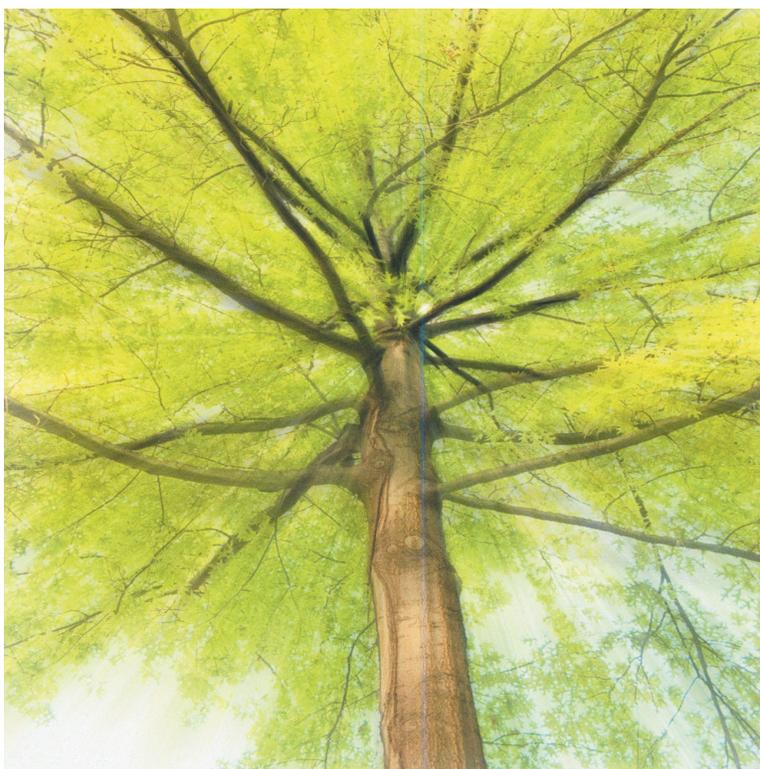


THE RIGHT TREE

A GUIDE TO PROPER TREE SELECTION AND
PLANTING NEAR POWER LINES

the right size



the right care

the right location

the right species

The right tree in the right place adds beauty to the landscape, offers many environmental benefits and saves you energy and money. However, the wrong tree in the wrong place is a hazard to both public safety and the reliability of electric service.

Trees can also interfere with underground utility lines, scrape the sides of houses or cars, interfere with pedestrians, block signage and cause sidewalks to heave or break. All of these potential problems can easily be avoided by planting the right tree in the right location.

That's why Tree Trust, Great River Energy and Minnesota Power have worked together to provide you with these important guidelines. With thoughtful planning and proper tree selection, you can enjoy the trees you plant for years, without worry that they will become a power line hazard.

We are committed to maintaining a safe, reliable electric system and improving the communities we serve and the environment.

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Benefits of properly placed trees	1
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**Know what's below.
Call before you dig.**

Before you dig, you must have your underground lines located. IT'S THE LAW. Call 811, contact your state's one-call service or schedule your appointment online. You must schedule an appointment at least three days before digging.

Minnesota

651-454-0002
MN 800-252-1166
gopherstateonecall.org

Wisconsin

WI 800-242-8511
diggershotline.com

THE RIGHT TREE

A GUIDE TO PROPER TREE SELECTION AND PLANTING NEAR POWER LINES

Look for trees that will stand no higher than 18' when fully grown.



No one wants to learn that their tree is growing too close to a power line and needs to be removed. This booklet provides guidance for homeowners, businesses and other landowners on selection and placement of trees to maximize their benefits and to avoid any hazards the trees might create. Trees, properly selected and sited, bring many benefits to homeowners and communities.

Natural Beauty— Trees provide beauty to the landscape. They can add to the comfort of a home and screen an unattractive view or provide privacy. Businesses also benefit from trees planted on boulevards and shopping areas.

Energy and Cost Savings— Properly placed shade trees lower temperatures in communities and homes and reduce the need for air conditioning, conserving energy and dollars, and reducing air pollution. Trees shade homes, streets and parking lots, reducing the urban heat island effect. In winter, trees provide shelter from winds, also reducing energy usage.

Air and Water Quality— Trees reduce air pollution by trapping particulates and absorbing pollutant gases. Their roots help hold soil in place, reducing erosion and slowing water runoff, contributing greatly to water quality.

Reduced Greenhouse Gases— Because they store large amounts of carbon in their trunks and leaves, trees play an important role in the environmental cycle by absorbing carbon dioxide and giving off oxygen.

THE RIGHT SIZE

SELECT A TREE THAT WILL GROW TO THE RIGHT HEIGHT

The first step toward selecting and planting the right tree is knowing how tall the tree will be at maturity. Without proper planning, the small tree you get at the nursery can grow rapidly around the power line, threatening public safety and reliability. For example:

- During storms, falling limbs or trees can bring down power lines, creating dangerous situations and outages.

- Trees that are close to or touch a power line can cause serious and fatal accidents. Read about “arc flashing” in the Q & A on page 7.

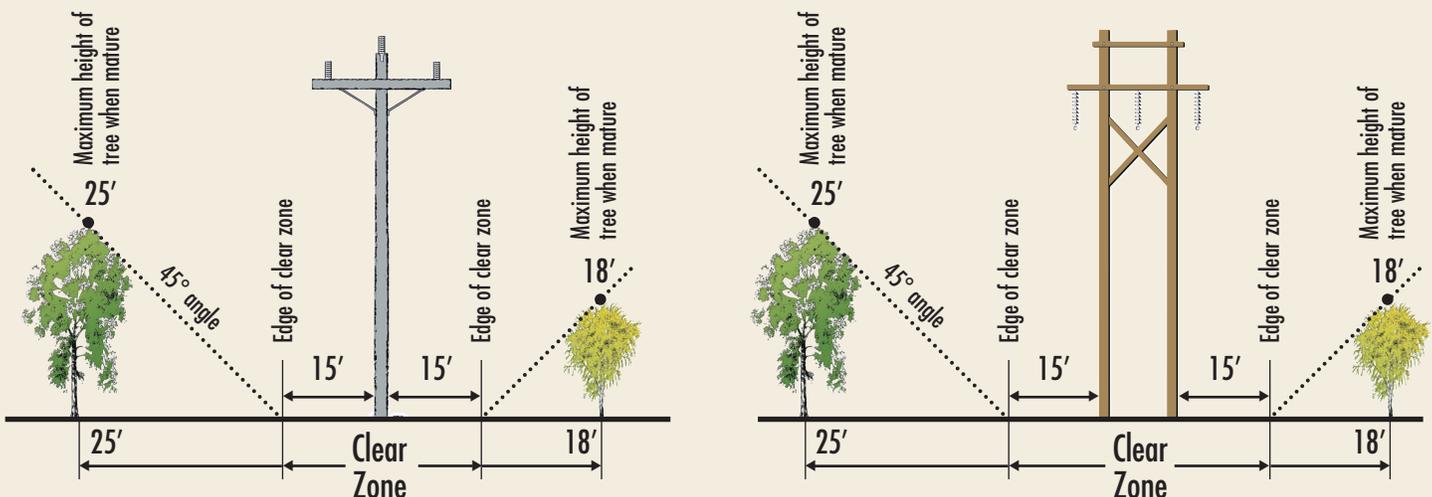
- Trees are a common cause of power outages. Even with regular tree pruning, electric utility companies respond to many service calls because of trees, adding to the overall cost of electrical service.

