

# Beyond the Ponderosa

SUCCESSFUL LANDSCAPE TREES

FOR HIGHER ELEVATIONS

IN THE SOUTHWEST

FOREWARD BY DR. DAVID R. PATTON, DEAN,  
NAU COLLEGE OF ECOSYSTEM SCIENCE  
AND MANAGEMENT

## BEYOND THE PONDEROSA

SUCCESSFUL LANDSCAPE TREES  
FOR HIGHER ELEVATIONS  
IN THE SOUTHWEST

PUBLISHED BY  
FLAGSTAFF COMMUNITY TREE BOARD

TECHNICAL EDITORS

TOM DEGOMEZ, M.S.  
UNIVERSITY OF ARIZONA  
COOPERATIVE EXTENSION

AND

JOHN DUFF BAILEY, PH.D.  
NORTHERN ARIZONA UNIVERSITY  
SCHOOL OF FORESTRY

PRODUCTION EDITOR

LOIS JOHNSON, CHAIR  
FLAGSTAFF COMMUNITY TREE BOARD

FOREWARD BY  
DR. DAVID R. PATTON, DEAN  
COLLEGE OF ECOSYSTEM SCIENCE AND MANAGEMENT  
NORTHERN ARIZONA UNIVERSITY

*Publisher:* Flagstaff Community Tree Board  
*Technical Editors:* Tom DeGomez, John Duff Bailey  
*Production Editor:* Lois Johnson  
*Cover Photograph:* Armand Ramirez  
*Interior Photographs:* Hattie Braun, Marie DeGomez, Tom DeGomez,  
Armand Ramirez, Dotty Spears  
*Interior Illustrator:* Kathy Bruce  
*Manuscript Typesetting:* Lois Johnson  
*Book Layout:* John Duff Bailey, Rebekah Cadigan, Tom DeGomez,  
Lois Johnson, Jonathan Koehn, Pat Pederson  
*Graphical Font:* Jonathon Macagba (hfonline@earthlink.net)

Copyright ©1998 by Flagstaff Community Tree Board

All rights reserved. No part of this publication may be reproduced or transmitted in any form or by any means, electronic or mechanical, including photocopy, recording, or any other information storage and retrieval system, without the written permission of the publisher.

The information in this book has been carefully researched, and all efforts have been made to ensure accuracy. Flagstaff Community Tree Board assumes no responsibility for any injuries suffered, damages or losses incurred during use of or as a result of following this information. It is important to study all directions carefully before taking any action based on the information and advice presented in this book. When using any commercial product, *always* read and follow label directions. Where trade names are used, no discrimination is intended and no endorsement by Flagstaff Community Tree Board is implied.

#### **Library of Congress Cataloging-in-Publication Data**

Beyond the Ponderosa: Successful Landscape Trees for Higher Elevations in the Southwest / Flagstaff Community Tree Board;

Includes bibliographical references and index.

Library of Congress Catalog Card Number: 98-85898

1. Trees 2. Landscape trees. 3. Arboriculture. 4. Ponderosa Pine. 5. High Elevation Gardening. 6. Flagstaff. I. Flagstaff Community Tree Board. II. Title: Beyond the Ponderosa, Successful Landscape Trees for Higher Elevations in the Southwest.

If you have any questions or comments concerning this book, please write to:

Flagstaff Community Tree Board  
c/o Flagstaff Clean and Green  
211 West Aspen  
Flagstaff, AZ 86004

Printed in the United States of America  
10987654321

THIS BOOK  
IS  
DEDICATED  
TO

**DR. DONALD WOMMACK**

**PROFESSOR EMERITUS**

**NORTHERN ARIZONA UNIVERSITY  
SCHOOL OF FORESTRY**

**FOR HIS INSPIRATION AND SUPPORT**



## FORWARD

BY

DR. DAVID R. PATTON, DEAN  
NORTHERN ARIZONA UNIVERSITY  
COLLEGE OF ECOSYSTEM SCIENCE & MANAGEMENT

*To exist as a nation, to prosper as a state,  
and to live as a people, we must have trees.*

