liability
- Minimize storm damage mitigation and storm cleanup
- Lessen damage to sidewalks, sewers and streets
- Avoid obstruction of motorist views and signage; to ensure continuous and reliable electricity
- Reduce tax burden created from deferred maintenance

Ordinances can include the following provisions:

- Establish a process, possibly permitting, for tree removal, pruning and planting
- Ensure that people who perform work on the trees are well-qualified
- Require developments and parking lots to have trees and landscaping
- Protect trees during development and construction;
- Establish a municipal tree commission

Example ordinances and tree plans from other communities are available from the Delaware Department of Agriculture Urban Forest Coordinator.

Responsibility for care of trees varies. Some ordinances place responsibility for right-of-way trees on property owners (e.g., Wilmington.) Some developments and municipalities in Delaware assume the care responsibilities of the street trees in their community.

Check with your local authority to determine citizen responsibilities in your community. Understand the legal requirements and obtain the necessary permissions before beginning a tree project. Be particularly cautious in cases in which utilities are involved. Law requires that before any digging for planting trees takes place, you call "Miss Utility" (1-800-282-8555) so that underground utilities can be marked.

COMMUNITY INVOLVEMENT



The entire community will benefit from a well-managed community forest. Maintaining a healthy and safe community forest requires the support of informed, involved citizens. Many citizens and leaders do not recognize the importance of trees and are not willing to pay (taxes) for a community tree program. Public involvement in decision-making, educational activities and volunteer projects help people understand the importance of a community's trees. A tree commission is a great way to foster community involvement.

A tree commission can:

- Provide a vehicle for citizen involvement in municipal tree programs
- Control all tree-related matters in a municipality or serve as an advisory body (or something in between)
- Develop a street tree ordinance
- Conduct a tree inventory
- Formulate a community tree plan

Information on community involvement is available from many professional sources of assistance, including Delaware Cooperative Extension, Delaware Center for Horticulture and Delaware Department of Agriculture Urban Forestry Coordinator (a specific list of publications and resources is available).

PLANT SELECTION

DIVERSITY

A wide diversity of trees in an urban forest is essential to give scenic beauty and variety, to provide food and habitat for wildlife, and to protect

about proper tree pruning procedures by contacting the ISA through a local arborist or at their Website: www2.champaign.isa-arbor.com.

Pruning or removing trees, especially large trees, can be dangerous work. Leave this to the professionals who have the proper equipment and safety measures. To ensure that the proper practices are employed, follow only ISA approved procedures and hire only ISA-certified professionals to perform tree work.

COMMON PROBLEMS TO AVOID

Insects and disease-causing pathogens are not usually the primary reasons for trees failing even though they may be the first things that come to mind when you recognize unhealthy trees. Typically, insects and diseases are the secondary agents that attack already weakened, wounded, improperly treated, neglected or generally unhealthy trees. Healthy, vigorous trees have defense mechanisms to combat insect and disease problems. In order to maintain healthy trees in an urban environment, it is necessary to identify and avoid some basic cultural mistakes.

Compaction

When soil is excessively compacted, there is no room for the oxygen necessary for the health of tree roots. Eliminate traffic over the root system of trees.

Excess mulch

A 2- to 3-inch layer of mulch is sufficient. When mulch is piled upon mulch each year, roots grow into the mulch layer. Those roots are susceptible to drought stress and winter injury. Mulch can also become crusted, causing water to run off. Add mulch to maintain a 2- to 3-inch layer only as the old mulch decomposes. Rake the mulch periodically to break up the crust that forms and incorporate it into the soil.

Trunk, Bark, Branch and Root Damage

Any damage to the physical integrity of the tree provides an entry point for insects and disease organisms. Keep lawn mowers and string trimmers away from the base of trees. Do not fasten bicycle lock chains around tree trunks. Never put nails into the tree trunk.

Supports, Wire, Twine and Tree Wrap

Supports, wire and twine left on newly planted trees are common causes of girdling damage. The girdling will gradually cut off the flow of water and nutrients and by the time damage becomes noticeable the tree can be near death. Tree wrap left on too long provides

until after a full season of growth in the new location.

Pruning is the most common tree maintenance procedure, and a few simple principles will help anyone understand how to prune a tree. Proper technique is essential; poor pruning can cause damage that lasts for the life of the tree. Learn where and how to make the cut before picking up the pruning shears. Each cut has the potential to change tree shape, so always have a purpose in mind before making a cut.

Trees do not “heal” the way people do. When a tree is wounded, it must grow over and “compartmentalize” the wound. In effect, the wound is contained within the tree forever. As a rule, small cuts do less damage to the tree than large cuts. This is why proper pruning (training) of young trees is critical. Waiting to prune a tree until it is mature can create the need for large cuts that the tree cannot grow over easily.

Although forest trees grow quite well with only nature’s pruning, landscape trees require a higher level of care to maintain their safety and aesthetics.

