

URBAN FORESTRY

A Manual for the State Forestry Agencies in the Southern Region



Unit: Tree Planting

The Urban Forestry Manual is being developed by the USDA Forest Service, Southern Region and Southern Research Station, and the Southern Group of State Foresters as an educational tool for State forestry agency employees and others who work with communities on urban forestry. It can be used for self-guided learning, finding specific information on a topic and developing workshops and presentations. There are 16 units (chapters) in the Manual - at this time 9 units are on the web site (www.urbanforestrysouth.usda.gov). The other units will be added as they become available.

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Using this Manual

The Urban Forestry Manual provides the scientific, technical, and practical information needed to work with communities on urban forestry. There are 16 units (listed below) that address specific topics in the practice of urban forestry. These units have been developed as a series, each building upon the information in previous ones. The units may also be used individually to gain information about a specific topic.

Benefits and Costs of the Urban Forest is the first unit in the Urban Forestry Manual. This is an introduction to urban forestry and it explains why your work with communities and individuals in urban forestry is important. This unit also includes information about how to maximize the benefits and minimize the costs related to the urban forest.

The Role of the State Forestry Agency in Urban Forestry is an introduction to State forestry agencies' responsibilities and activities in urban forestry. It explains why partnerships are important to State forestry agencies activities in urban forestry. This unit also discusses the importance of working with communities and individuals.

Tree Biology is an introduction to how trees grow and live. It describes how trees are structured, how they function, and how they grow and develop. It also explains how the urban environment influences tree growth and development.

Dendrology is an introduction to identifying and understanding trees in the urban environment. It explains the classification of trees, naming trees and tree identification. This unit also includes information on how characteristics of the urban environment influence tree identification.

Urban Soils is an introduction to the role that soils play in the health of the urban forest. It explains what soil characteristics are important for healthy tree growth. This unit also includes information about common soil problems in urban areas.

Site and Tree Selection provides information on how to select a site and species to maximize the benefits and minimize the costs related to urban forestry. It explains what factors you need to consider when selecting a planting site, tree species, and tree stock. This unit also discusses how to match these factors to ensure healthy tree growth and development.

Tree Planting is a unit that will introduces factors to consider and techniques to implement when planting trees. It includes recommended guidelines for planting and post-planting. It also explains how to work with communities and individuals to successfully plant trees.

Tree Maintenance is an introduction to the importance of providing regular maintenance to the urban forest. The basic steps to preventative maintenance are discussed, such as fertilization, mulching, pruning and tree protection.

Tree Diagnosis and Treatment provides an introduction on how to diagnosis and treat tree health problems. This unit explains how your knowledge and application of diagnosis and treatment can improve the health of the urban forest. It also includes information on why it is important to prevent tree health problems.

Trees and Construction is an introduction to the relationship between construction activities and trees. It explains the importance of communication during the construction process. The focus is on the impact of construction activities on trees, the protection of trees during construction, and care for the tree before and after construction.

Hazard Trees is an introduction to the importance of recognizing a hazard tree. It gives a general overview on evaluating a target, site conditions and the tree. This unit also includes information on how to prevent and manage hazard trees.

Urban Wildlife is an introduction to the relationship between wildlife and the urban environment. It first defines urban wildlife and describes the needs of wildlife, such as food, water, cover and living space. Then it discusses wildlife habitat in urban areas and how wildlife adapts to urban habitat. It also includes information on how to encourage and discourage wildlife.

Urban Ecosystems is an introduction to the role that trees play within an urban ecosystem. It first defines an ecosystem and why it is important to understand ecosystems. Then it discusses ecological concepts, such as structure and function, that are important to understanding ecosystems. This unit also includes information on understanding challenges in the urban forest ecosystem.

Urban Forestry Planning and Management is an introduction to the importance of planning and managing the urban forest. It starts with a definition of an urban forest management plan and why they are important. Then it discusses the steps involved in developing a management plan. It also includes information on the different components in a management plan.

Urban Forestry and Public Policy is an introduction to understanding public policy and how it relates to urban forestry. It first describes the role that each level of government has in setting public policy related to urban forestry. Next it provides information on local government in more detail because this is where most urban forestry policy is created and implemented. The role that Tree Boards have with local government is also discussed. The final section reviews public policy tools that can be used to address urban forestry issues in a community.

Working with the Public is an introduction on how to effectively work with the public. It starts with tips on how to work together as a team and how to work with volunteers. Then it discusses the role of communication and education in working with the public. The unit also includes information on the importance of leadership in urban forestry.