- Overgrown trees can block the path of construction vehicles that need access to the lines for maintenance and emergency repairs.

For these reasons, it is important to plant the right tree in the right place.

What You CAN Plant and Where—
A clear area along the power line route, or a **clear zone**, must be maintained at all times.

For safety and reliability, a **minimum** 15' clear zone is required on both sides of a power line. A tree should never be planted closer than its height at maturity to the edge of the clear zone. For instance, an 18' tree must be planted at least 18' from the edge of the clear zone.



As long as the proper clear zones are maintained, shrubs, other low-growing plants and many trees that remain short at maturity can safely be planted near power lines. For a list of appropriate trees, see pages 10 through 13. Great River Energy and Minnesota Power require a minimum 15' clear zone on both sides of any transmis-

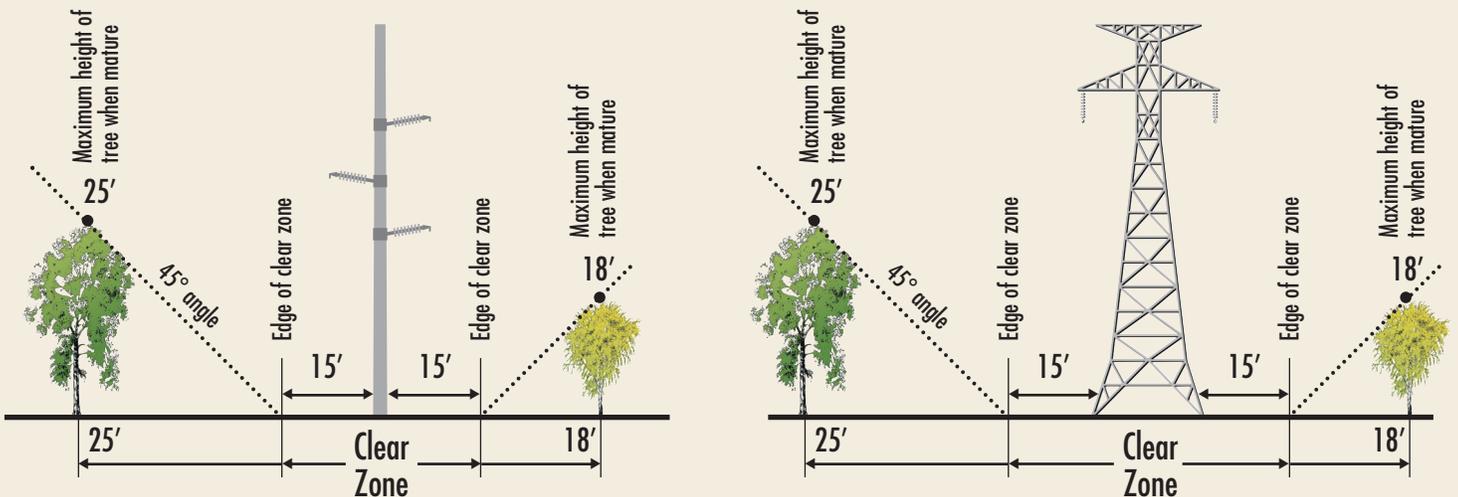
sion line, measured from the base of the structure. Follow the guidelines in the diagrams below and refer to page 7 to learn about utility safety and maintenance practices.

NOTE: Every electric utility has their own set of requirements, which may differ from Great River Energy's and Minnesota Power's requirements. Be sure to contact the owner of the power line before planting.

For guidance on where to plant trees to save energy and reduce your energy bills, see next page.

If you have any questions about acceptable plantings or where you can plant a tree or shrub near a power line, contact your local nursery, your electric provider, Great River Energy or Minnesota Power. We want to help you find the right tree.

These diagrams show a variety of power pole structures. See page 6 to learn more.



THE RIGHT PLACE

CONSERVE ENERGY BY PLANTING IN THE RIGHT PLACE

Energy Conservation

Properly placed trees conserve energy and reduce both heating and cooling bills. Planting deciduous trees—trees that drop their leaves in the fall—on the west and east sides of your house will provide the greatest energy savings during both summer and winter. The mature size of the tree should also be considered when siting in relation to your house.

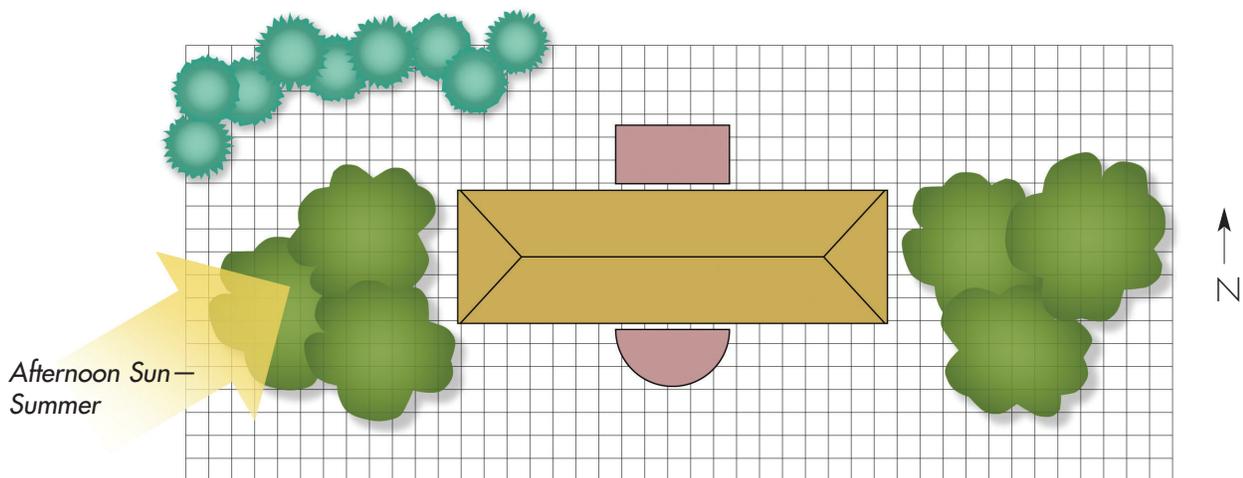
Summer

Cooling— Planting trees on the east and west sides of your house will block the morning and afternoon sun in the summer, thereby reducing your cooling bill.

