

Helping Trees Recover From Stress

INTRODUCTION

Trees are the dominant component in the natural and managed landscape in New England. For the most part, trees in forests thrive and, typically, live more than one hundred years. On the other hand, trees planted in cities and towns, and along roadways, often survive no more than a few decades, if that long. These trees are subjected to a variety of factors that reduce vigor and may eventually lead to decline and death. Almost all of these factors are the result of human activity. It is the purpose of this publication to introduce the reader to the stresses imposed on trees growing in communities and around homes, describe the common symptoms of stress, and suggest ways to prevent or reduce the impact of these stresses on trees.

CAUSES OF STRESS: AN OVERVIEW

Most people believe that insects and diseases are the primary cause for decline and death of trees in the landscape. In fact, it is human activity which causes most of the problems that trees experience. Even many pest and disease problems can be related directly or indirectly to the prior stresses imposed upon trees by human activity.

These activities may include improper planting and pruning of trees, as well as poor care. Applying too much or too little water, especially after planting, may injure roots and cause stress. Over application of fertilizer can also lead to root injury or rapid but weak growth that makes the tree prone to certain insect pests and plant diseases. Mechanical injuries from lawn mowers and weed trimmers can damage tree bark and create the opportunity for invasion by certain disease organisms. Excessive foot or vehicular traffic around trees can destroy the structure of soil leading to compaction of that soil. Compaction reduces the level of oxygen in soil, slows the penetration of water, and hinders the development of roots.

Other consequences of human activity, especially air pollution and road salt applications, are a little more difficult to assess and to prevent. For people living in areas prone to frequent air pollution events, the best remedy, as far as tree health is concerned, is to select species that are somewhat tolerant of common air pollutants. Similarly, different species of trees have different tolerances to salts. If exposure to road salt is a problem, salt tolerant species such as ginkgo may be planted.

Diagnosing the source of stress on a tree can sometimes be difficult because tree decline is rarely caused by one factor alone. It is more likely that a combination of factors are working together to cause the decline of a tree over a period of many years. The growing environment of a stressed tree should be carefully evaluated to determine as many of the causal factors as possible. Check for proper planting depth and for girdling roots. The past history of the tree should also be reviewed. Previous applications

of chemicals, recent periods of drought, extremely cold or open winters, flooding and similar events can be important in evaluating sources of stress.

Nurseries and garden centers sell a great variety of trees, each with its own specific environmental requirements. Landscape features such as soil acidity, sun or shade, level of soil moisture and drainage can influence how well a tree will grow and prosper. It is important to match these site features with the environmental needs of a tree before making a purchase.

SYMPTOMS OF STRESS

The symptoms of stress often develop slowly, more slowly than insect or disease symptoms. Some things to look for include: the appearance of abnormally small leaves, pale green coloration of leaves, unusually slow growth, premature development of fall leaf coloration, early leaf drop, dieback of twigs and branches, wilting of leaves and tender new growth, peeling bark, and presence of fungi protruding from stems and branches. Repeated occurrence of these symptoms over a period of years is a good indicator that a tree is being subjected to some chronic stress influences.

Some sources of stress, e.g. a prolonged drought, may reduce the vigor of a tree but, if provided with a good growing environment, the tree may overcome this stress and resume normal growth. However, it should be noted that it may take a tree several years to overcome a single stress factor. Also, the effects of drought on tree health may not become apparent until 2 or 3 years after the drought event.

WHAT THE HOMEOWNER CAN DO

Unfortunately, once symptoms of decline or stress become apparent, it is often too late to stop or reverse the damage to a tree. Therefore, prevention is the best approach to eliminating stress to trees. Prevention begins with proper selection and planting, and continues with regular inspection and care of these trees.

Proper Planting Techniques

Perhaps nothing is more important in preventing stress than the proper planting of trees. Research has shown that a tree planted at the correct depth, in a hole of sufficient size to accommodate the tree's expanding root system, has a much greater chance of survival than improperly planted ones.

Here are some rules to follow when planting trees:

< Locate trees away from high foot traffic areas that may cause compaction of soil and away from the street if road salts are routinely applied during the winter. Avoid planting trees where their roots may be confined, such as close to a street, sidewalk or building. Also, avoid planting trees beneath utility wires.