Using Each Unit

Each unit in the Urban Forestry Manual is organized as follows:

Table of Contents

Lists major topics that are included in the unit.

Unit Overview

Presents goals and objectives for the unit.

Before You Begin

Consider how your current activities and experiences relate to this topic.

Content

Presents specific material about this subject under several headings.

Next?

Think about how you can use the information in your daily responsibilities and in developing your career in forestry.

For More Information

Lists other sources of information about this subject, as well as the literature cited in the unit.

Appendix

Some units have an appendix that may include checklists or other information.

In addition, each unit has two sections that will help you assess your learning of the information.

Checking Your Understanding

At the end of major sections in the unit, there are short-answer questions about the information you have read. After you have written the answers, you may compare your responses to the answers provided at the end of each unit.

Case Study

These are stories based on the real experiences. The questions at the end of the case study challenge you to use the information you learned to solve a problem similar to what you will be facing when working. You will be asked to analyze an actual urban forestry problem and prepare your solutions. There are no right or wrong answers -- only what you decide is the best course of action after considering all of the information.

Tree Planting

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Overview

This unit provides guidelines for planting a tree and caring for it afterwards. The first section emphasizes factors that need to be considered before planting. The next section includes information about planting season, commonly used planting tools, preparation of the planting site, and care of the tree stock. The last section covers various ways to help a tree survive the first few years after planting. This information will be useful for helping individuals and groups successfully plant trees.

It's the Whole Hole

That Sinking Feeling

The call was from a homeowner who said his maple tree was sinking. He was sure a hole was going to open up and swallow the tree. Sam asked the usual questions about the site and decided an inspection of the tree was in order.

The subdivision was an upscale, planned community about 10 years old. Mr. Parker said he had planted the silver maple in his backyard "the day we moved in." The trunk was about 7 inches in diameter and, as expected, it had a thick fan of surface roots showing through the grass. Sam also expected to find a cavity in the trunk or some damage at the base of the trunk that would explain why the tree seemed to be sinking. Instead, he found Mr. Parker was right. It did look as if a hole was getting ready to swallow his tree! However, the hole wasn't the work of any mysterious gremlins. Sam found the tree had been planted on top of the construction bury pit. The debris buried there had decayed, collapsed, and left the tree without any base support. He estimated the hole was at least 4 feet deep. The thick root mat, common to silver maple, had helped keep the tree standing upright under some very poor planting conditions. But now the "soil" the tree had been planted over was gone, so Sam recommended the tree be removed. He also suggested that Mr. Parker may want to contact an engineer to determine the extent of the bury pit before planting another tree.

"If you create a root zone environment in which the roots can thrive the top of the tree will take care of itself. "
Unknown Author

Before You Begin

Knowing proper methods for planting trees is essential to developing and managing the urban forest. Use these questions to think about how this information relates to the urban forestry work in your community.

- What are some of the recent plantings that have been done in your area? Do you know of planting locations, such as the median in a street or the swampy area of a homeowner's backyard, that caused problems?

- What are the most common reasons a tree does not survive in your area after being planted?

- What methods are often used in your community to help a tree survive after planting?

On a separate piece of paper describe the urban forestry work you currently know about and how this work is a part of your job.

Planting for Healthy Trees

Proper planting techniques help to increase the benefits a community receives from the urban forest. Using correct planting methods can improve tree health, increase life expectancy of the tree, reduce need for corrective tree maintenance, and increase the tree's ability to become established more quickly and with less stress. However, these benefits also depend upon several other factors that are emphasized in the [Site and Tree Selection](#) unit.

Site conditions

Before planting, find out the conditions at the site, such as soil characteristics, light conditions, and location of overhead cables.

Different types of tree planting sites

Planting in unique sites, such as containers, street lawns, or tree pits, may require special attention to provide adequate soil volume, prevent pavement from expanding or buckling, and avoid drainage problems.

Species selection

It is important to know if the species is tolerant to the conditions at the site. You must also determine if the site needs special treatment to accommodate the species selected.

Different types of tree stock

Types of tree stock, such as bare root and container, have advantages and disadvantages related to establishment. How does the type of tree stock impact how the tree is planted and the maintenance required? Does the tree meet the American Standard for Nursery Stock?

Transplant shock

Transplant shock refers to the stress caused by root loss when trees were dug up at the nursery. The small root system that remains cannot absorb and transport all the nutrients and water needed by the tree, which results in slow growth and vulnerability to insects, disease, and other problems. The degree of transplant shock depends on such factors as tree species, size of tree, quality of nursery stock, amount of root loss, and soil conditions. Proper site and tree selection and planting techniques can minimize transplant shock.



