TEXAS A&M
FOREST SERVICE

ROBERT EDMONSON
BIOLOGIST IV
FOREST RESOURCE DEVELOPMENT

www.texasoakwilt.org
PO Box 1718
Johnson City, TX 78636

Office: 830.868.7949
Cell: 979.220.0913
redmonson@tfs.tamu.edu

http://tfsweb.tamu.edu

INTRODUCTION TO OAK WILT IN TEXAS

TEXAS OAK WILT

WHAT IS OAK WILT?

Oak wilt is an infectious tree disease caused by a fungus. All oak trees are susceptible to this potentially deadly disease. Thousands of acres in Central Texas have already been affected by oak wilt.

WHY SHOULD YOU CARE?

Oak wilt can impact entire communities. Infected trees usually die if they are not treated quickly by a qualified arborist. This can affect aesthetics, decrease property value, and be expensive to manage. Ignoring this disease is costly. Prevention is key.

HOW DOES IT SPREAD?

Above ground by beetles: The oak wilt fungus can produce spores on red oaks that it has killed. These spores are inadvertently transported by beetles feeding on the fungus. If these beetles land on a fresh wound or pruning cut on an uninfected oak, the spores may enter and infect a new tree.

Below ground through root connections: Once a new infection starts, the fungus may spread from tree to tree through an interconnected root system. Trees as far as 200 feet apart may be at risk. The fungus can spread as rapidly as 75 feet per year.

HOW TO RECOGNIZE OAK WILT

Look for defoliation and death of oak trees expanding from a central location. Live oaks will typically defoliate and die in 3-6 months while red oaks may die within 4-6 weeks. The most characteristic symptom of oak wilt is yellow and brown leaf veins in live oaks known as veinal necrosis. Sweet smelling fungal mats may form under the bark of dead red oaks in the spring. Laboratory isolation of the fungus is recommended to confirm the diagnosis. When in doubt, a trained expert should be consulted.

TEXAS A&M FOREST SERVICE TEXASOAKWILT.ORG

INTRODUCTION TO OAK WILT IN TEXAS

TEXAS OAK WILT

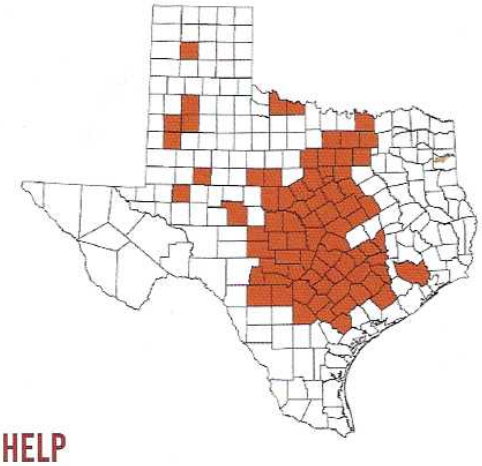
HOW TO REDUCE THE RISK OF OAK WILT

- Avoid pruning oak trees from February 1 to June 30.
- Make proper pruning cuts.
- Paint all oak wounds/cuts immediately with any type of paint.
- Sterilize tools with 10% bleach between trees.
- Only move firewood that has dried for over one year.

HOW TO MANAGE OAK WILT

- Prevent new infections by following the steps above.
- Improve landscape resilience by planting diverse tree species.
- If your trees are affected or at risk, consult with an Oak Wilt Qualified Arborist.
- Trench at least 4 feet deep and 100 feet away from trees with symptoms to stop the spread of oak wilt through tree roots.
- Preserve high-value trees with propiconazole fungicide injections. Fungicide does not stop the disease, but it can save individual trees.
- Burn, bury, or chip red oaks suspected of infection.
- Communicate with neighbors to monitor the infection area.

COUNTIES WITH CONFIRMED OAK WILT CASES



GET HELP

If you suspect that your tree has oak wilt or you need more information on how to prevent oak wilt, contact Texas A&M Forest Service for assistance and visit texasoakwilt.org.

TEXAS A&M FOREST SERVICE TEXASOAKWILT.ORG

TEXAS OAK WILT

PRUNING CALENDAR FOR OAK WILT PREVENTION

Oak Wilt, one of the most destructive tree diseases in the United States, is killing oak trees in Central Texas at epidemic proportions. Proper pruning techniques and timing can help prevent oak wilt. Oak wilt is expensive to manage, affects aesthetics and decreases property value. Prevention is key.

FEBRUARY

Beetles that carry the fungal spores from tree to tree are **most active February-June**.

Avoid pruning/wounding oaks February-June if possible. If pruning is a necessity for safety purposes, make sure to **PAINT ALL OAK WOUNDS IMMEDIATELY.**

MAY

Symptoms of oak wilt may be more pronounced this time of year. Reach out to a tree professional if concerned.

JULY

Beetles and fungal mat activity decrease with high temperatures.

AUGUST

Pruning your oak trees in the heat of summer can stress the tree. Try to wait until fall/winter to tackle pruning unless safety is a concern.

OCTOBER

Now is a good time to prune your trees, but always paint oak wounds immediately!

NOVEMBER

Fall is a great time to plant new trees!

DECEMBER

Don't move firewood! Never use infected red oak wood.

JANUARY

Wrap up your tree pruning.

TEXAS A&M FOREST SERVICE

Visit texasoakwilt.org for more information.

TREE PLANTING - The 12 Step Program

Robert Edmonson-Biologist IV-Texas A&M Forest Service

1) Select an appropriate location for the tree.
Use a tree that will grow well under local environmental conditions and provide it with plenty of space to grow and mature. This includes both vertical and horizontal space for the canopy and plenty of room for root growth.

2) Plant during the proper season.
Between Halloween and Thanksgiving is the best time for planting in Central Texas. Trees are able to get established well before the heat and drought of summer. Planting after March is generally too late.

3) Dig the hole at least twice as wide as the root ball (wider is better).
Wide areas give roots a place to spread and grow. Dig the hole no deeper than the root ball to keep the tree from settling too deep and dig square holes to allow for root penetration out of the hole and into the surrounding soil.

4) Fill the hole with water and check the drainage.
If it takes longer than 24 hours to drain, select another site or another tree. A tree will die if its roots are underwater for long periods of time. Tree roots need air.

5) Prune the tree sparingly only if necessary.
Remove dead, broken, and diseased branches and crushed and girdling roots **only**. Removing even a small portion of the healthy canopy actually slows root growth and delays establishment. A thoughtfully selected tree requires no pruning.

6) Remove all foreign materials from the tree.
This includes wires, twine, cords, containers, tags and especially non-biodegradable bags. If planting a balled and burlapped tree, remove as much of the burlap as possible to allow for water infiltration into the bag and root penetration out of the bag.

7) Set the tree in the hole with the root collar flush or slightly above natural grade.
Planting too deep is a leading cause of mortality of newly planted trees. Do not pick the tree up by the trunk. Always handle by the container or root ball.

8) Gently backfill with the same soil that came out of the hole.
Create a natural environment, not an artificial one. Do not add soil amendments or fertilizer. Too much nitrogen will burn tender young roots, slowing growth and delaying establishment. Settle the soil with water. Tamping the soil causes compaction and damages roots.

9) Stake the tree only if necessary.
Consult a professional if staking is required. Stakes should not be left in place longer than 1 year.

10) Mulch the tree out to the drip line, 2-3 inches deep, and up to but not touching the trunk.
Wood chips, pine bark, leaf litter, hay, etc. are great mulches. Mulch keeps soil temperature fluctuations to a minimum and increases soil moisture retention. Mulch also suppresses weed growth and organic mulch adds nutrients to the soil.

11) Protect the tree from animals (this includes humans).
A wire-mesh cage at least 3 feet in diameter and 4 feet tall staked to the ground works miracles. Deer and livestock will eat your tree if it is not protected and weed-whackers will kill your tree in an instant.

12) Perform routine maintenance for at least two growing seasons.
This includes biannual weed control, yearly mulch replacement, weekly watering (6 to 8 gallons per diameter inch of trunk) and protection maintenance. Prune and fertilize only if necessary.