— Theodore Roosevelt

Humans have the ability to modify their environment both for the necessities of life and for the pleasure of aesthetic change. In the Southwest, tree planting dates back to the Anasazi people. Many plantings were as necessary to their survival as the construction of irrigation ditches and shelters, and today, we still plant trees for very practical reasons. But why the aesthetic reason for planting? Then, like today, the need for artistic expression is cultural and spiritual. Aldo Leopold wrote, in A Sand County Almanac:

"When some remote ancestor of ours invented the shovel, he became a giver; he could plant a tree. And when the axe was invented, he became a taker: he could chop it down. Whoever owns land has thus assumed, whether he knows it or not, the divine functions of creating and destroying plants."

This book presents both the practical and the aesthetic--trees that are pleasing to the sight but with the genetic composition to flourish in harsh, high-elevation habitats of the Southwest. These trees will provide shade for humans and perhaps food and cover for urban wildlife as well as beauty for your inner soul.

"Why do we walk the paths of our ancestors by culturing our environment and planting trees--because we have shovels and axes and we can."

John Duff Bailey, 1998.

## ACKNOWLEDGEMENT

- To the following organizations for their financial support:

Northern Arizona University  
College of Ecosystem Science & Mgmt  
School of Forestry

University of Arizona  
Cooperative Extension  
Agricultural Experiment Station  
Coconino County Cooperative Extension



Arizona Native Plant Society

Arizona Public Service



Arizona State Land Department

City of Flagstaff  
Beautification Commission  
Clean and Green Committee



- To our photographers for their art, energy and time: Tom DeGomez, all photos, except for: Hattie Braun (amur maple fall color, silver maple young tree, honeylocust fall color, and Colorado blue spruce specimen), Marie DeGomez (ponderosa pine fruit and limber pine fruit), Armand Ramirez (aspen fall color and crabapple), and Dotty Spears (ornamental pear).
- To Armand Ramirez for the many mountains he climbed to obtain our cover photograph.

- To Jonathon Macagda for creating the gardening graphical font especially for this book.
- To Dr. David Patton for so graciously writing our forward.
- To our reviewers who gave their time and expertise:
  - Sylvester Allred**, Northern Arizona University (NAU);
  - Tina Ayers**, NAU;
  - Brad Blake**, NAU;
  - Hattie Braun**, private consultant;
  - Jan Busco**, The Arboretum at Flagstaff;
  - Laura DeWald**, NAU;
  - George Duda**, New Mexico State Forestry Department;
  - Elaine Ferris**, Alpine Garden Club;
  - Jim Freeman**, Tree Technologies Urban Forestry;
  - Phil Hoefer**, Colorado State Forestry Department;
  - Tom Kolb**, NAU;
  - Michael Kuhns**, Utah State University;
  - Ernest Kurmes**, NAU;
  - Beverly Loomis**, private consultant;
  - Pat Pedersen**, private consultant;
  - Barbara Palermo**, University of Arizona;
  - Christopher Sacchi**, The Arboretum at Flagstaff;
  - Carole Seeley**, University of Arizona;
  - Jim Sobek**, Clearwater Landscapes;
  - Curtis Smith**, New Mexico State University;
  - Shawn Symond**, Warners Nursery;
  - Mike Wagner**, NAU;
  - Gwen Waring**, Flagstaff Native Plant and Seed;
  - Bob Wilson**, Sinagua Nursery.
- To the Flagstaff Community Tree Board members who made this book possible:
  - John Duff Bailey, Brad Blake, Kathy Bruce, Rebekah Cadigan, Art Daley, Mary DelGiorgio, Tom DeGomez, Elaine Ferris, Lois Johnson, Jonathan Koehn, Tom Kolb, Beverly Loomis, Pat Pedersen, Jim Sobek, Shawn Symond, Don Wommack, and other members of the Board who contributed to the production of this book.
- To Pete Knight for his invaluable advice.
- To Kathy Bruce, our illustrator, for her wonderful talents and for telling us from the beginning that "we could do it."