By checking the site conditions before planting you may be able to avoid costly delays.

Opportunities for Providing Assistance

Tree planting is a common activity in urban areas. Planting is done in many locations - yards, parks, street medians, and in commercial sites - by individuals, business people, and organizations for various reasons. As an employee of the forestry agency, you may often be asked to decide when, where, and how to plant these trees. Your knowledge of proper planting techniques and post-planting care can help trees survive. There are different ways the State forestry agency can provide assistance related to tree planting (table 1).

Table 1. Examples of tree planting assistance and potential recipients.

Technical/Educational Assistance	Planning Assistance	Community Assistance
<ul style="list-style-type: none"> • Proper site preparation • Selecting quality tree stock • Checking soil conditions • Minimizing transplant shock • Post-planting care and maintenance • Tree diagnosis 	<ul style="list-style-type: none"> • Establishing planting guidelines for public spaces • Community planting and maintenance program • Survey of urban forest for planting and replacement needs 	<ul style="list-style-type: none"> • Homeowners • Local governments • Developers and home builders • Businesses • Landscape architects • Non-profit associations • Neighborhood associations

Planting Guidelines

Certain steps should be followed when planting to help insure the successful establishment of the tree. The goal is to provide an environment that encourages root growth.

- Choose a planting season
- Select tools and equipment
- Prepare the site
- Prepare the tree stock
- Plant the tree

Choose a Planting Season

Fall or spring is the best time to plant trees because temperatures are moderate and water can be provided to support healthy root growth. Fall planting is usually recommended because it allows time for root growth before hot weather in the summer. In some areas of the south, winter planting is also an option. Weather conditions to avoid include extreme heat and cold, low wind-chill temperatures, and high winds that may cause drought conditions.



It is best to plant deciduous trees when they are dormant, before leaves appear in the spring or after leaves drop off in the fall.

Select Tools and Equipment

The proper tools for preparing the planting area depend on the size of the tree, the type of root system, the site, and the condition of the soil. The most common hand tool for planting trees is the shovel, but other tools may be needed and used. The following tools are often used on urban planting sites:

Shovel and sharpshooter

A round-point shovel is good for digging a hole and a flat shovel is good for shoveling dirt back into the hole. A sharpshooter, similar to an elongated, round-point spade, is recommended for removing trees from the ground and for root pruning. These tools work best when the blade is sharp. A dull blade breaks and bruises roots instead of cutting them.

Dibble

This durable instrument with a heavy steel blade and tubular steel handle will make a hole in almost anything. It is primarily used to plant seedlings, but is sometimes used as a prying tool.

Hoedad, maddock, or pick

A hoedad, maddock, or pick can be used to break up hard or compacted soil so it is easier to shovel.

Rototiller

A rototiller can loosen the soil, particularly if it is compacted. However, care must be taken not to injure roots of any existing trees.

Tree spades, backhoes, and other mechanical equipment

For large trees, tree spades, backhoes, and other similar types of excavation equipment are sometimes used. When using mechanical excavators, it is important not to dig too deep. Power augers are sometimes used to penetrate hardpans. These machines do create glazed, smooth sides in the planting area so it is necessary to roughen the sides to increase root penetration and drainage.



Preparing the planting site.

Prepare the Site

Proper preparation of the planting site is critical to good root development. In urban areas, site preparation may require special planning because of the type of planting site, such as street or parking lot plantings. Also, when preparing the site, you may find surprises when digging, such as construction bury pits or asphalt. These surprises can increase the time and resources needed for planting. Three steps for preparing the site are:

- Determine size of planting area
- Remove competing vegetation
- Prepare the soil

Determine size of planting area

Because most root growth occurs in the upper 12 inches of soil, the planting area needs to be shallow and wide to accommodate the development of the fibrous roots (figure 1).

Three measurements to consider when determining the size of the planting area are:

- **Width**
The planting area should be 3 to 5 times as wide as the rootball.
- **Depth**
The planting area should be as deep as the root ball or slightly less. Planting a tree too deep is a common mistake that limits the soil oxygen available for root respiration, which can cause several problems including death of the tree.
- **Volume**
There needs to be enough loosened soil in the planting area for adequate root growth. Often, the planting area is too small and there is not enough space to provide the needed loose soil. The soil volume needed for healthy root growth and support of a tree depends on tree species, size at maturity, expected lifespan, and environmental stress factors.