BALL MOSS

1) What is ball moss?
Ball moss (*Tillandsia recurvata*) is a small **epiphyte** commonly found clinging to limbs of live oaks and other trees in southwest Texas. Ball moss is not a moss, but a true plant with flowers and seeds. It is a member of the bromeliad family, which also contains Spanish moss and pineapple.

2) What is an epiphyte?
Epiphytes are plants that attach themselves to limbs, tree trunks, power lines, fences, and many other structures with pseudo-roots. These are not true roots. They do not absorb water and minerals; they merely attach the plant to an aerial structure. Since epiphytes do not take nutrients and water from these aerial structures, they are not parasites; therefore, ball moss is not a parasite.

3) If ball moss is not a parasite, then why did those branches covered with it die?
If you take careful notice, you will observe the majority of these dead limbs are in the interior of the tree's canopy. Ball moss prefers an environment with low sunlight intensity and high humidity. The interior canopy of trees (especially live oaks) provides an ideal environment for ball moss. These interior limbs die from a lack of sunlight; then the ball moss plants colonize these branches.

4) Should I control ball moss?
If the tree is heavily covered with ball moss (to the extent that the plants are covering the exterior of the canopy) or if you just cannot stand having something growing on your trees, control is recommended. If it is a light infestation and does not bother you, control is not necessary.

5) How do I control ball moss?
Ball moss can be controlled using three methods: picking, pruning or spraying. Each method alone may not provide adequate control. Using combinations of all methods result in the most thorough treatment.

Picking involves physically pulling each plant off the tree. This method can be very effective, but is extremely tedious and labor intensive. It can also be quite dangerous without the use of a cherry picker. Please use caution and practice proper safety techniques if employing this method.

Pruning consists of cutting and removing the dead, interior limbs from the tree and/or lightly thinning the canopy. The majority of the ball moss is growing on the dead, interior limbs; therefore, by removing these limbs, you physically remove the majority of the ball moss. As mentioned above, ball moss prefers areas with low sunlight intensity. Light thinning of the canopy (if necessary) allows more sunlight to reach the interior of the tree, discouraging future infestation. When pruning oaks, make certain to paint all pruning cuts immediately to reduce the risk of oak wilt.

Spraying involves applying a chemical to the tree in a foliar spray. Kocide 101 provides adequate control. Do not exceed the recommended rates for this chemical. Higher concentrations of this chemical can actually damage the tree. The ball moss will shrivel up and die in 5 to 7 days, but will remain in the tree until the wind or rain knocks it out. For this reason, it is recommended to prune out the deadwood first. In doing so, you remove the majority of the ball moss from the tree and practice proper tree maintenance at the same time. Picking, pruning nor spraying will remove all of the ball moss from the tree, but these treatments can benefit the tree and certainly make you feel better.

Conservation Tree and Shrub Seedling Order Form

-- Spring 2024 --

Call: 806-892-3572
Fax: 806-892-3587
Email: wtn@tfs.tamu.edu

www.WestTexasNursery.com

West Texas Nursery
7914 E. Highway 62
Idalou, Texas 79329

Name: _____

Billing Address: _____

City: _____ State: _____ Zip: _____

Shipping Address: _____

City: _____ State: _____ Zip: _____

Shipping Address Type (circle one): **Business** **Residential**

Telephone: _____

Email: _____

PLEASE NOTE:

1. All trees are one-year-old seedlings. A box of 25 container seedlings and a bundle of 25 bareroot seedlings can be easily transported in a car.

2. Acceptance of this order is subject to prior sales and nursery production.

3. Orders may be paid with check, money order or credit card. Checks or money orders should be made payable to **TEXAS A&M FOREST SERVICE**. Enter credit card information in yellow box below.

4. Seedlings are to be used for resource conservation, wildlife, or windbreak purposes. They are not to be used for ornamental and/or landscape plantings. Contact a commercial nurseryman for trees needed for this purpose.

5. Bareroot seedlings will be packed in a Kraft bag. Each waterproof bag will contain one-year-old seedlings with a moisture retention medium on the roots. This gel-like material should stay on the roots when planting.

6. *** If you are claiming tax exemptions, you must provide a tax exempt certification form.***

Please select a 2nd species. Not doing so may delay shipment.

State second choice for container seedlings: _____

State second choice for bareroot seedlings: _____

(Do not write in gray space)

Order No._____ TFS Receipt No._____

Date Shipped _____ No. of Boxes Shipped_____

Zone _____ FedEx $_____ PR_____ AR_____

Evergreen Container Seedlings

Species	Quantity	Price per 25	Total
Afghanistan Pine		$ 65.00	
Austrian Pine		$ 65.00	
Deadora Cedar		$ 65.00	
Italian Stone Pine		$ 65.00	
Oriental Arborvitae		$ 65.00	

Line 1 Subtotal $

Hardwood Container Seedlings

Species	Quantity	Price per 25	Total
American Beautyberry		$ 65.00	
Black Cherry		$ 65.00	
Catalpa		$ 65.00	
Desert Willow		$ 65.00	
Honeylocust		$ 65.00	

Line 2 Subtotal $

Hardwood Bareroot Seedlings

Species	Quantity	Price per 25	Total
American Plum		$ 50.00	
Bur Oak		$ 50.00	
Chinkapin Oak		$ 50.00	
Pecan		$ 50.00	
Shumard Oak		$ 50.00	

Line 3 Subtotal $

Subtotal of Trees Ordered (Add Lines 1 + 2 + 3) $_____

****Shipping - add 16%** $_____

*****Tax - add 6.75%** $_____

Total Amount Due $_____

Credit Card (circle one): VISA MASTERCARD AMEX DISCOVER

Name (as it appears on card): _____

Card Number: _____ Expiration Date: _____

Signature of cardholder

All information in this box will be destroyed

Updated 9/8/2023

CENTRAL TEXAS RESTORATION & RECOVERY SEEDLING ORDER FORM (FALL 2023)

Call: 806-892-3572
Fax: 806-892-3587
Email: wtn@tfs.tamu.edu

TEXAS A&M FOREST SERVICE

West Texas Nursery
7914 E. Highway 62
Idalou, Texas 79329

Name: _____

Billing Address: _____

City: _____ State: _____ Zip: _____

Telephone: _____

Email Address:

_____

Trees to be planted in _____ County

*** Desired Pick Up Location (choose one) ***

Georgetown Boerne Hamilton Johnson City

Kerrville La Grange Mineral Wells Wimberley

Seedling Species	Quantity (Multiples of 10)	Price Per 10 ($)	Cost
Bur Oak		$ 45.00	
Pecan		$ 45.00	
Post Oak		$ 45.00	

Subtotal $_____

Tax - add 6.75% $_____

Total Amount Enclosed $_____

PLEASE NOTE:

1. Orders can be placed by calling our office or by mailing or faxing this form.
2. Acceptance of this order is subject to prior sales and nursery production.
3. Orders may be paid with check, money order or credit card. Checks or money orders should be made payable to **Texas A&M Forest Service**. Credit card information can be entered in the block below.
4. Seedlings are to be used for resource conservation, wildlife habitat, or site restoration purposes. They are not to be used for ornamental and/or landscape plantings. Contact a commercial nurseryman for trees needed for this purpose.
5. Delivery of seedlings will be around the first week of November. The forester at your chosen location will contact you prior to delivery to set a pick up schedule.