< Evaluate the planting site with respect to drainage, exposure to wind, amount of sunlight, type of soil (sandy or clay), space for root development, and soil pH. Also, note the hardiness zone in which you

live so that you are sure to select a tree that will survive the prevailing winter temperatures. Hardiness zones in Massachusetts range from USDA zone 7a on Cape Cod to USDA zone 4 in the Berkshires.

< Have soil tested prior to planting. Phosphorous, potassium and limestone are best incorporated into the soil before a tree is planted. When applied to the soil surface after planting, limestone, phosphorous, and potassium (to some extent), move very slowly into the soil.

A soil test will determine the amount, if any, of these materials that needs to be incorporated. It is not necessary to apply any other fertilizer at planting time. However, if fertilizer containing nitrogen is applied, the nitrogen must be in a slow-release or water insoluble form. Organic fertilizers are a good choice. Follow the directions on the product label. At planting time it is better to apply too little nitrogen than too much.

Fertilizers should be mixed thoroughly with the backfill material.

< Select a tree whose growth requirements most closely match the environment of the site where the tree will be planted.

Remember, choose the right plant for the right place.

< Dig the planting hole to a depth equal to the height of the root ball, as measured from the trunk flare to bottom of the ball. (See Figure 1)

To determine the true height of a root ball that is wrapped in burlap, remove the twine and burlap at the top of the root ball. Then carefully remove soil away from the tree trunk until you find the point where the trunk begins to flare. This is the natural point where the tree trunk ends and the root system begins.

Planting a tree with the flare below ground level can lead to stress and subsequent death of the tree.

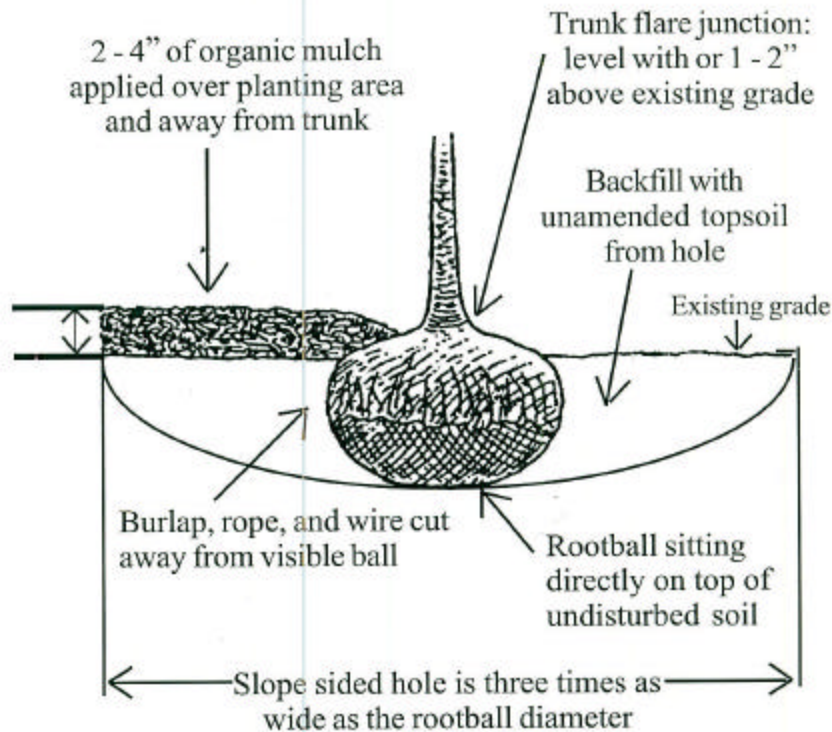


Figure 1

< Dig the hole at least two to three times as wide as the width of the root ball. If the site soil is severely compacted, the hole should be four to five times the root ball width.

< Set the tree into the hole so that the top of the root ball, where the trunk flare is visible, is at the same level as the surrounding grade or 1 to 2 inches higher than grade. Leave the bottom of the hole undisturbed.

< After setting the tree in the planting hole, remove all the twine and as much of the burlap as possible without allowing the rootball to break apart.

If non-degradable materials have been used in wrapping the rootball (such as plastic burlap), remove all of the material before backfilling. It is also advisable to remove the top 8 to 16 inches of a wire basket if one has been used around the rootball. Removal of the wire should only be done after the rootball is securely in place in the planting hole.

< Backfill the hole with the original soil. Do not amend the backfill with peat moss or other organic materials.

If the soil is of very poor quality, that is, very sandy or of heavy clay, it may be amended prior to digging the hole by working organic matter into an area that is at least 5 times larger than the diameter of the tree's rootball. Organic matter amendment should not exceed 20-35% of

the backfill by volume or 5% by weight.