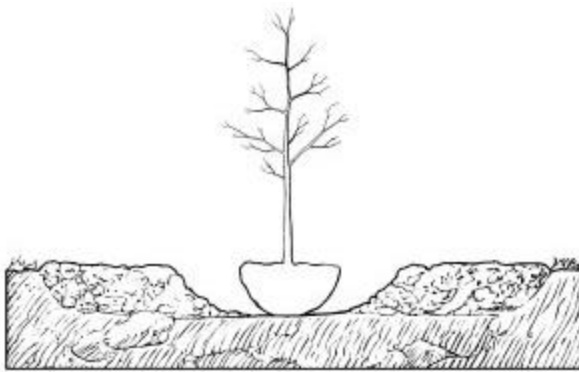


Figure 1. The planting area needs to be 3 to 5 times the size of the rootball to promote healthy tree growth.

Remove competing vegetation

Many planting sites have weeds, grass, liriopé, and other competing vegetation that should be removed. There are several ways to eliminate competing vegetation. The best method depends on the location and requirements of the site and the resources available.

- **Herbicides**
Herbicides kill grass and weeds about 10 days after application. It is important to apply herbicides according to the manufacturer's directions. In some situations a license is required to apply certain types of herbicide.
- **Multiple tilling**
Multiple tilling can help control weeds and vegetation. One option is to till once or twice during the summer and fall and once again before planting. If heavy equipment is used, steps need to be taken to prevent soil compaction, especially if the soil is wet. The critical root zones of nearby trees also need to be protected by not tilling too deep and too near.
- **Plastic sheeting**
A sheet of dark plastic staked over the planting area for 2 to 3 weeks in the

summer kills the grass and weeds. The plastic needs to be opaque so light cannot penetrate it. Remove the sheet before planting the tree.

- Hand weeding
Hand weeding is labor and time intensive, making it practical only for small planting areas.
- Stripping the sod
Sometimes it is necessary to remove sod from the planting site. Some topsoil will be removed in doing this, so it may be necessary to bring in additional topsoil or compost.

Prepare the soil

The soil conditions at the planting site greatly influence a tree's ability to survive the planting process and its mature health and form. Problems with soil condition should have been identified during site selection and corrected before planting. However, this is not always possible. Refer to the [Site and Tree Selection](#) and [Urban Soils](#) units for specific information on identifying and correcting soil problems before planting.

The soil in the planting area needs to be thoroughly loosened to encourage root growth. However, to reduce the settling of the soil after planting, do not disturb the bottom of the planting area. If this soil is disturbed, it should be pressed down to decrease settling. Roughen the sides of the planting area to help the roots penetrate glazed soil surfaces.



Do not plant the tree too deep.

When preparing the soil, several factors should be considered:

- Soil moisture
Good planting conditions require the soil to be moist. If the soil is too wet or too dry, avoid planting.
- Soil texture
Digging in clay soil may be more difficult and require more time for planting.
- Soil compaction
If the soil is hard to penetrate, a rototiller, hoedad, maddock, or pick can be used to loosen the soil.
- Soil temperature
The soil needs to be warm enough, usually above 40 degrees, for root growth. Avoid planting if the soil is frozen.
- Soil interfaces
Watch for rocks and construction debris when loosening the soil with tools and mechanical equipment.
- Soil amendments
Do not add organic matter, fertilizer, or other soil amendments. Also, do not place gravel in the bottom of the planting area. These amendments can cause problems with soil moisture and root growth.



Call local utilities for location of underground cables and pipes before you start digging.

Prepare the Tree Stock

The importance selecting of healthy tree stock is discussed in the [Site and Tree Selection](#) unit. Once the trees have been delivered to the site, keep them watered and protected from extreme weather conditions. The stock may need time to adapt if the conditions at the site are much different from the previous growing conditions (Harris 1992). These are steps to take to maintain the health of the tree stock:

Inspection

The tree should have been inspected at the nursery to insure it meets the minimum standards for the [American Standard for Nursery Stock](#). It should be inspected again at the site for damage from handling, transportation, or storage, with particular attention to the roots.

Handling

A tree should be picked up from the bottom of the container, root ball, or root-ball cage. Never lift a tree by the trunk. This causes the trunk of the tree to pull away from the roots. Dropping the tree may also damage the roots. Carefully transport the tree from the nursery to avoid damage to the branches, leaves, needles, bark, and roots.

Storage

Trees for transplanting usually should not be stored, particularly during the summer or winter, because the roots can dry out and die. Keep the roots moist, but not soaked. If trees, particularly bare-root trees, must be stored, "heel them in" by temporarily planting them and covering the roots with moist compost or sawdust. If they cannot be "heeled in", they should be kept in a cool place, away from asphalt or concrete. If trees are warmed up too quickly, they will break dormancy before planting.