## INTRODUCTION

The Flagstaff Community Tree Board began planning this book in 1996 in response to the relative lack of comprehensive information about landscaping trees appropriate for growth and beauty in higher elevations of the Southwest. The natural landscape is predominantly ponderosa pine, but many property owners want to move "beyond the ponderosa". The core of this book therefore is the 40-or-so other species from which to choose, depending on your actual site and commitment to maintenance. We present an assortment of species that are native and exotic, have deciduous and evergreen foliage, and produce showy or inconspicuous flowers. That said, let's not forget ponderosa pine. Most all the tree board members have ponderosa pine somewhere in their yards.

SPECIES CHARACTERISTICS are presented to help visualize if the tree in question is 'right' for your site. Perhaps the worst mistake made by homeowners is planting a fast growing, ultimately large tree in a small space. SITE SUITABILITY icons and text can further help in appropriate species selection. In particular, shade tolerance reflects that a tree will grow slower but survive in shade. CULTURAL CONSIDERATIONS will help both with selection and care. We also offer a collection of helpful comments about particularly strong or weak points about a species. Growth rate is intended to imply relative vigor under typical conditions in the region. Some contributor comments are not 'technical' in nature but are included as footnotes for your enjoyment.

We have also provided comprehensive but brief information on tree care and related terminology: selecting trees and sites, new plantings, mulching, water wells, staking, fertilizing, irrigating, training young trees and pruning. As with data on individual species (and their pictures), we have provided the best material we can – tools intended to HELP in your landscaping. We cannot guarantee success. Your property and planting stock are unique, as is each year's weather here in the Southwest. More detailed information for problem solving is available from sources such as Sunset's "Western Garden Book", Extension publications, and local specialists.

If you are thinking of adding a tree to your property, we recommend you start by looking through the pictures and adjacent information with particular attention to Table 1 on page 84. Then stand in your yard and visualize the tree where you plan to locate it. Pick out a good specimen at your nursery with help from its staff. Finally, get your tree into the ground quickly and begin regular care. Trees are like children; there is no substitute for tender loving care.

## CONTENTS

Foreword by Dr. David Patton	vii
Acknowledgment	viii
Introduction	x
USDA Zone Hardiness Map	xii
Sunset Climate Zones	xiii
Key to Symbols and Pictures	xiv
Landscape Trees	1-80
Tree Care Guide	82
Tree Selection	83
Tree Selection guide	84
Site Selection	85
New Plantings	85
Mulching and Water Wells	87
Staking	88
Fertilizing	89
Irrigation	90
Training Young Trees	92
Pruning	93
Rural Interface with Neighborwoods	94
Where to Find Help with Trees	95
Illustrations of Botanical Terms	96
Glossary	97
Bibliography	106
Index of Plant Names	107
Index of Common Names	108

## USDA\* PLANT HARDINESS ZONE MAP



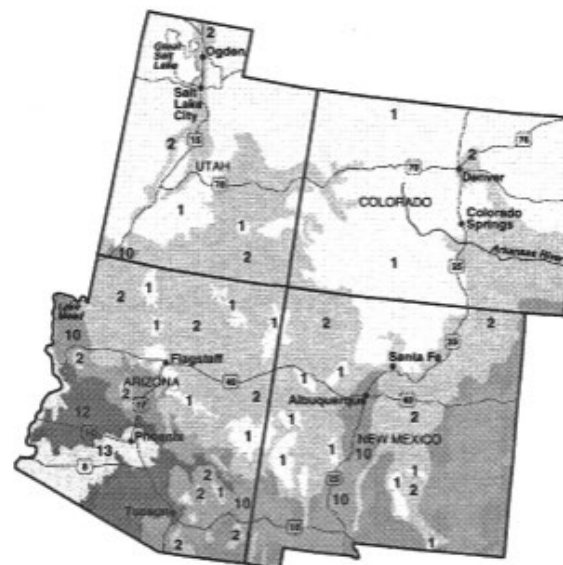
**Hardiness Zone  
Temperature Ranges**

°F	Zone	°C
-40 to -30	3	-40 to -34
-30 to -20	4	-34 to -29
-20 to -10	5	-29 to -23
-10 to 0	6	-23 to -17
0 to 10	7	-17 to -12
10 to 20	8	-12 to -7
20 to 30	9	-7 to -1

The USDA Plant Hardiness Zone Map is based upon the mean minimum temperature recorded for an area. To ascertain the zone in which you live, determine the lowest temperatures experienced over the last several decades.