In addition, trees planted to shade driveways, patios, sidewalks and streets will help create a cooler atmosphere around the home. Trees do this by transpiration, a natural evaporative cooler. Such plantings will make your house more comfortable in the summer even if you do not have air conditioning.

Reducing cooling costs also reduces the peak demand for electricity in summer months, which helps reduce the need for new power plants and keep electricity costs down.

Locate air conditioners away from south windows and shade them with deciduous trees, which will help them to run more efficiently by making the area cooler, but still allow good air circulation.



Save energy by planting trees that shade your house on the east and west sides in summer and then shed their leaves in the fall to allow heat gain from the winter sun. Evergreens planted on the north or northwest side can provide a windbreak in cooler climates.

Winter

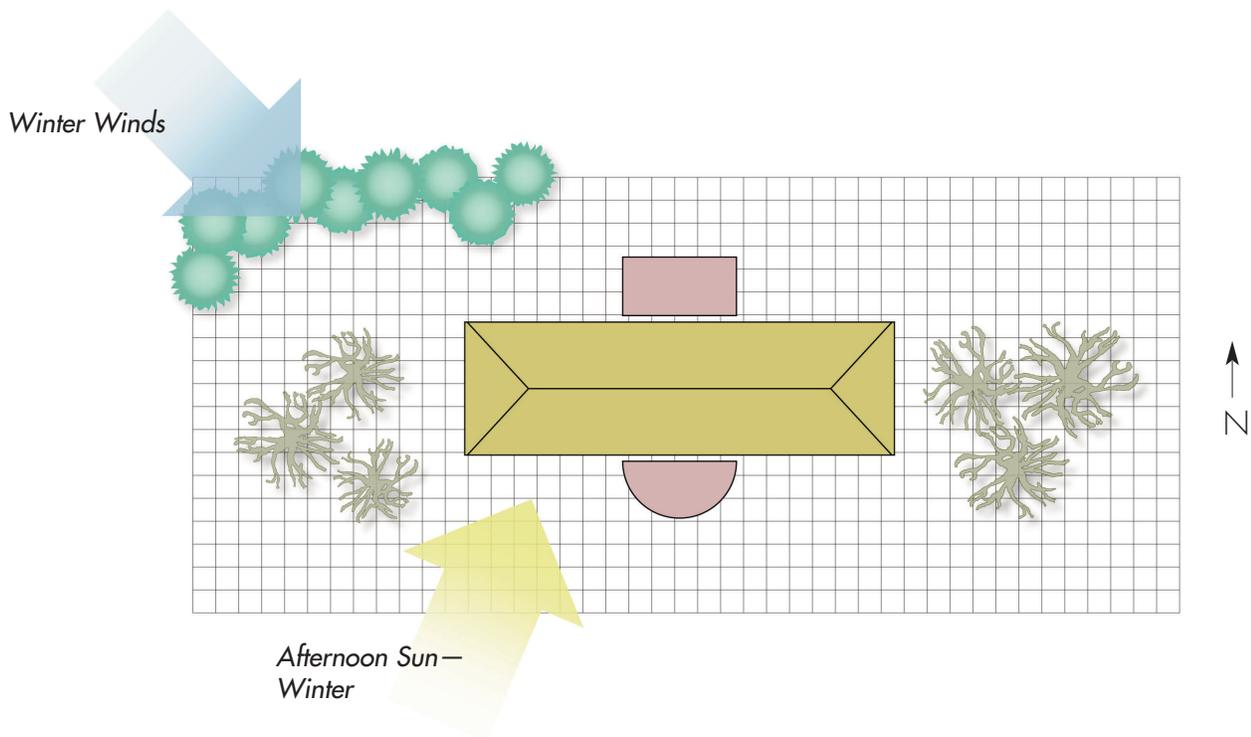
Heating— In cold climates, avoid planting trees on the south side of your house. On sunny winter days, you can open your shades on the south side to take advantage of passive solar warmth gained from the winter sun as it travels low in the southern sky. If trees already exist on

the south side of the house, prune their lower branches to allow more sun through.

Coniferous trees— trees that keep their “leaves” all year round— can be planted as a windbreak on the north–northwest side of the house. Such plantings can reduce heating costs that result from evaporative cooling and air infiltration in the winter.

Windbreaks also guide wind up and over the house. Conserve energy by planting a dense row or continuous clusters of evergreen trees with a row of shrubs or smaller trees in front.

Properly space windbreak rows so that sun can reach the lower branches of all plants.



Save energy by planting trees on the east and west sides, keeping the south side clear to allow heat gain from the winter sun. Evergreens planted on the north or northwest side can provide a windbreak in cooler climates. If you do plan on planting on the south side, be sure to choose a deciduous tree.

FACTS ABOUT POWER LINES AND STRUCTURES

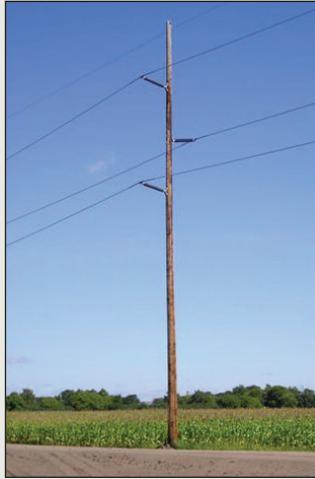
Electric power lines have been part of the landscape for more than a century, delivering the power we need to use our favorite electronics and appliances, and operate our businesses. There are transmission lines, such as those Great River Energy and Minnesota Power builds, and distribution lines from your local electric utility to your home or business.

Q. What are transmission and distribution power lines?

A. Transmission lines deliver large or “bulk” amounts of electricity from power plants to substations. Think of transmission lines as the interstate free-ways of the electrical system. Distribution lines deliver smaller amounts of electricity directly to homes, farms and businesses. Think of them as the smaller state or county highways of the electrical system. The electric provider who you pay each month is a distribution cooperative or company.