Avoid exposing the trees to extreme temperatures, wind, or other harmful climatic conditions.

Removal of containers, wrapping and wrapping cords

The containers and wrappings should always be removed from the rootball just before planting to prevent soil from drying out (figure 2). Do not disturb the root ball or injure the roots when the container or wrapping is removed. Any dead, diseased, broken, twisted, or girdling roots should be cut with a sharp knife. Circling roots need to be cut in a few places to help keep them from becoming girdling roots. If there are matted roots, make two or three vertical slices into the rootball with a sharp knife, or loosen the roots carefully with your hands.

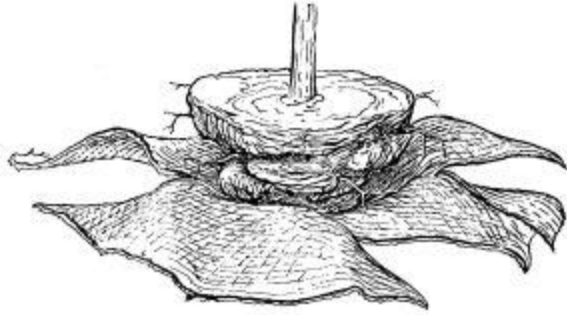


Figure 2. Wrappings need to be removed from ball and burlap trees.

Trees may be wrapped in a variety of materials. It is important to handle each of them properly so the health of the tree is not affected.

- Natural fabric wrapping
Although natural-fiber burlap will eventually decompose in the soil, it should still be removed if it is possible to do so without damaging the rootball. If removing it appears risky, then try to cut back the top half of the rootball to encourage infiltration of water to the plant's roots.
- Synthetic fabric or plastic-coated burlap
This fabric will not decompose naturally and therefore it must be removed to allow proper root growth and to avoid girdling roots. Shiny fibers indicate synthetic burlap.
- Wire baskets
Wire baskets are sometimes used to hold the soil in place around the roots in larger trees. It may be detrimental to remove the basket from large rootballs before planting. In these cases, cut away as much wire as possible, at least the top 2/3 of the root ball, and bend back to the bottom of the planting area. This will help avoid growth and maintenance problems.
- Wrapping cords
Remove all wrapping cords, especially nylon string or rope.

Tags and Labels

All tags and labels need to be removed from the tree to prevent girdling of branches and trunk.

Plant the Tree

Carefully place the bare roots or root ball in the planting area. In most cases, the root crown, where the roots end and the trunk begins, needs to be at ground level. Straighten the roots of bare-root trees to prevent circling, girdling, or crossing roots.

It is usually best to backfill with the same soil that came out of the planting area. When refilling, use your hands, shovel handle, or stick to press the soil around the roots to eliminate air pockets that can cause the roots to dry out. Avoid packing the soil too hard since this can reduce soil pores and cause compaction. Be careful not to place soil over the root crown. While backfilling, apply water to settle the soil. Make sure the tree is straight.



Do not plant a \$100 tree in a \$10 hole.



Having a tree planting ceremony is a good way to promote special programs in the community.

Checking Your Understanding of Planting Guidelines

On a separate sheet of paper, answer these questions about the important points you need to remember:

1. Why is it important to know and be able to use proper planting techniques?
2. What are the guidelines to follow when planting a tree?
3. What should be your primary concern in preparing a site for planting a tree?

Answers are at the end of the unit.

Post-Planting Guidelines

The care a tree receives after planting is critical to its survival in an urban environment. Maintaining the proper soil moisture is the key factor in helping a tree become established. Here are some basic factors to consider in caring for a tree after planting:

- Water
- Mulch
- Pruning
- Fertilizing
- Staking
- Protection
- Regular monitoring and maintenance

Watering

The entire planting area needs to be watered within 2 hours of planting. Watering will help settle the soil and assure adequate soil moisture for root development. The amount and frequency of watering needed after planting depend on weather conditions (rainfall and temperature) and the time of year. The soil texture, type of tree stock planted, and size of the rootball also affect the amount of soil moisture needed by a newly planted tree. After the initial watering, it is also just as important to avoid over-watering the tree. Soil moisture needs to be monitored for the first few years until the tree becomes established.

A temporary berm may be constructed around the planting area to hold water in place during the first few years. This may be useful in open sites that require hand watering or in climates where rainfall is inadequate. However, if the site has poor drainage, do not build a berm. After the tree is established, the berm should be removed to promote watering and root development beyond the original planting area.