(Do not write in gray space)

Order No. _____ TFS Receipt No. _____

Shipped _____ Location _____

Orders will NOT be accepted via e-mail

Credit Card (circle one): VISA MASTERCARD AMEX DISCOVER

Name (as it appears on card): _____

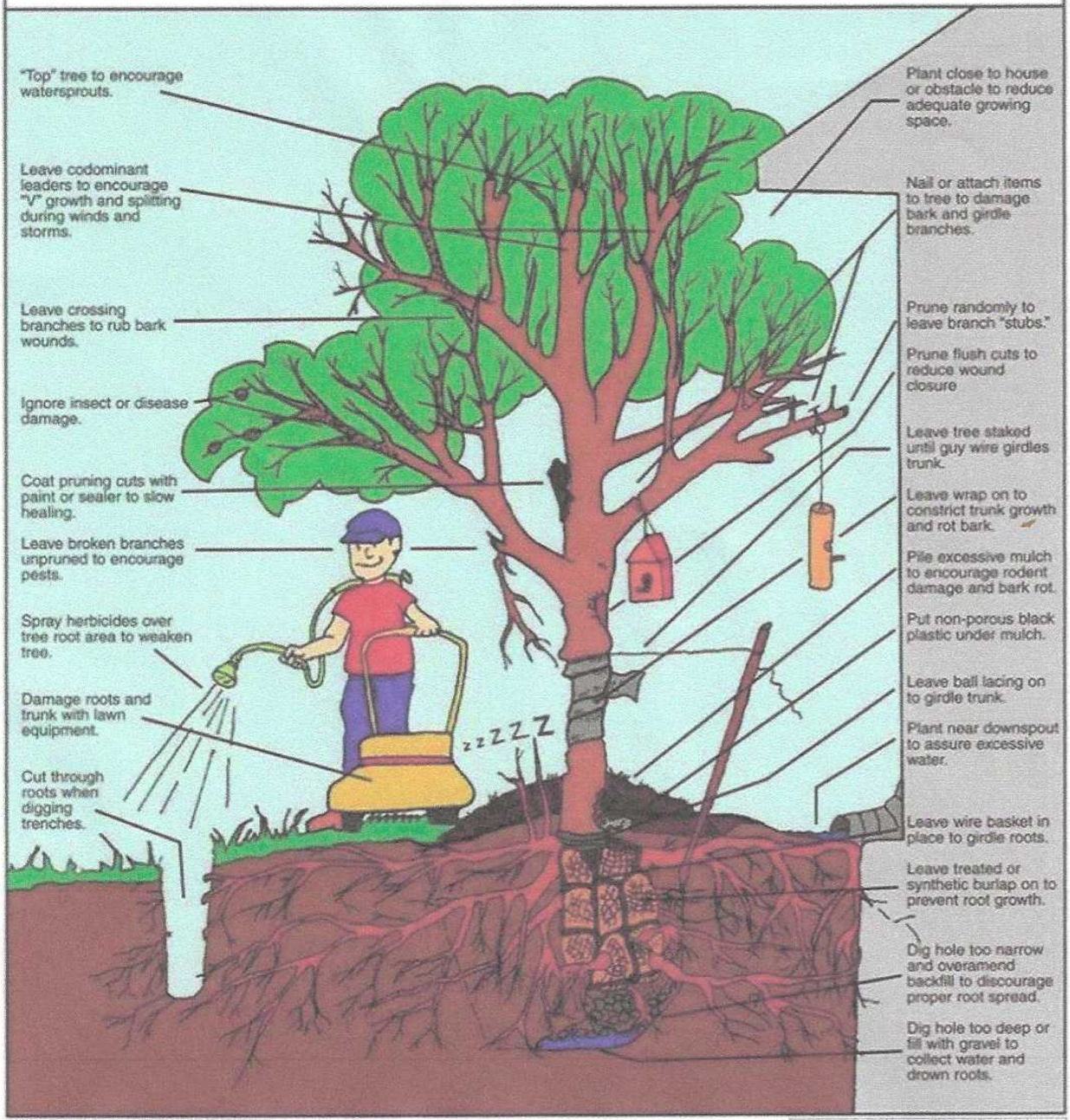
Card Number: _____ Expiration Date: _____

Signature of cardholder: All information in this box will be destroyed.

Updated 9-8-2023

HOW TO KILL A TREE

Few residential trees die of "old age." Mechanical damage and improper tree care kill more trees than any insects or diseases. Avoid making the tree-damaging mistakes shown in the diagram below!



Poster Design by: Dr. Bonnie Appleton, Virginia Tech University
Layout: Dianne Baker, ArtTechArt, Inc.
Illustrations: S.K. Kerns

Funds provided by the Urban and Community Forestry Assistance Grants Programs of the U.S. Forest Service in cooperation with the Virginia Department of Forestry © 1996

NA-FR-01-95

USDA Forest Service

Northeastern Area State and Private Forestry

HOW to Prune Trees

Peter J. Bedker, Joseph G. O'Brien, and Manfred M. Mielke
Illustrations by Julie Martinez, Afton, MN

Introduction

The objective of pruning is to produce strong, healthy, attractive plants. By understanding how, when and why to prune, and by following a few simple principles, this objective can be achieved.

Why Prune

The main reasons for pruning ornamental and shade trees include safety, health, and aesthetics. In addition, pruning can be used to stimulate fruit production and increase the value of timber. Pruning for *safety* (Fig. 1A) involves removing branches that could fall and cause injury or property damage, trimming branches that interfere with lines of sight on streets or driveways, and removing branches that grow into utility lines. Safety pruning can be largely avoided by carefully choosing species that will not grow beyond the space available to them, and have strength and form characteristics that are suited to the site.

Pruning for *health* (Fig. 1B) involves removing diseased or insect-infested wood, thinning the crown to increase airflow and reduce some pest problems, and removing

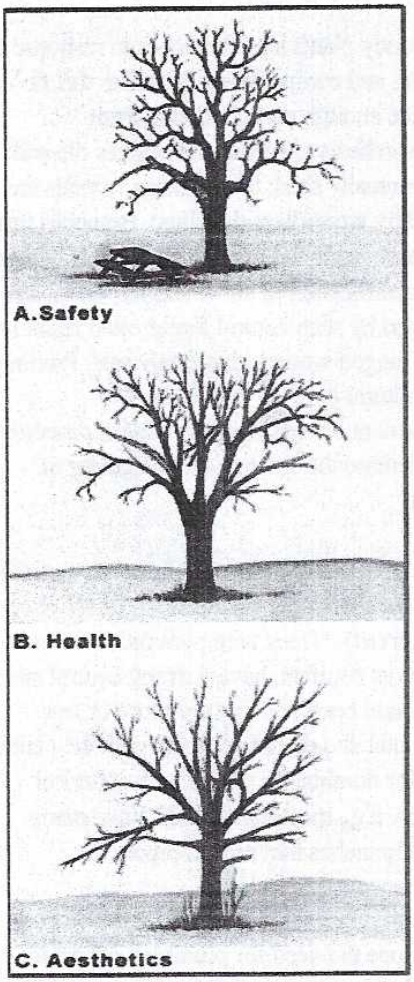


Figure 1. Reasons for pruning.

crossing and rubbing branches. Pruning can best be used to encourage trees to develop a strong structure and reduce the likelihood of damage during severe weather. Removing broken or damaged limbs encourage wound closure.

Pruning for *aesthetics* (Fig. 1C) involves enhancing the natural form and character of trees or stimulating flower production. Pruning for form can be especially important on open-grown trees that do very little self-pruning.

All woody plants shed branches in response to shading and competition. Branches that do not produce enough carbohydrates from photosynthesis to sustain themselves die and are eventually shed; the resulting wounds are sealed by **woundwood** (callus). Branches that are poorly attached may be broken off by wind and accumulation of snow and ice. Branches removed by such natural forces often result in large, ragged wounds that rarely seal. Pruning as a cultural practice can be used to supplement or replace these natural processes and increase the strength and longevity of plants.

Trees have many forms, but the most common types are pyramidal **(excurrent)** or spherical **(decurrent)**. Trees with pyramidal crowns, e.g., most conifers, have a strong central stem and lateral branches that are more or less horizontal and do not compete with the central stem for dominance. Trees with spherical crowns, e.g., most hardwoods, have many lateral branches that may compete for dominance.

To reduce the need for pruning it is best to consider a tree's natural form. It is very difficult to impose an unnatural form on a tree without a commitment to constant maintenance.