Q. What are volts?

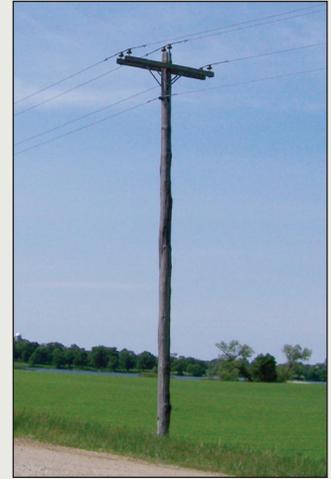
A. The force or electrical pressure of an electrical current is measured in volts. The voltage at which a transmission line operates is expressed in kilovolts (kV). One kV equals 1,000 volts. Any line that operates at over 100 kV is considered a high voltage transmission line. Lines operating below 100 kV are either considered sub-transmission lines or distribution lines.



69-kV/115-kV transmission structure



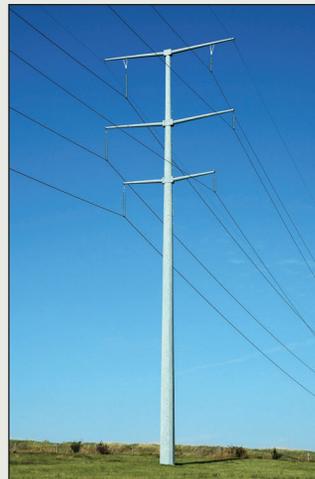
69-kV/115-kV transmission structure with distribution underbuild



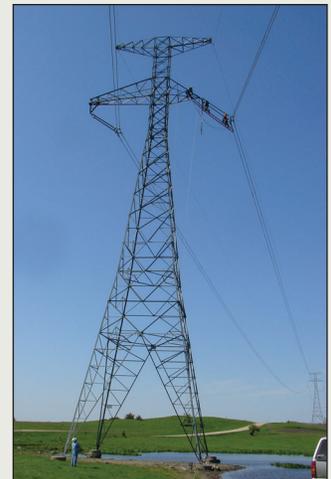
Distribution structure



230-kV/345-kV H-frame transmission structure



230-kV/345-kV steel transmission structure



230-kV/345-kV lattice transmission structure

ELECTRIC UTILITY SAFETY AND MAINTENANCE PRACTICES

Since 1996, three large-scale electric grid failures in the U.S. and Canada have been caused in part by trees, including the 2003 east coast black-out that affected 50 million people. The federal government has since developed mandatory reliability standards including strict requirements for vegetation management to help prevent problems caused by tree contact with high voltage transmission lines. In turn, utilities have enhanced their vegetation management programs and begun taking a more proactive approach to maintaining clear zones.

To ensure safe, reliable operation of transmission lines, Great River Energy and Minnesota Power inspect lines regularly by air and by ground for:

- Trees that are growing or could grow too close to the power line
- Equipment needing repair or replacement
- Anything that might jeopardize safe, reliable operation of the line

REMOVING TREES VERSUS PRUNING

Now that utilities are taking a more proactive approach to maintaining clear zones, trees that may become hazards are most often being removed rather than pruned. Trees do not even need to touch a power line to cause an arc flash. (See Q & A below.) Although pruning trees away from power lines can help, severely pruned trees are, at best, unsightly. At worst they become unhealthy, hazardous trees that need to be removed anyway.

Q. Will you enter my property to remove or prune trees?

A. Sometimes, yes. Occasionally crews may have to enter your property to remove or prune trees or to perform other maintenance work. In the event of an emergency, quick and direct access may be necessary for repair. Great River Energy and Minnesota Power typically use existing field or access roads with your permission and make every effort to avoid damaging property. We (or one of our contractors) will make a reasonable effort to contact you first. However, in emergencies, it may not be possible to contact you first.

Q. Do you use herbicides?

A. Where conditions permit and with the property owner's permission, Great River Energy and Minnesota Power also use herbicides as an effective and economical method of controlling tree and brush growth. Great River Energy's and Minnesota Power's herbicide application methods follow U.S. Environmental Protection Agency and state agency regulations. Herbicides are applied by licensed applicators.

Q. What is arc flashing? Why can't a tree come close to a power line as long as it doesn't actually touch it?

A. When trees or other objects are close to a power line an "arc flash" can form. An arc flash is a short circuit through air that can flash over from an energized conductor (like a power line) to trees, people or other objects (anything that conducts electricity) and form an arc of electricity in the air connecting the two. Arc flashes produce intense heat and light, and can cause serious and fatal injuries, widespread outages and/or fires.

To maintain a safe, reliable system, utilities closely follow industry standards, such as those outlined in the National Electrical Safety Code and requirements of the North American Electric Reliability Corporation.

NERC
NORTH AMERICAN ELECTRIC
RELIABILITY CORPORATION

THE RIGHT KIND

Appearance

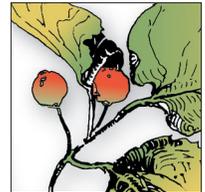
When choosing a tree, you should consider its appearance and how it fits into your landscape. Trees vary widely in size and shape. They can be evergreen or drop their leaves each year. Many have showy blossoms, turn bright colors in the fall or have attractive bark all winter.

Consider how the tree will look when mature. Will it frame the house nicely or seem too large? Sometimes a tree that seems too big in a front yard will make a good background for the house when placed in the back. Consult your local nursery about trees that grow well in your area and their mature size. This will help you make the right decision about what to buy and where to place your trees.

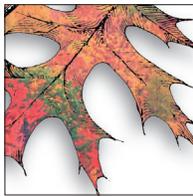


*Blossoms. Many trees have colorful blossoms, including: crab apples (*Malus* spp.), magnolias and most of the *Prunus* spp.*

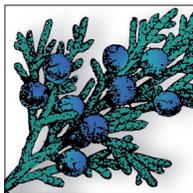
*Fruit. Many trees have fruit that attracts wildlife and adds color to your yard, including: most of the dogwoods (*Cornus* spp.), hawthorns (*Crataegus* spp.) and crab apples (*Malus* spp.).*



*Fall Color. Trees with brightly colored leaves in the fall include: serviceberry (*Amelanchier*) and dogwoods (*Cornus* spp.).*



*Bark. Some trees have attractive bark that is especially noticeable in the winter, such as: amur chokecherry (*Prunus maaccii*) and Princess Kay Plum (*Prunus nigra* 'Princess Kay').*



Evergreens. Evergreens provide year-round color and shelter for birds.

Hardiness & Health

Another consideration in tree selection is the long-term health of the tree, which can be affected by soils, climate, susceptibility to disease and quality of nursery stock.

Pruning— Again, size is important. Trees that need to be pruned severely to fit into their space are prone to disease, insect infestation and wind damage.