Do not let roots dry out!

Mulching

Applying 2 to 4 inches of mulch greatly benefits a newly planted tree by reducing turfgrass competition, reducing evaporation, and regulating soil temperature. However, the mulch should be kept away from the bark of the tree to prevent insect and disease problems. In some cases, using geotextile material instead of mulch works well for seedlings. Refer to the *Tree Maintenance* unit for more information on mulching, such as benefits, precautions, applications, and types.

Pruning

Pruning a newly planted tree, if done at all, should be limited to broken or damaged branches. However, sometimes pruning is required at certain locations, such as near a highway to allow for vehicle clearance. Pruning to shape or "train" new trees should be done after they become established, which generally takes at least one growing season.

Fertilizing

Trees should not be fertilized when they are planted because fertilization can cause new crown growth. There may not be enough roots to support the demand for water and nutrients for the new crown growth. Fertilizer can also "burn" the roots. Fertilizers may be used in site preparation, but only if the soil is in extremely poor condition.

Staking

In most cases, trees do not need to be staked because a well-planted tree with an adequate rootball can stand on its own without support. However, some conditions may warrant staking.

- Windy conditions
If a tree is unstable in strong winds, staking can help protect it from blowing over. Also, if there are frequent high winds at a site, such as mountain ridges or ocean shores, staking may be needed.
- Sandy soil
In sandy soil, trees tend to blow over and staking can prevent this.
- Small root ball
Bare-root trees and those in grow bags sometimes require staking because they do not have large enough root balls to support the trunk.
- Leaning tree
Staking can prevent some trees from falling over.
- Protection
There may be situations where stakes can protect the tree from being damaged by lawnmowers, vandals, or traffic.

Disadvantages of staking

While staking can keep a tree standing, it can also cause damage.

- Weaker structure
By protecting trees from the normal range of motion resulting from wind, trunk cells develop abnormally, weakening trunk structure. Staking limits the uniform development of reaction wood, making these trees more prone to blowing over as they age.
- Bark and trunk damage
Staking wires can damage and wound the bark of trees.

Staking instructions

If staking is needed, here are some recommendations to help the tree survive (figure 3):

- **Stakes**
Two stakes, one of either side of the tree, are usually adequate. Three stakes may be used on trees with trunks larger than 3 inches in diameter. Avoid using only one tall upright stake against the tree trunk because it can damage the bark and rootball of the tree. Stakes should not be set into the rootball.
- **Ties**
Wires can harm the tree bark and trunk. Plastic webbing, polyethylene tape, inner tube, elastic cord, or other soft, flexible material make good ties. Protect the trunk with soft material, such as rubber tubing, lawn chair webbing, or soft permeable cloth. Using elastic cords as ties allows for more movement of the tree.
- **Attachment**
The ties should be attached to the tree with a small amount of slack. This allows the tree to move in the wind and develop reaction wood for support in the trunk. A staking system that allows at least some movement results in a stronger trunk. The ties should be attached at the lowest position on the trunk that will hold the tree erect (Ingram, Black and Gilman 1991).



For more information on different staking techniques refer to the publication, ["Trees for Urban and Suburban Landscapes."](#)

- **Removal**
Ties should be checked regularly to make sure they are not damaging to tree. Stakes and webbing need to be removed when the tree can stand by itself, usually after one growing season or less. Keeping the tree staked longer than one year may result in the bark eventually growing around the ties and girdling the trunk. Longer periods of staking also reduce the chance the tree will be able to stand alone.



Figure 3. One example of how to properly stake a tree.

Protection

Sometimes trees need protection after they have just been planted.

Tree shelters

A tree shelter protects a young tree or seedling from animal, vehicle, lawnmower, and string trimmer damage. It is a light-colored, translucent plastic tube that fits around the trunk of the tree below the lowest permanent branch. Tree shelters are like mini-greenhouses and can protect the trunks from cold, windy weather.

Tree wraps and guards

Wrapping a tree's trunk with paper, burlap, or plastic is usually unnecessary and can actually harm the bark by increasing insect, disease, and water damage. Some young trees, especially those with thin bark, such as red maple, may need to be wrapped to protect them from sun scald. Sun scald (actually a freezing injury) occurs in winter when the temperature of a tree trunk increases during the day and then drops quickly at night. Such sudden drop in temperature can injure or kill the bark and cambium (Harris 1992). If a wrap is used, it needs to be removed during the first growing season to reduce the possibilities of insect and disease problems.