Pollarding and **topiary** are extreme examples of pruning to create a desired, unnatural effect. Pollarding is the practice of pruning trees annually to remove all new growth. The following year, a profusion of new branches is produced at the ends of the branches. Topiary involves pruning trees and shrubs into geometric or animal shapes. Both pollarding and topiary are specialized applications that involve pruning to change the natural form of trees. As topiary demonstrates, given enough care and attention plants can be pruned into nearly any form. Yet just as proper pruning can enhance the form or character of plants, improper pruning can destroy it.

Pruning Approaches

Producing strong structure should be the emphasis when pruning young trees. As trees mature, the aim of pruning will shift to maintaining tree structure, form, health and appearance.

Proper pruning cuts are made at a node, the point at which one branch or twig attaches to another. In the spring of the year growth begins at buds, and twigs grow until a new node is formed. The length of a branch between nodes is called an internode.

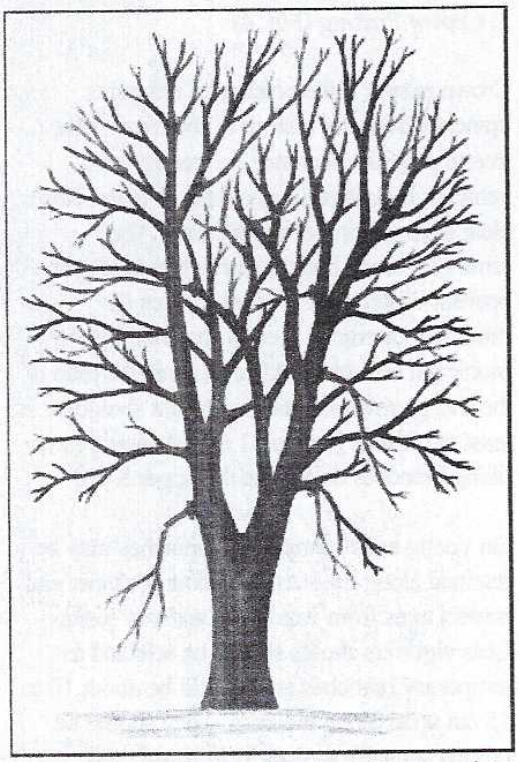


Figure 2. Crown thinning - branches to be removed are shaded in blue; pruning cuts should be made at the red lines. No more than one-fourth of the living branches should be removed at one time.

The most common types of pruning are:

1. *Crown Thinning* (Fig. 2)

Crown thinning, primarily for hardwoods, is the selective removal of branches to increase light penetration and air movement throughout the crown of a tree. The intent is to maintain or develop a tree's structure and form. To avoid unnecessary stress and prevent excessive production of epicormic sprouts, no more than one-quarter of the living crown should be removed at a time. If it is necessary to remove more, it should be done over successive years.

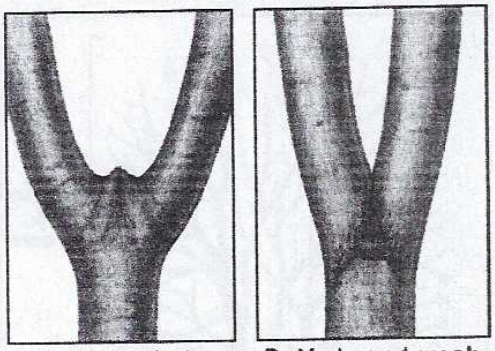


Figure 3. Types of branch unions.

Branches with strong U-shaped angles of attachment should be retained (Fig 3A). Branches with narrow, V-shaped angles of attachment often form **included bark** and should be removed (Fig. 3B). Included bark forms when two branches grow at sharply acute angles to one another, producing a wedge of inward-rolled bark between them. Included bark prevents strong attachment of branches, often causing a crack at the point below where the branches meet. Codominant stems that are approximately the same size and arise from the same position often form included bark. Removing some of the lateral branches from a codominant stem can reduce its growth enough to allow the other stem to become dominant.

Lateral branches should be no more than one-half to three-quarters of the diameter of the stem at the point of attachment. Avoid producing "lion's tails," tufts of branches and foliage at the ends of branches, caused by removing all inner lateral branches and foliage. Lion's tails can result in sunscalding, abundant **epicormic sprouts**, and weak branch structure and breakage. Branches that rub or cross

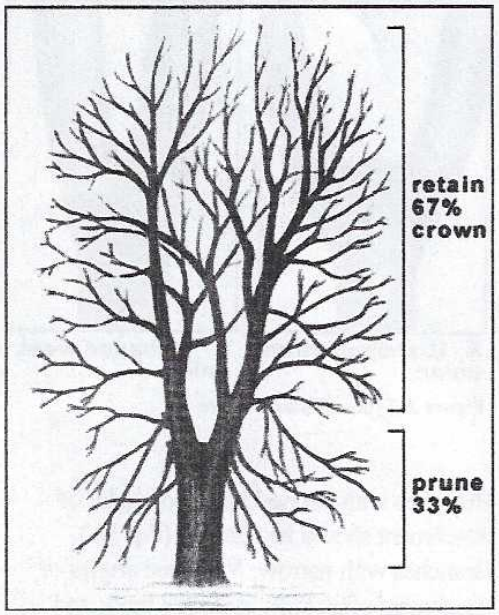


Figure 4. Crown raising - branches to be removed are shaded in blue; pruning cuts should be made where indicated with red lines. The ratio of live crown to total tree height should be at least two-thirds.

another branch should be removed.

Conifers that have branches in whorls and pyramidal crowns rarely need crown thinning except to restore a dominant leader. Occasionally, the leader of a tree may be damaged and multiple branches may become codominant. Select the strongest leader and remove competing branches to prevent the development of codominant stems.

2. *Crown Raising* (Fig. 4)

Crown raising is the practice of removing branches from the bottom of the crown of a tree to provide clearance for pedestrians, vehicles, buildings, lines of site, or to develop a clear stem for timber production. Also, removing lower branches on white pines can prevent blister rust. For street trees the minimum clearance is often specified by municipal ordinance. After pruning, the ratio of the living crown to total tree height should be at least two-thirds (e.g., a 12 m tree should have living branches on at least the upper 8 m).

On young trees "temporary" branches may be retained along the stem to encourage taper and protect trees from vandalism and sun scald. Less vigorous shoots should be selected as temporary branches and should be about 10 to 15 cm apart along the stem. They should be pruned annually to slow their growth and should be removed eventually.

3. *Crown Reduction* (Fig. 5)

Crown reduction pruning is most often used when a tree has grown too large for its permitted space. This method, sometimes called **drop crotch pruning**, is preferred to topping because it results in a more natural appearance, increases the time before pruning is needed again, and minimizes stress (see drop crotch cuts in the next section).

Crown reduction pruning, a method of last resort, often results in large pruning wounds to stems that may lead to decay. This method should never be used on a tree with a pyramidal growth form. A better long term solution is to remove the tree and replace it

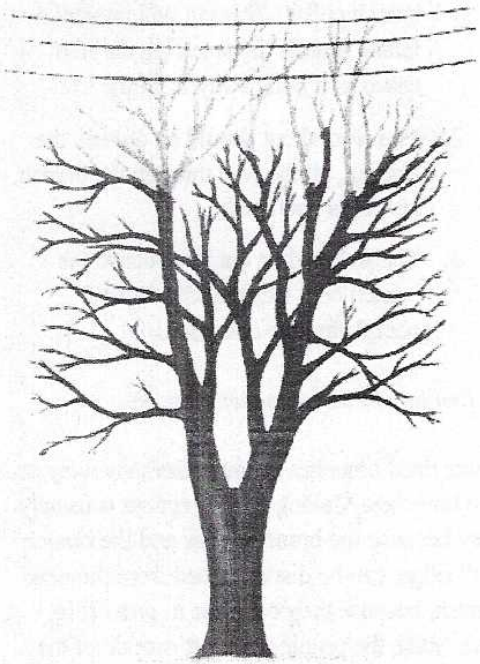


Figure 5. Crown reduction - branches to be removed are shaded in blue; pruning cuts should be made where indicated with red lines. To prevent branch dieback, cuts should be made at lateral branches that are at least one-third the diameter of the stem at their union.

with a tree that will not grow beyond the available space.