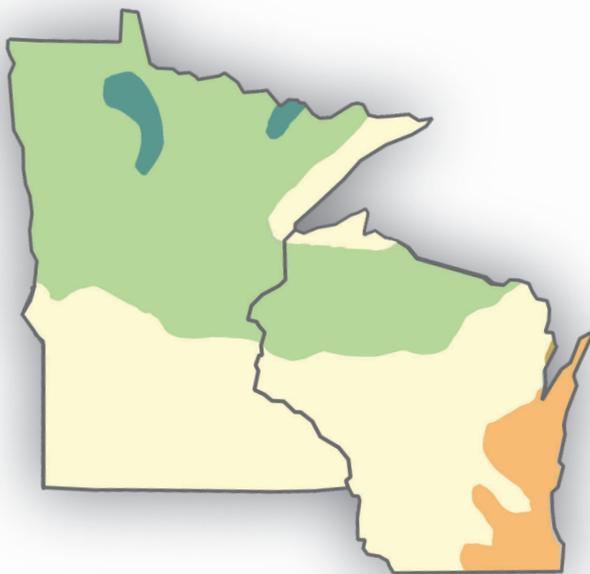
Cold Hardiness Zone— Select trees that are hardy in your area so they will withstand cold winters and the heat of summer. Trees in this guide are identified by their cold hardiness zone. Check the map below to see which trees will thrive in your area.

Soil— Soil conditions can affect the health of your trees. Some trees don't do well in boggy, poorly drained, clay or heavily compacted sites. Others have problems in sandy soils that don't hold moisture. The pH of the soil can affect growth in some trees. Most trees listed in this guide are widely adaptable to a variety of soil types. Check the special notes, however, to make sure the tree you choose will do well

on your site. If you need help determining your soil type, consult your local agricultural extension office. They can give you information for your area and even test your soil if necessary. Numbers for these offices are listed on the last page of this guide.

Insects and disease— Some tree species are particularly prone to certain disease or insect infestations. Choosing other species or disease-resistant cultivars of these trees can help assure the long-term health of your trees.

Plant stock— Purchase trees with healthy stems and roots. Stems should be free of wounds, cankers (dead areas), or other damage. Roots should be at or near the surface of the soil ball and growing away from the stem.



Hardiness Zone Key

Zone 2	-50	To	-40	
Zone 3	-40	To	-30	
Zone 4	-30	To	-20	
Zone 5	-20	To	-10	

Use these cold hardiness zones to select trees that will survive winter in your region.

THE RIGHT TREES

— FOR PLANTING NEAR POWER LINES

The trees listed in the following pages are appropriate for planting near power lines. See photos on pages 14 and 15. Deciduous trees are trees that drop their leaves in the fall. Coniferous trees are trees which keep their “leaves” all year long.

This list was developed to provide you with a starting point for tree selection. Please work with your local forester or nursery to determine specific benefits and limitations of each species for your area. Some of the species are often found as both

shrubs and in tree form, (e.g. pussy willow and nannyberry). A shrub form can easily be pruned into a multi-stemmed small tree.

	Size	Form	Rate ¹	Zone	Fall Color	Flower	Light ²	Culture/Comments
Deciduous Trees								
<i>Acer tataricum</i> tatarian maple	15-18'h 15-25'w	rounded, spreading	S/M	3-6	yellow red- dish brown	—	☉	Tolerant of harsh conditions, including high pH and drought. Not as hardy as <i>ginnala</i> .
<i>Amelanchier x grandiflora</i> apple serviceberry	18'h 15-20'w	oval to spreading	M	3-8	orange to red	white	☉	Comes in clump and single stem forms. Great tree to attract wildlife. Blue to red fruits. Select cultivars: 'Forest Prince' and 'Princess Diana.'
<i>Amelanchier laevis</i> allegheeny serviceberry	18'h 15'w	upright, oval	M	4-8	orange	white	☉	Comes in clump and single stem forms. Can form thickets. Edible, purplish blue fruit attract birds and wildlife.
<i>Cornus alternifolia</i> pagoda dogwood	15-18'h 20-25'w	rounded, spreading	M	3-7	reddish - purple	yellow white	☉	Keep root zone cool. Moist, acidic, well drained soil. Best in cooler climates. Fruit enjoyed by birds. Performs well in shady areas. May tolerate full shade.
<i>Cornus racemosa</i> gray dogwood	10-15'h 10-15'w	rounded	M	3-8	purple-red	white	☉	Showy white fruits in late summer attract birds. Tolerant of a wide range of soils. Native to the Upper Midwest of the U.S. Performs well in shady areas.
<i>Crataegus crus—gali</i> var. <i>inermis</i> thornless cockspur hawthorn	15-18'h 15-20'w	spreading	M	4-7	orange	white	☉	Thornless variety of hawthorn. Abundant white flowers in June, followed by red persistent fruit in autumn. Prefers moist conditions, but is also drought tolerant.

	Size	Form	Rate ¹	Zone	Fall Color	Flower	Light ²	Culture/Comments
<i>Crataegus laevigata</i> 'Supurba' crimson cloud hawthorn	15'h 10-15'w	rounded	M	4-7	—	red	☉	Thornless and resistant to leaf spot diseases. Flowers are large and very bright red with white centers. Red fruits persist into winter.
<i>Crataegus x mordenensis</i> 'Toba' toba hawthorn	12-15'h 12'w	upright, spreading	M	3-7	—	white	☉	Hardier than the other hawthorns. Fragrant, double white flowers turn to pink. Interesting twisted bark.
<i>Hamamelis virginiana</i> witch hazel	15-18'h 15'w	rounded, vase- shaped	M	4-8	yellow	yellow	☉	Moist soil. Somewhat tolerant of urban environment. Flowers in fall. Native to Minnesota and Wisconsin.
<i>Magnolia stellata</i> 'Royal' royal star magnolia	8-10'h 8-10'w	rounded	S	4-8	yellow	white	☉	Sheltered location in north to prevent buds from freezing. Prefers moist, rich well drained acid soil.
<i>Malus</i> spp. flowering crab	10-18'h 10-25'w	oval to rounded	varies	2-8	—	white, pink red	☉	Well drained acid soil. See following cultivars. Consult nursery about various other cultivars that will work.
<i>Malus</i> 'Coralcole' coralburst crab	8-10'h 12-15'w	rounded	M	3-7	—	pink	☉	Dense branching habit and uniform grower. Coral-pink buds opening to double pink flowers followed by bronze fruit. Very resistant to scab.
<i>Malus</i> 'Hargozam' harvest gold crab	18'h 15'w	upright	M	4-7	—	white	☉	Very good disease resistance, and said to have good salt tolerance. Colorful golden fruit remain showy into December and persist into spring. Green foliage.
<i>Malus</i> 'Louisa' louisa crab	15'h 15'w	weeping	M	4-7	—	pink	☉	Red buds open to pink flowers, glossy green foliage, and persistent yellow fruits. Disease resistant.
<i>Malus</i> 'Pink Spires' pink spires crab	15'h 12'w	narrow	M	2-7	copper	pink	☉	Ideal for confined screen or as a border plant. Foliage is red-purplish in spring and turns to green-bronze in summer. Purplish-red fruits do not drop.
<i>Malus</i> 'Prairifire' prairifire crab	15'h 20'w	spreading, rounded	M	4-7	red/orange	red	☉	Good disease resistance. Foliage is purple maturing to red-green and has good retention during summer. Maroon fruit does not drop and bark is glossy dark red. Blooms later than most crabs.