Refer to the publication, ["Use and Misuse of Tree Trunk Protective Wraps, Paint, and Guards,"](#) listed at the end of the unit for more information on tree wraps and guards.

Protective grates

At some locations, especially those near sidewalks and roads, grates are used to protect the soil from being compacted. They are usually 3 to 5 feet in diameter and are placed at the same level as the pavement. If the soil level is well below the cover, the soil may be

covered with gravel to decrease erosion from watering. Some communities require protective covers for safety reasons.

Staking

Staking, as stated earlier, is another way to protect the tree from damage by lawn mowers and string trimmers. However, remember to monitor and remove the stakes within one year after planting.

Regular Monitoring and Maintenance

Recently planted trees may suffer a great deal of stress. Trees need to be monitored regularly during the first 2 years, especially the soil moisture. Proper mulching helps maintain the necessary soil moisture. Tree shelters, wrapping, and staking need to be checked and removed as soon as possible, usually within the first year. Berms used for watering also need to be removed. Regular maintenance after planting will help ensure the healthy growth of the urban forest

Checking Your Understanding of Post-Planting Guidelines

On a separate sheet of paper, answer these questions about the important points you need to remember:

1. What is the most important maintenance requirement of a tree after planting?
2. List three reasons a tree may need to be staked. When a tree is staked, what precautions should be taken to prevent damage to the tree?
3. What are some of the reasons a newly planted tree may need to be protected in an urban environment? List two ways that you can do this.

Answers are at the end of the unit.

Case Study

Down Below

The zelkovas were here and ready to be planted in a grass median down a 2-mile stretch of a 4-lane highway. This was an important project for the local Tree Board because the highway was one of the gateway corridors into the community. They scheduled the planting for a weekend when traffic would be light, and asked Lawrence, a forester with the State forestry agency, to help with the planting.

The balled and burlapped zelkova trees were brought to the site early Saturday morning. The 3-inch caliper trees were so heavy they had to be rolled from the truck to the planting area and the wire baskets removed. The Tree Board members had their shovels and began planting the first trees about 40 feet apart. The first five trees went in without any problems -- everything was great. The planters even had a water truck there to water the trees.

But then, trouble. Denise was starting to dig the planting area for the 6th tree when her shovel hit asphalt. She tried another spot a few feet farther down the median -- asphalt again! Someone else went even farther down the median and also found asphalt.

The members of the Tree Board were devastated. Everything had been arranged for that day. The trees were expensive and had already been paid for. They had to decide quickly what to do and they asked Lawrence for help.

You and the Tree Board and the Zelkovas

Put yourself in Lawrence's position. What would you suggest they do? On a separate page, answer these challenge questions, explaining the recommendations you would make for solving this planting problem.

- There are volunteers, lots of tree stock, and equipment standing in the median on this busy highway on a Saturday morning. What are some of the things you need to decide first?
- The major question is what to do with the trees -- where and how should they be planted? What options do they have?
- What are some of the planning considerations in making this decision? Community issues? Planting issues? Volunteer issues?
- What about the trees while these decisions are made?
- The trees will need to be planted somewhere. What about after they are planted?

After you have answered the challenge questions, read the rest of the story to compare your solutions with what really happened.

The Rest of the Story

Asphalt Begone

They really didn't have any choice but to postpone the planting. Tree Board members apologized to the volunteers and sent them home for Saturday morning. After the volunteers left, there was a hasty meeting to decide what to do. Board members realized they had only two options -- try to find a way to plant the trees here or find another location. Since the median was located in one of major gateways to the city, they agreed this was where they wanted to plant the trees, if at all possible.

Lawrence thought it was possible and recommended they get a backhoe to dig out the asphalt under the median. He thought they would probably need dump trucks to take the asphalt to the landfill and topsoil backfilling the planting areas. He also suggested the Tree Board check into procedures for using a backhoe on a major highway because they might have to block traffic while using it. It might also be useful to check with the State highway department to find out the extent of the asphalt in this section of the median. They agreed to go ahead with arranging for the planting, even though it was going to be more expensive. While these arrangements were being made, they stored the zelkovas in an area protected from the weather and kept the roots moist.

The next weekend everything went just as planned. The volunteers and the water truck were back. A local construction company donated the use of the backhoe and dump truck. The City's Landscaping Division donated topsoil and mulch. After the trees were planted, Lawrence recommended the lower branches be pruned for truck clearance. The Tree Board had already arranged for one of their members to monitor the trees for the next few years.