Pruning Cuts

Pruning cuts should be made so that only branch tissue is removed and stem tissue is not damaged. At the point where the branch attaches to the stem, branch and stem tissues remain separate, but are contiguous. If only branch tissues are cut when pruning, the stem tissues of the tree will probably not become decayed, and the wound will seal more effectively.

1. *Pruning living branches* (Fig. 6)

To find the proper place to cut a branch, look for the **branch collar** that grows from the stem tissue at the underside of the base of the branch (Fig. 6A). On the upper surface, there is usually a **branch bark ridge** that runs (more or less) parallel to the branch angle, along the stem of the tree. A proper pruning cut does not damage either the branch bark ridge or the branch collar.

A proper cut begins just outside the branch bark ridge and angles down away from the stem of the tree, avoiding injury to the branch collar (Fig. 6B). Make the cut as close as possible to the stem in the **branch axil**, but outside the branch bark ridge, so that stem tissue is not injured and the wound can seal in the shortest time possible. If the cut is too far from the stem, leaving a branch stub, the branch tissue usually dies and woundwood forms from the stem tissue. Wound closure is delayed because the woundwood must seal over the stub that was left.

The quality of pruning cuts can be evaluated by examining pruning wounds after one growing season. A concentric ring of woundwood will form from proper pruning cuts (Fig. 6B). **Flush cuts** made inside the branch bark ridge or branch collar, result in pronounced development of woundwood on the sides of the pruning wounds with very little woundwood forming on the top or bottom (Fig. 7D). As described above, stub cuts result in the death of the remaining branch and woundwood forms around the base from stem tissues.
When pruning small branches with hand pruners, make sure the tools are sharp enough

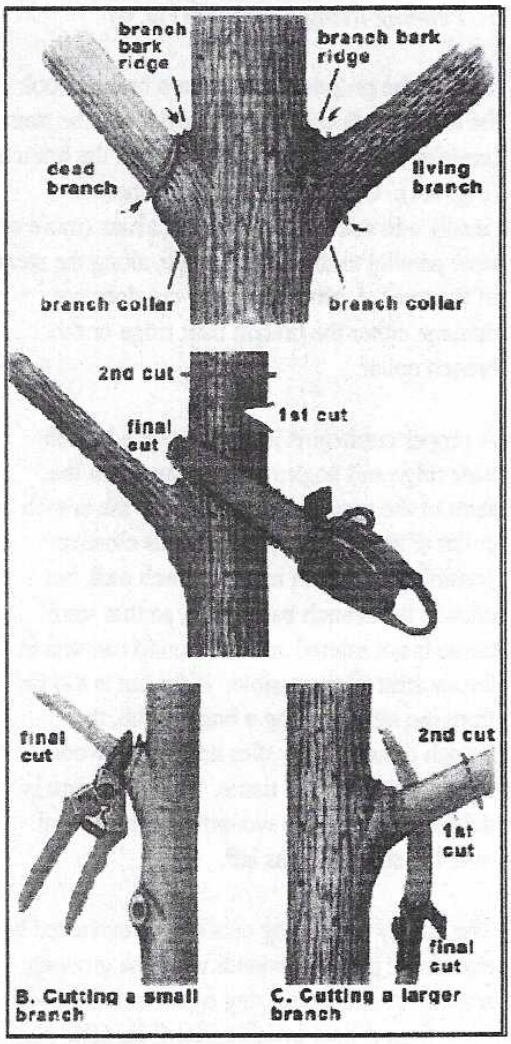


Figure 6. Pruning cuts

to cut the branches cleanly without tearing. Branches large enough to require saws should be supported with one hand while the cuts are made. If the branch is too large to support, make a three-step pruning cut to prevent bark ripping (Fig. 6C).

1. The first cut is a shallow notch made on the underside of the branch, outside the branch collar. This cut will prevent a falling branch from tearing the stem tissue as it pulls away from the tree.
2. The second cut should be outside the first cut, all the way through the branch, leaving a short stub.
3. The stub is then cut just outside the branch bark ridge/branch collar, completing the operation.

2. *Pruning dead branches* (Fig. 6)

Prune dead branches in much the same way as live branches. Making the correct cut is usually easy because the branch collar and the branch bark ridge, can be distinguished from the dead branch, because they continue to grow (Fig. 6A). Make the pruning cut just outside of the ring of woundwood tissue that has formed, being careful not to cause unnecessary injury (Fig. 6C). Large dead branches should be supported with one hand or cut with the three-step method, just as live branches. Cutting large living branches with the three step method is more critical because of the greater likelihood of bark ripping.

3. *Drop Crotch Cuts* (Fig. 6D)

A proper cut begins just above the branch bark ridge and extends through the stem parallel to the branch bark ridge. Usually, the stem being removed is too large to be supported with one hand, so the three cut method should be used.

1. With the first cut, make a notch on the side of the stem away from the branch to be retained, well above the branch crotch.

2. Begin the second cut inside the branch crotch, staying well above the branch bark ridge, and cut through the stem above the notch.
3. Cut the remaining stub just inside the branch bark ridge through the stem parallel to the branch bark ridge.

To prevent the abundant growth of epicormic sprouts on the stem below the cut, or dieback of the stem to a lower lateral branch, make the cut at a lateral branch that is at least one-third of the diameter of the stem at their union.

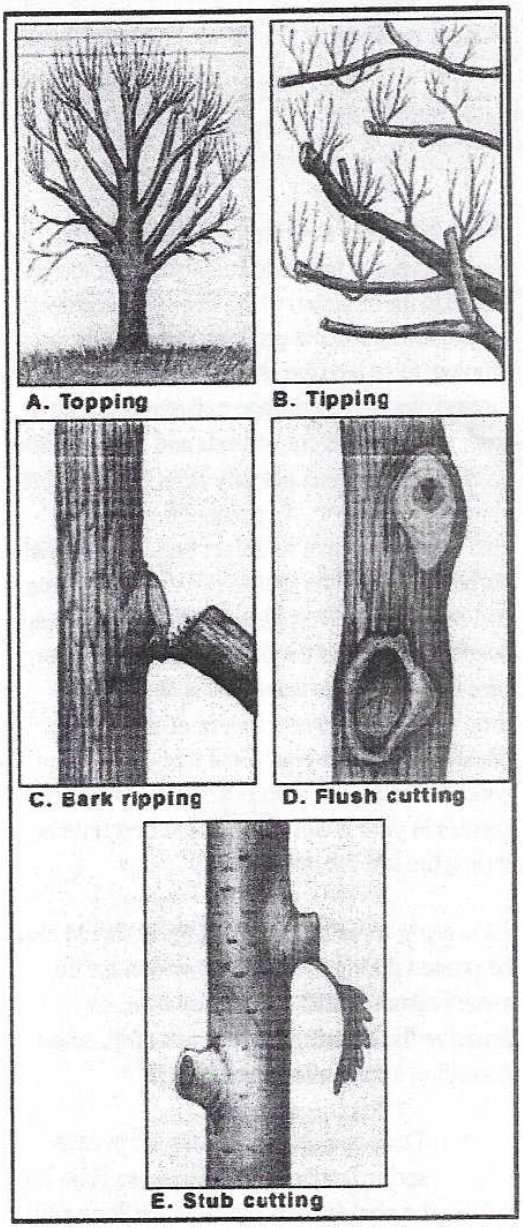
Pruning Practices That Harm Trees

Topping and **tipping** (Fig. 7A, 7B) are pruning practices that harm trees and should not be used. Crown reduction pruning is the preferred method to reduce the size or height of the crown of a tree, but is rarely needed and should be used infrequently.

Topping, the pruning of large upright branches between nodes, is sometimes done to reduce the height of a tree (Fig. 7A). Tipping is a practice of cutting lateral branches between nodes (Fig. 7B) to reduce crown width.