¹Growth Rate S=12 in/yr or less, M=13-25 in/yr, F=more than 25 in/yr. ²Light ☉ Full Sun, ☉ Partial Shade, ● Full Shade.

THE RIGHT TREES

— FOR PLANTING NEAR POWER LINES

	Size	Form	Rate ¹	Zone	Fall Color	Flower	Light ²	Culture/Comments
<i>Malus transitoria</i> 'Schmidtcutleaf' golden raindrops crab	18'h 15'w	narrow, upright	F	4-7	orange- purple	white	○	Distinguished by its fine textured deeply cut leaves. Golden yellow fruits are persistent. Disease resistant.
<i>Malus</i> 'Spring Snow' spring snow crab	20-25'h 14-16'w	upright rounded	F	4-7	yellow	white	○●	Pink buds that open to fragrant white flowers in spring. Bright green, shiny foliage. Good heat tolerance.
<i>Prunus americana</i> american plum	15-18'h 10-20'w	rounded	F	3-6	—	white	○	Very hardy, drought resistant tree. Thrives with neglect. Can form thickets. Excellent for wildlife. Fruit used for jams.
<i>Prunus maackii</i> amur chokecherry	18'h 18-25'w	oval to rounded	F	3-6	—	white	○	Prefers fertile, well drained soil. Easily develops girdling roots. Beautiful amber-colored birchlike bark. Small red to black fruits attract birds.
<i>Prunus cerasifera</i> 'Newport' newport plum	15-18'h 15-20'w	rounded	M	4-8	—	pinkish white	○●	Moist, well drained soil. Purple fruit in summer. Reddish-purple leaves.
<i>Prunus nigra</i> 'Princess Kay' princess kay plum	15'h 18-10'w	upright, narrow	M	2-6	—	double white	○	Requires well drained soil. Not drought tolerant. Yellow-red fruit. Prominent lenticels on dark bark for winter interest.
<i>Prunus</i> 'North Star' & 'Meteor' sour cherry	8-12'h 6-10'w	rounded	M	4	—	golden yellow	○	Well drained soil. Red berry used for preserves and eaten by birds.
<i>Prunus virginiana</i> 'Schubert' canada red chokecherry	15-18'h 15-20'w	oval	M	2-6	—	white	○	Tolerates low fertility and dry sites. Dark red-purple leaves and fruit. Susceptible to insects and black knot. Hardy and attractive.
<i>Salix discolor</i> pussy willow	18'h 12-15'w	pyramidal to oval	M	2-7	—	—	○	Moist to wet soil. Multi-stemmed. Fuzzy silver catkins.
<i>Syringa reticulata</i> japanese tree lilac	18'h 15-25'w	pyramidal, rounded	M	3-7	—	creamy white	○●	Full sun for best flowers. Loose, well drained acidic soil. Prefers cool summers.
<i>Syringa x hyacinthiflora</i> 'Pocahontas' pocahontas lilac tree form	10-12'h 10-12'w	upright	M	2-7	purple	white	○	Exceptional hardiness and vigor. Deep purple single florets. Prune to maintain shape.
<i>Viburnum lentago</i> nannyberry tree form	15-18'h 8-10'w	oval	M	3-7	purple red	white	○●	Very adaptable to wide range of conditions. Blue and black fruits are good winter food for birds. Native to Eastern U.S.

	Size	Form	Rate ¹	Zone	Fall Color	Flower	Light ²	Culture/Comments
Coniferous Trees								
<i>Juniperus chinensis</i> chinese juniper	15-18'h 4-6'w	pyramidal to rounded	S	4-8	—	—	○	Tolerant of wide range of soils and pH and urban environment. Attracts birds. Selected cultivars: 'Hetzil Columnaris,' 'Maneyi,' 'Sea Green.'
<i>Juniperus scopulorum</i> rocky mountain juniper	14-18'h 4-6'w	pyramidal	S	3-7	—	—	○	More cold tolerant than other junipers makes it good for prairie climates. Growth habit and foliage color vary with cultivars. Selected cultivars: 'Blue Trail,' 'Medora,' 'Sutherland,' 'Wichita.'
<i>Juniperus scopulorum</i> 'Medora' medora juniper	10-12'h 8-10'w	upright narrow	M	3-7	blue-green	blue-green	○●	Slender-shaped with a blue-green color. Needs little shearing. An excellent columnar blue juniper, hardy and acclimated for the northern states.
<i>Pinus mugo</i> mugo pine	10-18'h 4-6'w	rounded, to pyramidal	S	3-7	—	—	○●	Deep moist loam. Tolerant of calcareous soils.
<i>Picea pungens</i> fat albert spruce	15'h 10-12'w	upright	M	3-7	blue	blue	○●	A truly blue spruce. Naturally straight leader and well-shaped form. Requires no staking or training.
<i>Thuja occidentalis</i> arborvitae	15-18'h 15-20'w	pyramidal	S/M	3-7	—	—	○●	pH tolerant. Check specific cultivars for details: 'Smaragd,' 'Sunkist,' 'Techny,' 'Teddy.'

¹Growth Rate S=12 in/yr or less, M=13-25 in/yr, F=more than 25 in/yr. ²Light ○ Full Sun, ● Partial Shade, ● Full Shade.