Digging In

- Did you also decide to plant the zelkovas in the median? Why or why not?
- Were your planting suggestions (using the backhoe, bringing in topsoil, etc.) similar to the ones Lawrence made? If you made different suggestions, how might these have changed the plans for planting?
- Were your recommendations for caring for the zelkovas the same as Lawrence's? Before planting? For maintenance after planting?
- Considering this experience, what suggestions would you make to the Tree Board when planning future tree plantings?

Next?

This unit on *Tree Planting* has provided basic information about preparing the site, planting the tree, and post-planting care of the tree. The questions here will help you think about how this knowledge can be used in your work and will help you develop an action plan for applying it to planting practices in your area.

- What are some of the situations in your work where this information about planting will be most helpful?

- How can this information about planting trees be used to help develop and maintain the urban forest in your community?

- How can you use your knowledge of proper planting guidelines when working with community groups or organizations?

- What other resources are available for you to use when you have questions about planting in your specific area?

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Checking Your Answers

Checking your Answers about Planting Guidelines

1. Why is it important to know and be able to use proper planting techniques?

Trees in an urban environment face many environmental conditions that make survival difficult. Using proper planting techniques helps maintain the urban forest in several ways:

- Helps the tree become established more quickly and with less stress.
- Improves the health of the tree and increases its life expectancy.
- Reduces the need for corrective maintenance as it grows.
- Increases the benefits and reduces the cost of managing the urban forest.

2. What are the guidelines to follow when planting a tree?

A tree's survival and establishment are greatly increased when these guidelines are considered when planting:

- Select a season or time of year for planting that will ensure adequate moisture for root development and avoid extremes in temperature and other conditions.
- Select the proper tools and equipment for planting the tree.
- Prepare the site properly to improve growing conditions.
- Handle the tree stock carefully before and during the planting.
- Use recommended planting methods.

3. What should be your primary concern in preparing a site for planting a tree?

Identifying and alleviating soil problems at the planting site is the primary concern in site preparation for tree planting. Soil conditions greatly impact a tree's ability to survive the planting process and problems should be corrected or minimized during site preparation. Soil testing can help identify problems and determine steps to solve them. At the time of planting, it is also important to loosen the soil to the depth of the rootball and to dig the area wide enough to provide space for adequate root growth.

Checking Your Answers About Post-Planting Guidelines

1. What is the most important maintenance requirement of a tree after planting?

Water is the primary requirement for a tree after planting and is the key to its survival. Many of the tree's roots may be lost during the transplanting process and new ones must be grown in order to absorb water and nutrients necessary for growth. An adequate amount of soil moisture, appropriate to the on site and weather conditions, is necessary for the tree to reestablish its root system. However, too much water can cause the tree to become stressed and die. Watering immediately after planting will help settle the soil around the rootball and relieve problems caused by water stress and transplant shock. Periodic watering should continue until the tree becomes established.

2. List three reasons a tree may need to be staked. When a tree is staked, what precautions should be taken to prevent damage to the tree?

These are some of the conditions that may require a newly planted tree to be staked:

- Windy conditions that can blow the tree down before the root system is established
- Sandy soil that will not hold the rootball in place until additional roots are established
- Small rootball that will not support the trunk
- Tree is leaning
- Nearby activity of people and machines. (However, other means of protection should be considered before staking a tree.)

Here are some precautions that need to be taken to prevent damage or injury to a tree that has been staked:

- Do not drive stakes into the rootball.
- Use a soft, flexible material for ties that will not damage the bark; wire should not be used. A soft, flexible material should also be used under the ties as additional protection for the trunk. Ties need to be attached so that some movement in wind is possible. They also need to be attached no higher than half way up the tree.
- Check ties periodically to make sure the bark is not growing around them.
- Remove ties and stakes as soon as the tree can stand alone so the tree can naturally develop the reaction wood that helps to support it.

3. What are some of the reasons a newly planted tree may need to be protected in an urban environment? List two ways that you can do this.

In an urban environment, trees are exposed to many different environmental conditions that may reduce the survival rate after planting. Some of these problems include damage to the tree tissue from people, animals, and machines, such as lawn mowers and trimmers, and damage to soil from compaction and drainage problems. Problems may

also occur because the tree is not planted in its natural habitat, such as being planted alone rather than in a stand. This may require staking or protection of the trunk from sun scald.

- Several types of protection can be used for urban trees:
- Tree shelters protect the trunk from tissue damage.
- Staking may be necessary to support the tree until the root system is reestablished.
- Tree wraps protect tissue from sun scald.
- Grating may be used around the tree to protect the soil.