< Firm the backfill by lightly tamping the soil. ***Do not pack the soil!*** You may also firm the soil by stopping periodically and watering the backfill until the soil is settled.

< Water the soil thoroughly after completing the planting. Then apply a 2 to 4 inch layer of organic mulch, such as bark chips, over the planting area.

Do not place any of the mulch against the trunk of the tree!

< Water the soil around newly planted trees once each week through the first growing season. Soil should be soaked to a depth of at least 6 inches at each watering.

A slow soaking, extended over several hours is more effective than a large application of water all at once. Specialty Asoaker@ hoses are effective in applying water to newly planted trees.

CARING FOR TREES

Once trees are planted, some routine care should be given to them to insure their health and vigor. This includes pruning, watering, fertilizing, mulching and checking for presence of any insect or disease problems.

T Proper Pruning

Pruning is an important element in the care of trees. The primary purposes of pruning are to remove dead, damaged or diseased branches; to selectively eliminate crowded branches or stems; to correct structural problems with tree limbs and stems; and to control the shape of a tree.

Pruning should be initiated while trees are still young and small. It is much easier and safer to remove poorly growing stems and branches on a small trees than on older, larger ones. While proper pruning does require some knowledge and skill, much pruning work can be done by the homeowner.

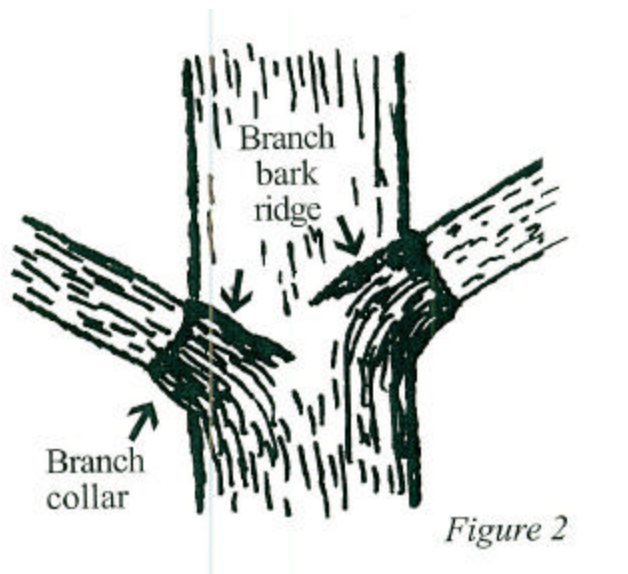
Here are some simple rules:

< Do corrective pruning to:

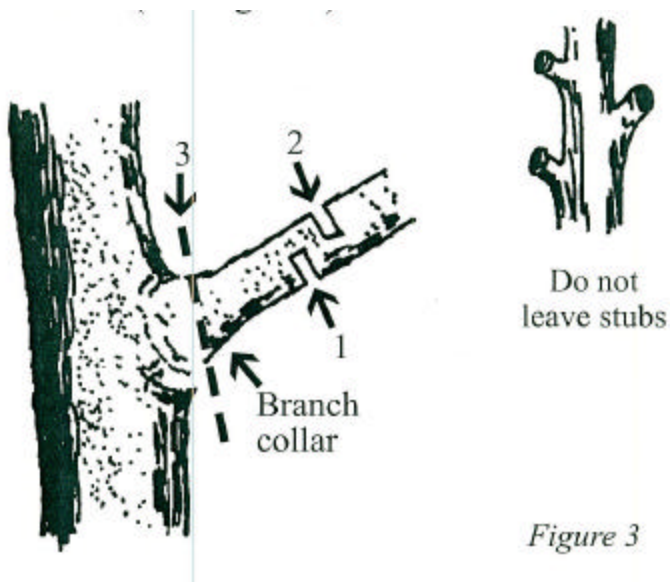
- ! prevent branches from rubbing.
- ! remove dead, diseased or damaged branches.
- ! remove double leaders.
- ! remove narrow, V-shaped crotches.
- ! remove branches growing back toward the center of the tree.

< Do not remove or Atop@ the central leader (stem) unless it is damaged.

< Cut branches at the branch collar, *not flush against the trunk*. (See Figure 2.)