\*USDA – United States Department of Agriculture

## SUNSET™ \* CLIMATE ZONES



**The West's Climate Zones**

Zone	Growing Season
1	Early June to end of August
2	Early May to end of September
10	Beginning of April to early November
12	Mid-March to late November
13	Mid-February to end of November

Sunset™ climate zones are based upon six important geographic and climatic factors. Refer to the *Sunset Western Garden Book* to establish the zone in which you live.

\*Sunset™ – A registered trade mark of the Sunset Publishing Corporation, Menlo Park, California.



## KEY TO SYMBOLS

### TREE SHAPES



V-Shaped   Broad   Round   Pyramidal   Oval   Columnar

### SPECIAL CONSIDERATIONS



**Native Trees** (trees from Arizona, New Mexico, Colorado, Utah)



**Wildlife Trees** (trees especially noted to attract wildlife)



Tree is known to have parts that may be toxic or dangerous.

### WATER REQUIREMENT



Infrequent; drought tolerant.



Moderate; occasional water with well drained soil.



Frequent; regular watering with moist soil required.

### POWER LINES



Do not plant under power lines.



Appropriate to plant under power lines.

### SHADE TOLERANCE



Intolerant; requires full sun.



Intermediate; tolerates some shade.



Tolerant; will survive in full shade.

### FERTILIZER REQUIREMENT



Infrequent; fertilize when signs of nutrient deficiency appear.



Moderate; fertilize every five years.



High; fertilize every other year.

### MAINTENANCE LEVEL



Low amounts of leaf and fruit litter.



Modest amounts of leaf and fruit litter; occasional cleanup required.



High amounts of leaf and fruit litter; regular cleanup required.

### PRUNING REQUIREMENT



Generally only when tree is young.



Prune only to maintain shape and health of tree.



High amount of pruning and training.

### LONGEVITY

Short: 70 years or less

Moderate: 70 to 150 years

Long: 150 to 500 years

Very long: 500 years or more

### INTERPRETING PAGE HEADINGS

*Acer negundo*<sup>1</sup> boxelder<sup>2</sup>

AY-ser neh-GUN-doh<sup>3</sup>

Aceraceae<sup>4</sup> (Maple Family)<sup>5</sup>

Origin: North America<sup>6</sup>

<sup>1</sup>Genus and species

<sup>2</sup>Common name

<sup>3</sup>Genus and species pronunciation

<sup>4</sup>Family name

<sup>5</sup>Common family name

<sup>6</sup>Original native range

***Abies concolor*** white fir

AY-beez KON-kuh-luhr

*Pinaceae* (Pine Family)

Origin: western North America

**SPECIES CHARACTERISTICS**



**Form:** Very large, attractive, symmetrical tree 80'-100' tall with narrow, pointed crown spreading 30'.

**Trunk:** Light gray bark, smooth with resin blisters when young, becoming very thick and deeply furrowed with age; 30" diameter.

**Foliage:** Evergreen with needles often 2" or more in length, flat and flexible. Light bluish-green with whitish lines on both surfaces.

**Flowers & Fruit:** Cone-bearing. Cones are 3"-5", upright, fleshy, greenish, purple, or yellow in color.

**Cultivars:** 'Candicans' has narrow growth habit with steel-blue needles and beautiful purple cones. 'Conico' is a semi-dwarf, conical cultivar that can reach 11' tall. 'Compacta' is densely branched. 'Globosa' is rounded and dwarfed.

**SITE SUITABILITY**



**Climate Zones:** Sunset 1-9, 14-24. USDA 2.

**Rooting:** Shallow lateral rooting; recommended for park-like areas and large yards.

**Soil:** Requires moist, coarse soil in well-drained sites; sensitive to soil compaction and high pH.

**CULTURAL CONSIDERATIONS**



**Growth Rate:** Slow-moderate.

**Longevity:** Long.

**Pests:** Balsam twig aphid, Western spruce budworm, dwarf mistletoe.

**Pruning & Training:** Tips of shoots may be pinched back to keep tree within bounds and make them more compact. Prune dead branches back to live lateral.