These practices invariably result in the development of epicormic sprouts, or in the death of the cut branch back to the next lateral branch below. These epicormic sprouts are weakly attached to the stem and eventually will be supported by a decaying branch.

Improper pruning cuts cause unnecessary injury and bark ripping (Fig. 7C). Flush cuts injure



stem tissues and can result in decay (Fig. 7D). **Stub cuts** delay wound closure and can provide entry to canker fungi that kill the cambium, delaying or preventing woundwood formation (Fig. 7E).

When to Prune

Conifers may be pruned any time of year, but pruning during the dormant season may minimize sap and resin flow from cut branches.

Hardwood trees and shrubs *without showy flowers*: prune in the dormant season to easily visualize the structure of the tree, to maximize wound closure in the growing season after pruning, to reduce the chance of transmitting disease, and to discourage excessive sap flow from wounds. Recent wounds and the chemical scents they emit can actually attract insects that spread tree disease. In particular, wounded elm wood is known to attract bark beetles that harbor spores of the Dutch elm disease fungus, and open wounds on oaks are known to attract beetles that spread the oak wilt fungus. Take care to prune these trees during the correct time of year to prevent spread of these fatal diseases. Contact your local tree disease specialist to find out when to prune these tree species in your area. Usually, the best time is during the late fall and winter.

Flowering trees and shrubs: these should also be pruned during the dormant season for the same reasons stated above; however, to preserve the current year's flower crop, prune according to the following schedule:

- Trees and shrubs that flower in early spring (redbud, dogwood, etc.) should be pruned immediately after flowering (flower buds arise the year before they flush, and will form on the new growth).
- Many flowering trees are susceptible to fireblight, a bacterial disease that can be spread by pruning. These trees, including many varieties of crabapple, hawthorn, pear, mountain ash, flowering quince and pyracantha, should be pruned during the dormant season. Check with your county extension agent or a horticulturist for additional information.
- Trees and shrubs that flower in the summer or fall always should be pruned during the dormant season (flower buds will form on new twigs during the next growing season, and the flowers will flush normally).

Dead branches: can be removed any time of the year.

Pruning Tools

Proper tools are essential for satisfactory pruning (Fig.6). The choice of which tool to use depends largely on the size of branches to be pruned and the amount of pruning to be done. If possible, test a tool before you buy it to ensure it suits your specific needs. As with most things, higher quality often equates to higher cost.

Generally speaking, the smaller a branch is when pruned, the sooner the wound created will seal. Hand pruners are used to prune small branches (under 2.5 cm diameter) and many different kinds are available. Hand pruners can be grouped into by-pass or anvil styles based on the blade configuration. Anvil style pruners have a straight blade that cuts the branch against a small anvil or block as the handles are squeezed. By-pass pruners use a curved cutting blade that slides past a broader lower blade, much like a scissors. To prevent unnecessary tearing or crushing of tissues, it is best to use a

by-pass style pruner. Left- or right-handed types can be purchased.

Slightly larger branches that cannot be cut with a hand pruner may be cut with small pruning saws (up to 10 cm) or lopping shears (up to 7 cm diameter) with larger cutting surfaces and greater leverage. Lopping shears are also available in by-pass and anvil styles.

For branches too large to be cut with a hand pruner or lopping shears, pruning saws must be used. Pruning saws differ greatly in handle styles, the length and shape of the blade, and the layout and type of teeth. Most have tempered metal blades that retain their sharpness for many pruning cuts. Unlike most other saws, pruning saws are often designed to cut on the "pull-stroke."

Chain saws are preferred when pruning branches larger than about 10 cm. Chainsaws should be used only by qualified individuals. To avoid the need to cut branches greater than 10 cm diameter, prune when branches are small.

Pole pruners must be used to cut branches beyond reach. Generally, pruning heads can cut branches up to 4.4 cm diameter and are available in the by-pass and anvil styles. Once again, the by-pass type is preferred. For cutting larger branches, saw blades can be fastened directly to the pruning head, or a separate saw head can be purchased. Because of the danger of electrocution, pole pruners should not be used near utility lines except by qualified utility line clearance personnel.

To ensure that satisfactory cuts are made and to reduce fatigue, keep your pruning tools sharp and in good working condition. Hand pruners, lopping shears, and pole pruners should be periodically sharpened with a sharpening stone. Replacement blades are available for many styles. Pruning saws should be professionally sharpened or periodically replaced. To reduce cost, many styles have replaceable blades.

Tools should be clean and sanitized as well as sharp. Although sanitizing tools may be inconvenient and seldom practiced, doing so may prevent the spread of disease from infected to healthy trees on contaminated tools. Tools become contaminated when they come into contact with fungi, bacteria, viruses and other microorganisms that cause disease in trees. Most pathogens need some way of entering the tree to cause disease, and fresh wounds are perfect places for infections to begin. Microorganisms on tool surfaces are easily introduced into susceptible trees when subsequent cuts are made. The need for sanitizing tools can be greatly reduced by pruning during the dormant season.

If sanitizing is necessary it should be practiced as follows: Before each branch is cut, sanitize pruning tools with either 70% denatured alcohol, or with liquid household bleach diluted 1 to 9 with water (1 part bleach, 9 parts water). Tools should be immersed in the solution, preferably for 1-2 minutes, and wood particles should be wiped from all cutting surfaces. Bleach is corrosive to metal surfaces, so tools should be thoroughly cleaned with soap and water after each use.

Treating wounds

Tree sap, gums, and resins are the natural means by which trees combat invasion by pathogens. Although unsightly, sap flow from pruning wounds is not generally harmful; however, excessive "bleeding" can weaken trees.

When oaks or elms are wounded during a critical time of year (usually spring for oaks, or throughout the growing season for elms) -- either from storms, other unforeseen mechanical wounds, or from necessary branch removals -- some type of wound dressing should be applied to the wound. Do this immediately after the wound is created. In most other instances, wound dressings are unnecessary, and may even be detrimental. Wound dressings will not stop decay or cure infectious diseases. They may actually interfere with the protective benefits of tree gums and resins, and prevent wound surfaces from closing as quickly as they might under natural conditions. The only benefit of wound dressings is to prevent introduction of pathogens in the specific cases of Dutch elm disease and oak wilt.

Pruning Guidelines

To encourage the development of a strong, healthy tree, consider the following guidelines when pruning.

General

- Prune first for safety, next for health, and finally for aesthetics.
- Never prune trees that are touching or near utility lines; instead consult your local utility company.
- Avoid pruning trees when you might increase susceptibility to important pests (e.g. in areas where oak wilt exists, avoid pruning oaks in the spring and early summer; prune trees susceptible to fireblight only during the dormant season).
- Use the following decision guide for size of branches to be removed: 1) under 5 cm diameter - go ahead, 2) between 5 and 10 cm diameter - think twice, and 3) greater than 10 cm diameter - have a good reason.

Crown Thinning

- Assess how a tree will be pruned from the top down.
- Favor branches with strong, U-shaped angles of attachment. Remove branches with weak, V-shaped angles of attachment and/or included bark.
- Ideally, lateral branches should be evenly spaced on the main stem of young trees.
- Remove any branches that rub or cross another branch.
- Make sure that lateral branches are no more than one-half to three-quarters of the diameter of the stem to discourage the development of co-dominant stems.

- Do not remove more than one-quarter of the living crown of a tree at one time. If it is necessary to remove more, do it over successive years.

Crown Raising

- Always maintain live branches on at least two-thirds of a tree's total height. Removing too many lower branches will hinder the development of a strong stem.
- Remove basal sprouts and vigorous epicormic sprouts.

Crown Reduction

- Use crown reduction pruning only when absolutely necessary. Make the pruning cut at a lateral branch that is at least one-third the diameter of the stem to be removed.
- If it is necessary to remove more than half of the foliage from a branch, remove the entire branch.

Glossary

Branch Axil: the angle formed where a branch joins another branch or stem of a woody plant.