< Use the three cut technique for large branches. (See Figure 3)



If pruning requires the use of a chain saw, removal of very large branches, or climbing into the tree, it is best that this work be done by a certified arborist (check local Yellow Pages under ATree Service®). Pruning under such situations can be very dangerous and should be left to the professional.

T Watering

Once a tree is established, it seldom needs watering. The exceptions are for trees growing in sandy soils, and those exposed to a prolonged drought. When watering, it is important to apply enough water to penetrate the soil to a depth of at least 10 to 14 inches. This is where most of the water absorbing roots of a tree are located. A test hole can be dug to determine how long one needs to water, or how much water needs to be applied, to moisten the soil to that depth. In general, such applications should be made about once every two weeks.

T Fertilizing

Trees growing in a forest do quite well by relying on nutrients made available from rocks in the soil, and from the decay of organic matter in the soil. In home landscapes, trees may not get all the nutrients they need by way of these processes. Therefore, it is sometimes necessary to apply fertilizer around trees to provide the essential elements needed for growth. It should not be assumed, however, that trees need annual applications of fertilizer for their survival. Too much fertilizer can actually lead to stress on a tree rather than relieve it.

Trees that have been in place for at least two or three years have a well developed root system capable of absorbing adequate amounts of mineral nutrients from the soil. Fertilizer application to trees should only be made if tree leaves are showing symptoms of nutrient deficiency, such as abnormally pale leaf color or abnormally small leaves. Other symptoms of nutrient deficiency include shorter than normal annual twig growth and tip die-back of branches. ***Be aware that these same symptoms may be the result of stress factors other than a lack of nutrients.*** Always evaluate the tree and the area around the tree for other possible explanations for the tree's decline.

If fertilizer is to be applied, use one with a ratio of N-P-K of 3-1-2 or 4-1-2. Fertilizer with an analysis such as 24-8-16, 12-4-4, 18-6-12 or similar formulation would be a good choice. Products designed for application to lawns are satisfactory but avoid those containing weed killers. Fertilizers containing a high proportion of the nitrogen in a slow-release or water insoluble form should be used.

Care should be taken when applying fertilizer or any garden chemical that correct amounts are used. Apply fertilizer at a rate that is equivalent to no more than 1 pound of actual nitrogen per 1000 square feet of area. This rate may be adjusted upward if the plant response is less than satisfactory. Fertilizer should be applied in spring or in early fall. The easiest way to apply fertilizer is to spread it on the ground around the tree, beginning about 6 feet away from the trunk and extending to a distance several feet beyond the drip line of the tree. Where there is danger of burning the lawn around a tree, fertilizer application may be split into 2 or 3 applications, each about 4 weeks apart. Water the area thoroughly after applying fertilizer.

Just as important as applying fertilizer is application of limestone. In Massachusetts, most soils are acidic, with the exception of parts of the Berkshires and planting areas near concrete surfaces. Limestone is used to reduce soil acidity. The amount to apply depends upon soil pH, a measure of soil acidity. Have soil tested for pH every 4 or 5 years. For the most part, trees prefer a pH between 6 and

7 for good growth.

T Mulching

Mulching involves the placement of wood chips, bark nuggets, pine needles, or other organic material over the soil surface surrounding a tree. The purpose of the mulch is to keep soil cool during the hottest months, reduce moisture loss from the soil, and eliminate weeds that compete with trees for water and nutrients. The zone of mulch can also help prevent injury to trees by keeping lawn mowers and weed trimmers away from the trunks of trees. Mulches should be applied to a depth of 2 to 4 inches and spread over as large a portion of the root zone of a tree as is possible.

The mulch should not be in contact with the trunk of the tree.

Since organic mulches decompose over time, it will be necessary to replenish the mulch every few years. However, the depth of the undecomposed organic mulch should not exceed 4 inches.



Figure 4

T Insect/Disease Control

The key to insect and disease control in trees is to maintain a proper growing environment for trees and to encourage their vigor. Vigor should not be interpreted as rapid growth since very fast growth, especially that induced by over fertilization, can make a tree more prone to pest problems. Good cultural practices such as those previously mentioned are crucial for vigorous growth.

Most trees are often able to withstand a certain amount of insect infestation. It is when pest populations build to very high levels that problems occur. Unfortunately, pests are not usually noticed until they are in

abundance. Therefore, a program of regular and methodical inspection of trees should be implemented, especially during the spring months when many insect infestations occur. Tree inspection should include examination of bark, stems, and leaves for any signs of pests or abnormal appearance of these plant structures.