DECIDUOUS TREES



Acer tataricum
tatarian maple



Amelanchier laevis
Allegheny
serviceberry



Cornus alternifolia
pagoda dogwood



Cornu racemosa
gray dogwood



Crataegus
curs-galli var. *inermus*
thornless cockspur
hawthorn



Crataegus laevigata
"Superba"
crimson cloud
hawthorn



Crataegus X
mordenesis "toba"
toba hawthorn



Hamamelis
virginiana
witch hazel



Magnolia stellata
"Royal"
royal star magnolia



Malus "Coralcole"
coralburst crab



Malus "Hargozam"
harvest gold crab



Malus "Louisa"
louisa crab



Malus "Pink Spires"
pink spires crab



Malus "Prairifire"
prairifire crab



Malus transitoria
"Schmidtcutleaf"
golden raindrops
crab



Malus "Spring Snow"
spring snow crab



Prunus Americana
american plum



Prunus maackii
amur chokecherry



Prunus cerasifera
"Newport"
newport plum



Prunus nigra
"Princess Kay"
princess kay plum



Prunus "North Star"
sour cherry



Prunus virginiana
"Schubert"
canada red
chokecherry



Salix discolor
pussy willow



Syringa reticulata
japanese tree lilac



Syringa x
hyacinthiflora
"Pocahontas"
Pocahontas lilac tree
form



Viburnum lentago
nannyberry tree form

CONIFEROUS TREES



Juniperus scopulorum
"Medora"
medora juniper



Picea pungens
fat albert spruce

Photos courtesy of Bailey Nurseries and Gertens.

THE RIGHT WAY

— TO PLANT A TREE

Proper Tree Planting

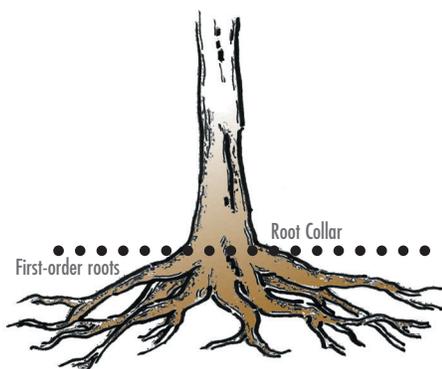
Once you have selected the right tree for your site, follow these general steps to make sure it will grow well. Also refer to Special Planting Considerations for the type of tree you are using.

1. CALL BEFORE YOU DIG!

Call 811 or your state's one-call agency (see inside front cover) to locate all underground lines in your yard before digging.

2. Decide how deep to plant the tree.

The tree should be planted so that its **root collar** (the bulge or flare right above the root system) or the first main branch root is even with or slightly above the soil surface. Many trees are planted too deep at the nursery. So, to



Root collar should be even with or slightly above ground level.

locate the root collar, probe with a wire or remove extra soil. Prune away smaller roots growing from the trunk down to where the first large side roots (first-order roots) occur, about the width of a pencil.

3. Prepare the site. Dig a large saucer-shaped hole two to five times wider than the root ball and just deep enough so that the root collar is slightly above the soil surface. To determine how deep you need to dig the hole, measure from the first-order roots to the bottom of the rootball. Do not dig the hole deeper than you plan to plant the tree. (See diagram next page.) It is better if the root collar is slightly higher than ground level because of possible settling. Do not disturb the soil beneath the root ball.

4. Place the tree carefully in the center of the hole after removing it from the container.

5. Backfill when the tree is positioned and straight. Backfill the hole with the soil that was removed. As the backfill is added, lightly push the soil around the roots or water the soil to eliminate air pockets. (Do not pack the soil after you water.) Backfill to the height just below the root collar. Don't plant the tree too deep.

6. Mulch with woodchips to a depth of 4 inches on top of the planting circle. Keep the mulch 4 inches away from the trunk to keep fungus from growing on the trunk.

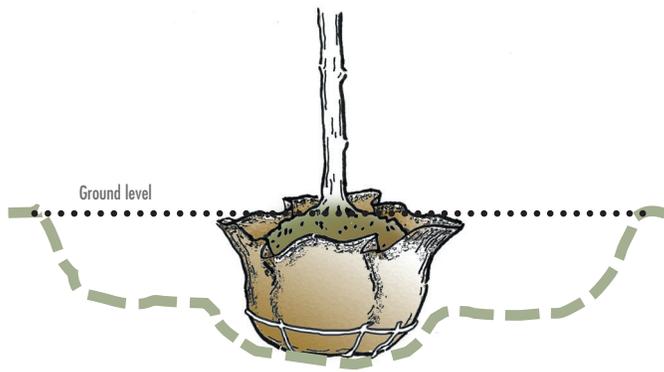
7. Water is very important to a newly planted tree. A slow, root-saturating, one-hour trickle once a week is a good rule of thumb for a new tree. This provides the new roots with sufficient moisture without drowning them. If it rains or is very dry, the watering schedule should be adjusted accordingly.

Special Planting Considerations

Nurseries sell trees in three types: ball and burlap, containerized and bare-root. There are some special planting considerations for each one.

Ball and burlap trees— Ball and burlap trees are generally larger trees dug from the ground at the nursery and might weigh several hundred pounds. The root ball is wrapped in burlap and encased in a wire or string basket.

■ The basket and burlap should not be removed until the tree is positioned in the hole. This keeps the root ball intact.



Ball & burlap tree properly placed in wide hole.

- Carefully loosen the top of the burlap. Probe with a wire or remove soil to determine where the root collar is located—right above where the large roots begin. Dig the hole so the root collar is even with or slightly above the soil surface.

- Carefully place the tree in the hole and backfill some soil around the tree to stabilize it. Cut away as much of the wire basket as you can without disturbing the soil ball.

- Remove all twine and rope from around the ball.

- Remove the nails holding the burlap together and gently fold the burlap back.

- Cut away loose burlap without damaging the root ball. Push any part of the basket and burlap that could not

be removed down into the ground. This will allow the roots to grow out into the soil.

Containerized trees— Containerized trees usually come in plastic or paper pots, or wooden baskets.

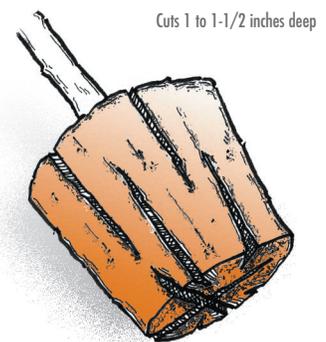
- Remember, the tree may be planted too deep in the pot. Remove soil down to the root collar, where the first large side roots begin (those about the width of a pencil). If the soil ball is dry, water it.

- Determine if the tree roots hold the soil together in the pot or if the soil is loose.

- If the soil is packed or the pot is root-bound, carefully remove the tree from the pot. You may have to lay the tree on its side and press the pot to free it from the soil ball.

- If you see roots circling around the edge of the soil ball once the container is off, make a vertical slice up each quarter of the root ball. Cut an X cut across the bottom of the soil ball and continue planting normally. Cuts should be 1 to 1-1/2 inches deep. See below. This will reduce the chances of the tree developing stem-girdling roots or restricted roots as it grows.