Branch Bark Ridge: a ridge of bark that forms in a branch crotch and partially around the stem resulting from the growth of the stem and branch tissues against one another.

Branch Collar: a "shoulder" or bulge formed at the base of a branch by the annual production of overlapping layers of branch and stem tissues.

Crown Raising: a method of pruning to provide clearance for pedestrians, vehicles, buildings, lines of sight, and vistas by removing lower branches.

Crown Reduction Pruning: a method of pruning used to reduce the height of a tree. Branches are cut back to laterals that are at least one-third the diameter of the limb being removed.

Crown Thinning: a method of pruning to increase light penetration and air movement through the crown of a tree by selective removal of branches.

Callus: see woundwood.

Decurrent: a major tree form resulting from weak apical control. Trees with this form have several to many lateral branches that compete with the central stem for dominance resulting in a spherical or globose crown. Most hardwood trees have decurrent forms.

Epicormic Sprout: a shoot that arises from latent or adventitious buds; also know as water sprouts that occur for on stems and branches and suckers that are produced from the base of trees. In older wood, epicormic shoots often result from severe defoliation or radical pruning.

Excurrent: a major tree form resulting from strong apical control. Trees with this form have a strong central stem and pyramidal shape. Lateral branches rarely compete for dominance. Most conifers and a few hardwoods, such as sweetgum and tuliptree, have excurrent forms.

Flush Cuts: pruning cuts that originate inside the branch bark ridge or the branch collar, causing unnecessary injury to stem tissues.

Included Bark: bark enclosed between

branches with narrow angles of attachment, forming a wedge between the branches.

Pollarding: the annual removal of all of the previous year's growth, resulting in a flush of slender shoots and branches each spring.

Stub Cuts: pruning cuts made too far outside the branch bark ridge or branch collar, that leave branch tissue attached to the stem.

Tipping: a poor maintenance practice used to control the size of tree crowns; involves the cutting of branches at right angles leaving long stubs.

Topping: a poor maintenance practice often used to control the size of trees; involves the indiscriminate cutting of branches and stems at right angles leaving long stubs. Synonyms include rounding-over, heading-back, dehorning, capping and hat-racking. Topping is often improperly referred to as pollarding.

Topiary: the pruning and training of a plant into a desired geometric or animal shape.

Woundwood: lignified, differentiated tissues produced on woody plants as a response to wounding (also known as callus tissue).

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"How to Prune Trees" was written to help people properly prune the trees they care about. If you doubt your ability to safely prune large trees, please hire a professional arborist. Information in this publication can be used to interview and hire a competent arborist.

Native Trees & Shrubs of the Edwards Plateau

Robert Edmonson-Texas A&M Forest Service-Revised August 2023

Common Name(s) / Scientific Name	Form	Site	Ecoregion
alderleaf mountain mahogany *Cercocarpus montanus*	S/ST	U/S	EPW
algerita (agarita) *Mahonia trifoliolata*	S	U/S	throughout
American beautyberry *Callicarpa americana*	S	B/U	BC
American elm *Ulmus americana*	LT	B/D	BC/LU
American smoketree *Cotinus obovatus*	S/ST	U/S	BC
American sycamore *Platanus occidentalis*	LT	R/B	BC/EPW
American witchhazel *Hamamelis virginiana*	S/ST	B	BC
Arizona walnut *Juglans major*	LT	B/D/U	BC/EPW
Ashe's juniper (blueberry) *Juniperus ashei*	S/ST/MT	D/U/S	throughout
bald cypress *Taxodium distichum*	LT	W/R/B	BC
bastard oak (Durand) *Quercus sinuata*	ST/MT	B/D	BC/EPW/SEP
bastard oak (white shin) *Quercus sinuata* var. *breviloba*	S/ST	U/S	BC/EPW/SEP
Berlandier's wolfberry *Lycium berlandieri*	S	D/U	EPW/SEP
bigtooth maple *Acer grandidentatum*	MT	B/D/U	BC
black cherry *Prunus serotina* var. *eximia*	MT	B/D/U/S	BC/EPW
black hickory *Carya texana*	MT	D	LU
black walnut *Juglans nigra*	MT	B/D	BC
black willow *Salix nigra*	MT	W/R/B	throughout
blackjack oak *Quercus marilandica*	MT	D/U	BC/EPW/LU
boxelder *Acer negundo*	MT	B/D/U	BC/LU
Brazilian bluewood *Condalia hookeri*	S/ST/MT	D/U	BC/SEP
bur oak *Quercus macrocarpa*	LT	B/D	BC/EPW/LU
bush croton *Croton fruticulosus*	S	U/S	throughout
canyon mock orange *Philadelphus ernestii*	S	B/U	BC
Carolina basswood *Tilia americana* var. *caroliniana*	MT	B	BC
Carolina buckthorn *Frangula caroliniana*	S/ST	D/U/S	BC/EPW/LU
catclaw acacia (Wright's) *Senegalia wrightii*	S/ST	U/S	SEP
catclaw mimosa *Mimosa aculeaticarpa*	S/ST	U	throughout
cedar elm *Ulmus crassifolia*	MT	R/B/D/U	BC/EPW/LU
chinquapin oak *Quercus muehlenbergii*	MT/LT	R/B	BC/EPW
clapweed (Mormon tea) *Ephedra antisyphilitica*	S	U	BC/SEP
coastal plain willow *Salix caroliniana*	S/ST	R/B	BC
cockspur hawthorn *Crataegus crus-galli*	S/ST	B/D/U	throughout
common buttonbush *Cephalanthus occidentalis*	S/ST	W/R	throughout
common hoptree (wafer ash) *Ptelea trifoliata*	S/ST	R/B/D	BC/EPW/LU
common persimmon *Diospyros virginiana*	MT	D	LU
coralberry (Indian currant) *Symphoricarpos orbiculatus*	S	D/U	BC
creek plum *Prunus rivularis*	S	B/U	throughout
desert willow *Chilopsis linearis*	ST/MT	D/U/S	SEP
dwarf palmetto *Sabal minor*	S	B	BC
eastern cottonwood *Populus deltoides*	LT	R/B/D	BC/EPW