- Remove dead or diseased wood anytime
- Correct crossing branches, branches that grow back into the center of the tree or branches that form narrow-angled crotches when a tree is young
- Remove suckers and water sprouts that disrupt the natural shape of the tree
- Prune with sharp tools that are appropriate for the branch size (pruning saw for branches thicker than $\frac{3}{4}$ inch; tree loppers for branches up to $\frac{3}{4}$ inch; pruning shears for branches no thicker than a pencil)
- Use the 3-cut method for any branch you cannot support with your free hand (usually 1 inch and larger diameter). This method prevents bark stripping.
 - 1) Saw a notch on the underside of large limbs several inches away from the trunk
 - 2) Then on the top of the branch, make your next cut just beyond the undercut to remove the bulk of the branch
 - 3) Make the final pruning cut outside the bark-branch intersection or collar
- Do not apply wound dressing or tree paint to the cut surface; it can trap water and start decay.
- Avoid pruning during the spring when trees are leafing out

An arborist is a specialist in the care of individual trees. Many professional arborists belong to and are certified by the International Society of Arboriculture (ISA), which advocates and documents the correct procedures for pruning trees. You can learn more

against exotic pest disasters. To avoid disasters caused by introduced pests such as the Dutch elm disease:

- Never use a single species in mass plantings in a park or neighborhood.
- Never allow one species to dominate a shopping mall or corporate campus.
- Never line a long street on both sides with one species.
- Group species in multiples of 3, 5 or 7. Urban wildlife health and diversity depend on a variety of tree species.
- A good guideline is to plant no more than 20 percent of a single species.

CLIMATE

It is important to select species that will survive in your USDA Cold Hardiness Zone. Southern Delaware is in cold hardiness zone 7, while northern Delaware is right at the border between zones 6 and 7. Deodar cedars grow well in southern Delaware but are considered borderline in the northern part of the state. Cold hardiness is not the only important climatic factor. You must also consider warm hardiness, or the southern-most range of a species. European white birch is a fantastic tree in New England, but is below its southern climatic range in Delaware and suffers many disease and insect problems. Warm hardiness is harder to quantify than cold hardiness because it is a chronic problem, weakening trees rather than killing them immediately during a low-temperature event. Plants that are grown at the southern end of their range become weak and gradually succumb to disease or insect problems.

Native trees have evolved with an adaptation to the climate of Delaware, so they will be both cold- and warm-hardy. However, many non-native trees and shrubs are also well adapted to Delaware’s climate.

- Follow USDA Cold Hardiness Zone guidelines when selecting plants.
- Refer to the recommended plant list in this publication for guidance.

MICROHABITATS

Many microhabitats exist within a climatic region. While the overall temperature range fits the hardiness zone, the microhabitat may provide extra warmth, moisture, wind, salt or a host of additional characteristics. Some microhabitats are by human creation such as buildings, and walls in the form of angles, edges, hot reflective surfaces, cool shadows, and wind tunnel effects. Select trees for their ability to withstand conditions of the individual planting site.

Look for the following possible microhabitat extremes:

- Very wet or very dry conditions
- Unusually high soil temperatures
- Soil compaction and lack of oxygen availability
- Deep or day-long shade from structures or other trees
- Heat reflected from glass, light colored walls, concrete or other structures
- Ocean salt spray or heavy salt from ice and snow treatments
- High winds tunneled between buildings
- Possibility of damage from car doors, bumpers, mowers and string trimmers
- Likelihood of vandalism
- High probability of buried construction materials or other rubble
- Natural gas, water, sewer, or buried electrical and communication lines
- Likelihood of consistently high auto exhaust and smog levels

APPROPRIATE SIZE

Little trees can grow into very big trees. Never plant medium-height (30 to 50 feet tall at maturity) or tall (60 to 100 feet at maturity) trees under power lines. If a tree must be planted near power lines, choose one that grows no higher than 15 to 25 feet.

Smaller transplanted trees establish and resume growing more quickly than larger (and often more expensive) trees. A larger caliper (trunk diameter) tree (such as 3- to 4-inch caliper) takes several years to recover from transplant shock. A 1½ - to 2-inch caliper tree establishes and grows more quickly and often catches up to the 4-inch caliper tree before the larger tree recovers from shock.

DESIGN

Before selecting a tree, consider the function you wish the tree to provide. Will it be viewed as a single specimen, or is it part of a cluster of trees and plants that create a grove or mass? How is the site used? Do people want shade, a screen from traffic or the enclosure provided by a canopy of trees? Should the tree be green all year (evergreen), or should it allow sun to warm the area in the winter (deciduous)? What special features, such as bright fall color, winter bark interest, colorful fruit or showy flowers, are desired?

If the effect of an individual species is desired, allow the following distances between trees so each tree has room to develop as it matures:

of potassium.

A mature tree growing in a lawn that is fertilized regularly does not need extra fertilizer. Trees confined to small planting areas usually have a greater need for fertilizer.

To speed young tree growth the second year;

- Take a soil test to determine fertilizer needs during the second year after planting and fertilize young trees to promote growth. Recommendations are attached to soil test results from the University of Delaware Soils Testing Laboratory provide information on proper tree fertilization.
- Spread 2 cups of 10-8-6 around the base.

MULCHING

Mulching helps reduce weeds, moderates soil temperatures, and is a visual reminder to keep mowers and string trimmers away from tree trunks. Many materials make good mulches, including shredded bark and bark chunks, composted sewage sludge, one-year-old wood chips, pine needles, and composted, shredded leaves.



- Don't use plastic sheets under the mulch because they interfere with the passage of air and water as well as inhibit root growth.
- Apply 2 to 3 inches of mulch around, but not touching, the tree trunk.
- Never pile up a cone of mulch around the trunk! Rodents and insects will over-winter in mulch and feed on the trunk. Cone-shaped mulch piles and thick layers of mulch also can keep water from reaching tree roots.
- Do not build up layers of mulch by adding a new layer each year. Each spring, rake to remove any hard crust and add only enough new mulch to maintain a 2- to 3-inch layer.
- Maintain a 2- to 3-inch mulch layer around, but not touching the base of the tree.

PRUNING TREES

Prune sparingly immediately after planting, removing only branches damaged during the transplanting process. Wait to begin necessary corrective pruning