- If the container cannot be removed easily or the tree starts to come out without the soil, first carefully cut off the bottom of the container. Place the tree and remaining pot in the planting hole and adjust for final position. Then cut the container away from the soil ball. Gently backfill and then remove the sides of the pot.



Containerized root ball showing proper scoring.

THE RIGHT CARE

— TO KEEP YOUR TREE HEALTHY

Bare-root trees— Bare-root stock has no soil on the roots. The roots must be carefully protected from drying out.

■ Bare-root trees must be kept cool and moist at all times. Small, hair-like absorbing roots can dry out quickly on a sunny or windy day. Leave these trees in their packing materials and keep them moist, or cover with moist mulch until you are ready to plant.

■ Soak in water for six to 12 hours before planting. Prune damaged, diseased or girdling roots before planting.

■ Make sure the hole you dig is wide enough to spread the roots all the way out. Don't wrap the roots around in the hole.

■ Stabilize the tree and spread roots out to their normal position by mounding a little soil in the bottom of the hole, then setting the tree on the mound and positioning the roots out. See below.

■ Since there is no root ball to hold the tree straight, you will need to support it carefully while backfilling the hole. Backfill the hole half way, and then water it to eliminate any air pockets under the roots. Don't pack the soil after watering.

■ Be sure to plant the tree so the root collar is slightly above ground level. Occasionally, you may need to stake a bare-root tree after planting. Be sure to remove the stake after the first growing season.

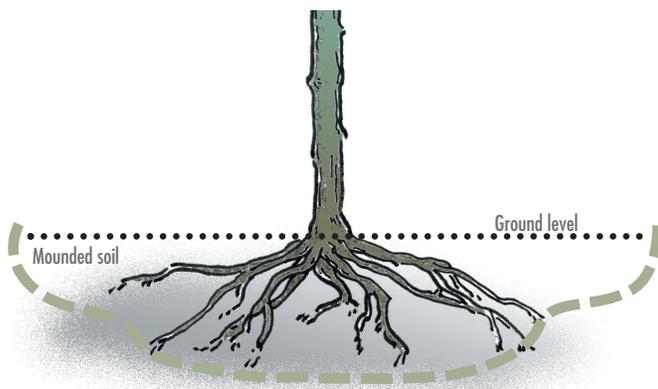
■ Some bare-root species may have to be "sweated" to break dormancy, or they will not grow. Sweating requires a dark, humid environment to help trees leaf out. Consult your nursery about whether your trees need this procedure.

After-Planting Care

Watering— Newly planted trees need regular watering. Generally, a deep watering once a week is enough. You do not need to water if there has been sufficient rainfall. Ball and burlap and containerized trees have all their roots confined to the root ball. Be sure to water the ball thoroughly. Water the tree during dry periods for the first three years after planting.

Fertilizer— Newly planted trees are easily burned by fertilizer. If the trees are planted into fertile soil, do not add any fertilizer during the first three years.

Staking— Most newly planted trees do not need staking. Only those that are unstable should be staked. Secure the tree to the stakes using soft materials that will not damage the cambium (the layer right under the bark) of the tree. Stakes should be removed once the tree is established, usually one year.



Bare-root tree planted with root collar placed at ground level and backfill for stabilizing the tree and positioning roots.

Pruning— Pruning is an important maintenance practice that will improve the health and development of the tree. When you plant, and each following year, prune all broken, dead or rubbing branches. Trim away any secondary or competing “leaders.” Be very careful not to trim the tree’s main leader.

For younger trees you may want to “raise the crown” by removing some of the lower branches, especially to provide clearance for pedestrians. Only remove a few branches each season. Don’t cut the tips off the branches. Instead, make your cuts at the unions between two branches.

Proper pruning can be a successful defense against insects and disease, if the proper cut is made. Refer to the illustration at right for guidance on how to make the proper type of cut for smaller branches.

Application of wound dressings or pruning paints is unnecessary in most instances. These paints can prevent wounds from healing correctly. Only use pruning paint when pruning oaks from April to June, the high-risk period for spread of oak wilt.

When to prune— The best time to prune most trees is when they are dormant—in the winter or very early spring. This helps reduce the spread of disease as well as reducing the stress on the trees. Efforts should be made to avoid pruning oaks or elms during the growing season.

How to prune—

Step 1. Locate the branch bark ridge.

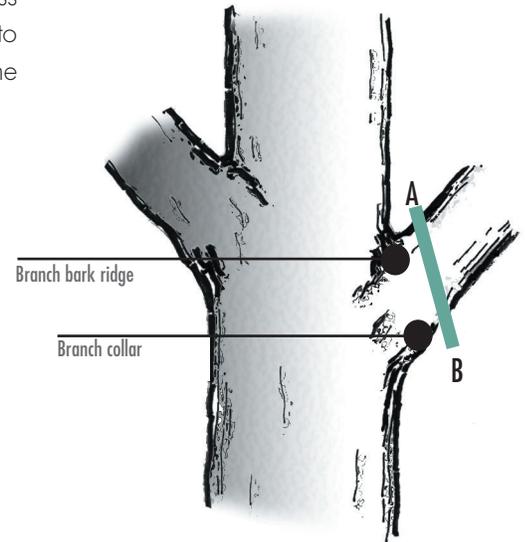
Step 2. Locate the branch collar.

Step 3. Locate the A & B targets.

Step 4. Support the branch as you cut to keep the bark from ripping.

Step 5. Use clean, sharp pruning shears or a pruning saw to cut from A to B.

Note: *It is important not to cut into the branch collar because it creates a larger wound and it’s more difficult for the tree to cover over the wound.*



Avoid cutting into branch bark ridge and branch collar.

Caution — *Touching a power line can be fatal. When you’re pruning, keep yourself and all equipment away from any power line. Always assume that all overhead lines are energized.*

THE EXPERTS

For more information:

University of Minnesota Extension — extension.umn.edu/Garden

Minnesota Landscape Arboretum — arboretum.umn.edu/

Minnesota Landscape Arboretum Yard and Garden Desk — 952-443-1426

University of Wisconsin Extension Urban Horticulture — uwex.edu/ces/wihort/

Soil testing:

University of Minnesota — 612-625-3101 — <http://soiltest.cfans.umn.edu/>

University of Wisconsin — 608-262-4364

Thank you to the following people who have contributed expert advice to this guide:

Kelly Fleissner, City Forester, City of Duluth

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If you have any questions or need to order a copy of this booklet, contact Great River Energy or Minnesota Power.

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