Common Name(s) / Scientific Name	Form	Site	Ecoregion
evergreen sumac *Rhus virens*	S/ST	U/S	BC/EPW/SEP
Eve's necklacepod *Styphnolobium affine*	ST/MT	B/D/U	throughout
false indigo bush *Amorpha fruticosa*	S	D/U	throughout
fourwing saltbush *Atriplex canescens*	S	U	SEP
fragrant mimosa *Mimosa borealis*	S	U/S	throughout
fragrant sumac *Rhus aromatica*	S	U/S	SEP
green ash *Fraxinus pennsylvanica*	MT/LT	R/B	BC/EPW
green hawthorn *Crataegus viridis*	S/ST	B/D/U	BC/EPW/LU
green snakewood *Condalia viridis*	S	U	EPW/SEP
Gregg's hawthorn *Crataegus greggiana*	S/ST	D/U	EPW
gum bully (bumelia) *Sideroxylon lanuginosum*	MT	D/U/S	throughout
Havana snakeroot (shrubby boneset) *Ageratina havanensis*	S	B/U	throughout
honey mesquite *Prosopis glandulosa*	ST/MT	B/D/U	throughout
javelina bush *Condalia ericoides*	S	U	SEP
Jersey tea (prairie redroot) *Ceanothus herbaceus*	S	B/U	BC/EPW,SEP
Jerusalem thorn (retama) *Parkinsonia aculeata*	S/ST	B/D/U	BC/SEP
knockaway (anaqua) *Ehretia anacua*	MT	B	BC
Lacey oak *Quercus laceyi*	MT	U/S	BC/EPW
Lindheimer's hackberry *Celtis lindheimeri*	MT	B/U	BC
Lindheimer's silktassel *Garrya ovata* ssp. *lindheimeri*	S/ST	U/S	BC/EPW
little walnut *Juglans microcarpa*	ST/MT	B/D/U	BC/EPW/SEP
littleleaf leadtree (goldenball) *Leucaena retusa*	ST/MT	U/S	BC/EPW/SEP
littleleaf sumac *Rhus microphylla*	S/ST	D/U/S	throughout
lotebush *Ziziphus obtusifolia*	S/ST	U/S	BC/SEP
mescal bean (Texas mountain laurel) *Sophora secundiflora*	S/ST	U/S	BC/EPW/SEP
Mexican buckeye *Ungnadia speciosa*	S/ST	U/S	throughout
Mexican plum *Prunus mexicana*	ST/MT	B/D/U	BC/EPW
Mexican redbud *Cercis canadensis* var. *mexicana*	ST	B/D/U	SEP
Mohr oak *Quercus mohriana*	ST	U/S	SEP
mouse's eye (mouse ears) *Bernardia myricifolia*	S/ST	U	BC/EPW
netleaf hackberry *Celtis laevigata* var. *reticulata*	MT	B/D/U	throughout
neatleaf swampprivet *Forestiera reticulata*	S/ST	B/U	BC/SEP
netleaf white oak (Mexican) *Quercus polymorpha*	MT/LT	B/D/U	SEP
northern spicebush *Lindera benzoin*	S/ST	R/B	BC
nutmeg hickory *Carya myristiciformis*	MT	R/B	BC
Ohio buckeye (Texas) *Aesculus glabra* var. *arguta*	ST/MT	D/U	BC/LU
Osage-orange (bois d'arc) *Maclura pomifera*	LT	B/D	BC/EPW
papershell pinyon *Pinus remota*	MT	U	SEP
peachbush *Prunus texana*	S/ST	U	EPW/LU
pecan *Carya illinoinensis*	LT	B/D	throughout
Pinchot's juniper (redberry) *Juniperus pinchotii*	S/ST/MT	U/S	SEP
possumhaw (deciduous holly) *Ilex decidua*	S/ST	B/D/U	BC/EPW
post oak *Quercus stellata*	LT	D/U	throughout
prairie sumac (flameleaf) *Rhus lanceolata*	S/ST	D/U/S	throughout

Common Name(s) / Scientific Name	Form	Site	Ecoregion
pungent oak *Quercus pungens*	S/ST	U	SEP
red buckeye *Aesculus pavia*	S/ST	B/D	BC
red buckeye (yellow woolly) *Aesculus pavia* var. *flavescens*	S/ST	B/D	BC
red mulberry *Morus rubra*	LT	R/B/D	BC/EPW/LU
Reverchon's hawthorn *Crataegus reverchonii*	S/ST	D/U	throughout
Roemer's false indigo *Amorpha roemeriana*	S	D/U	BC/EPW
Rooseveltweed (false willow) *Baccharis neglecta*	S	D/U/S	throughout
roughleaf dogwood *Cornus drummondii*	S/ST	B/D/U	BC/EPW/LU
roundflower catclaw (Roemer's) *Senegalia roemeriana*	S/ST	U/S	throughout
rusty blackhaw *Viburnum rufidulum*	ST	D/U	BC/EPW/LU
sand post oak *Quercus margaretta*	MT	U	LU
sandpaper oak (Vasey) *Quercus vaseyana*	S/ST	U	EPW/SEP
skunkbush sumac *Rhus trilobata*	S	D/U	throughout
slippery elm *Ulmus rubra*	LT	B/D	BC/EPW
stretchberry (elbow bush) *Forestiera pubescens*	S	B/U	throughout
sugarberry *Celtis laevigata*	MT/LT	B/D/U	throughout
sweet acacia (huisache) *Vachellia farnesiana*	ST/MT	B/D/U	BC/SEP
sycamoreleaf snowbell *Styrax platanifolius*	S/ST	B	BC
sycamoreleaf snowbell (hairy) *Styrax platanifolius* ssp. *stellatus*	S/ST	B	BC
Texas almond *Prunus minutiflora*	S	U	BC/SEP
Texas ash *Fraxinus albicans*	MT	B/D/U	BC/EPW
Texas barberry *Mahonia swaseyi*	S	D/U	BC/EPW
Texas barometer bush (cenizo) *Leucophyllum frutescens*	S	D/U/S	SEP
Texas crab apple (Blanco) *Malus ioensis* var. *texana*	S/ST	D/U	BC/EPW
Texas Hercules' club (prickly ash) *Zanthoxylum hirsutum*	S/ST	D/U	throughout
Texas hogplum *Colubrina texensis*	S	D/U	BC/EPW/SEP
Texas kidneywood *Eysenhardtia texana*	S/ST	U/S	throughout
Texas live oak (escarpment) *Quercus fusiformis*	LT	B/D/U/S	throughout
Texas madrone *Arbutus xalapensis*	MT	U/S	BC
Texas mimosa *Mimosa texana*	S	U/S	BC/EPW/SEP
Texas mock orange *Philadelphus texensis*	S	B/U	BC
Texas mulberry *Morus microphylla*	S/ST	B/D/U/S	BC/EPW/SEP
Texas persimmon *Diospyros texana*	S/ST	B/U/S	throughout
Texas red oak (Spanish) *Quercus buckleyi*	MT	D/U/S	throughout
Texas redbud *Cercis canadensis* var. *texensis*	ST	B/D/U/S	throughout
Texas snowbell *Styrax platanifolius* ssp. *texanus*	S/ST	B/U	BC/SEP
Tracy's hawthorn *Crataegus tracyi*	S/ST	D/U	BC/SEP
Turner's hawthorn *Crataegus turnerorum*	S/ST	U	SEP
vine jointfir *Ephedra pedunculata*	S	U	SEP
wand butterflybush *Buddleja racemosa*	S	B/U	BC
western soapberry *Sapindus saponaria* var. *drummondii*	MT	B/D/U	throughout
whitebrush (beebrush) *Aloysia gratissima*	S	D	throughout
yaupon *Ilex vomitoria*	S/ST	B/D/U	BC

Form

S-Shrub: less than 10 feet, usually multi-stemmed
ST-Small Tree: 10 to 20 feet
MT-Medium Tree: 20-50 feet
LT-Large Tree: greater than 50 feet, requires large space

Site (where to plant/introduce these plants)

W-Wetland: various soil depths, usually clayey, constantly wet/boggy, frequently flooded
R-Riparian: various soil depths & textures, saturated, frequently flooded
B-Bottomland: deeper soils, various textures, moist, occasionally flooded
D-Deep Upland: deeper soils, usually sandy or loamy textures, moist to dry, rarely flooded
U-Upland: shallow soils, usually clayey texture, dry, not flooded
S-Shallow Upland: very shallow & rocky soils, dry to very dry, not flooded

Ecoregion (where these plants naturally occur on the Edwards Plateau)

BC-Balcones Canyonlands (eastern & southern Edwards Plateau)
All or parts of Bandera, Bexar, Blanco, Burnet, Comal, Edwards, Gillespie, Hays, Kendall, Kerr, Kinney, Medina, Real, Travis, Uvalde, and Williamson counties

EPW-Edwards Plateau Woodland (central Edwards Plateau)
All or parts of Bandera, Blanco, Burnet, Concho, Edwards, Gillespie, Kendall, Kerr, Kimble, Lampasas, Llano, Mason, McCulloch, Menard, Real, San Saba, Schleicher, Sutton, and Tom Green counties

LU-Llano Uplift (northeastern Edwards Plateau)
All or parts of Blanco, Burnet, Gillespie, Llano, Mason, McCulloch, and San Saba counties

SEP-Semiarid Edwards Plateau (western Edwards Plateau)
All or parts of Coke, Crockett, Edwards, Glasscock, Irion, Kinney, Nolan, Reagan, Runnels, Schleicher, Sterling, Sutton, Taylor, Tom Green, Upton, and Val Verde counties

Taxanomic Resources

USDA NRCS PLANTS Database
Integrated Taxanomic Information System (ITIS)

Plant Links (all plants are linked to additional information)

Lady Bird Johnson Wildflower Center