There are many options for controlling insect pests on trees, including many measures that do not rely on the application of chemical pesticides. When dealing with small trees, pest control materials may be applied by the homeowner. A local garden supply dealer may be consulted regarding the appropriate materials to use. With large trees, specialized equipment will be needed to make applications of control materials. In such cases, it may be practical to hire an arborist who is licensed and certified to apply pesticides.

Tree diseases develop slowly and are usually caused by fungi or bacteria. Symptoms of disease infections typically appear as leaf spots, blights, yellowing of leaves, or wilting. Proper recognition of tree disease symptoms requires familiarity with the abnormal appearance and growth of trees. Trees should also be examined regularly for signs of peeling bark, dieback of twigs and branches, and fungi growing out from the trunk or at the base of the trunk. Some diseases result in little lasting damage to trees while others become progressively worse and can eventually kill trees. The damage caused by diseases can be compounded if the tree is being affected by other stress factors such as drought. If a wilt disease or dieback of branches is occurring, the problem may be internal or below ground. In these situations, it is best to consult with a professional.

When leaf spot and blight symptoms are visible, it is usually too late to apply chemical controls for that season. In addition, trees with good vitality generally have the capacity to limit and compensate for these kinds of disease infections. When diseases occur, effective management strategies include removing fallen leaves, pruning diseased and damaged branches, and providing good care.

T When to Hire a Professional

Trees that are stressed should be dealt with as soon as possible. In some instances, you may not recognize the causes of stress, have the knowledge to alleviate the problem, or have the time to provide proper maintenance or treatment. At such times, it may be in your best interest, and that of your trees, to hire an arborist. Arborists are individuals trained in the proper care of trees. They provide such services as pruning, tree removal, planting, fertilizing, and pest and disease management. Consulting arborists may not perform any services, but they can evaluate the health and condition of trees, diagnose problems, and recommend proper treatments.

To get the best service for your dollar, follow these tips:

< Hire a *certified* arborist. While this may not guarantee quality of performance, it does certify that the individual is knowledgeable about tree care. Certified arborists are required to complete comprehensive testing, and demonstrate ongoing participation in educational activities in order to maintain certification.

< Ask for proof of proper insurance coverage, including liability for personal and property damage,

and Worker=s Compensation insurance.

< Ask for, and check, references from other jobs performed by the company.

< Obtain written estimates of the work to be done and the price from 2 or 3 arborists.

WHERE TO TURN FOR HELP

The following organizations can offer advice and/or referrals regarding tree care or hiring of professional arborists:

Associated Landscape Contractors of Massachusetts

8 Pleasant Street
South Natick, MA 01760
(508) 653-3373

Forest Health Program, Massachusetts Department of Environmental Management

100 Cambridge St., 19th Floor
Boston, MA 02202
(617) 727-3180 ext. 675

International Society of Arboriculture

P.O. Box 3129
Champaign, IL 61826-3129
(217) 355-9411

Massachusetts Arborists= Association

(For a list of Massachusetts Certified Arborists)

8 Pleasant Street
South Natick, MA 01760
(508) 653-3320

Massachusetts Nursery and Landscape Association

P.O. Box 387
Conway, MA 01341
(413) 369-4731

Massachusetts Tree Wardens= and Foresters= Association

(Each town in the Commonwealth has a tree warden who may be contacted for information. Check at your town office for the name of the local tree warden.)

81 Oak Street

Clinton, MA
(508) 365-2842

Massachusetts Urban Forestry Program
Massachusetts Department of Environmental Management
100 Cambridge St., 19th Floor
Boston, MA 02202
(617) 727-3180 ext. 657

National Arborist Association
P.O. Box 1094
Amherst, NH 03031-1094
(800) 733-2622

ADDITIONAL READING:

Fertilizing Trees and Shrubs by Ronald F. Kujawski. UMass Extension IPM Fact Sheet Series, May 2000.

Recommendations for Planting and Maintaining Trees and Shrubs by Deborah C. Swanson. UMass Extension IPM Fact Sheet Series, January 2000.

The International Society of Arboriculture offers a series of brochures on tree care as part of its Consumer Information Program. Titles include: *Insect and Disease Problems; Mature Tree Care; Trees and Turf; Tree Selection; Plant Health Care; Recognizing Tree Hazards; Why Hire an Arborist; Pruning Young Trees; Pruning Mature Trees; Why Topping Hurts. **These publications may be obtained from some professional arborists as well as at some garden centers.***

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