**COMMENTS** White fir is commonly used for Christmas trees and landscaping in western gardens and is an excellent choice for most sites. However, it should be sheltered when young, and soil should be cool and moist. White fir may not perform well in dry, windy areas and is prone to ice damage.

*"Love the quiet elegance of this tree."*







***Abies lasiocarpa* (var. *arizonica*) corkbark fir or sub-alpine fir**

AY-beez la-sih-oh-KAR-puh (a-rih-ZOH-nih-kuh)

*Pinaceae* (Pine Family)

Origin: southwestern North America (high elevations)

**SPECIES CHARACTERISTICS**



**Form:** Large tree 75'-100' tall with 15'-20' crown spread and an attractive, slender, erect, symmetrical crown shape.

**Trunk:** Creamy to ash-colored, thick corky bark, 18"-24" in diameter.

**Foliage:** Evergreen with bluish-green needles 1"-2" long, soft to touch and fragrant.

**Flowers & Fruit:** Cone-bearing. Cones are 2"-4", upright, shatter when ripe. Seeds attract birds.

**SITE SUITABILITY**



**Climate Zones:** Sunset 1-9, 14-17. USDA 3.

**Rooting:** Shallow lateral roots; recommended for park-like areas and large yards.

**Soil:** Requires moist, coarse, well-drained soil; sensitive to soil compaction.

**CULTURAL CONSIDERATIONS**



**Growth Rate:** Slow.

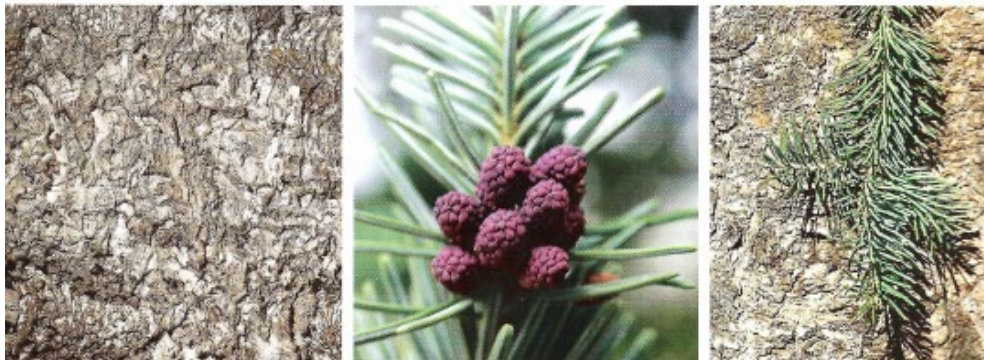
**Longevity:** Long.

**Pests:** Western spruce budworm, aphids.

**Pruning & Training:** Tips of shoots may be pinched back to keep tree within bounds and make them more compact.

**COMMENTS** Corkbark fir is very handsome as a young plant. If used in parks, plant away from high traffic areas where damage to bark may occur due to vandalism. Unfortunately, corkbark fir will not do well in hot, dry, windy areas since its roots need to stay cool and is short-lived in such environments. Availability is typically limited to bareroot seedlings 3-6" tall. Makes a good bonsai-type specimen.

*"Their spires inspire me."*





## ***Acer ginnala*** amur maple

AY-ser gin-AL-a or jin-AL-a

Aceraceae (Maple Family)

Origin: Manchuria, North China, Japan

### SPECIES CHARACTERISTICS



**Form:** Shrub or small tree 15'-20' tall with 10' crown spread.

**Trunk:** Single or multiple stems with smooth bark. Twigs are often purple when young.

**Foliage:** Deciduous. Three-lobed, 3" long and 2" wide. Early fall, red to yellow color.

**Flowers & Fruit:** Attractive clusters of small yellow fragrant flowers in spring followed by red, double-winged samara ¾"-1" long.

**Cultivars:** 'Red Rhapsody' has beautiful fall color. 'Bailey Compact' forms a dense 6'-8' tall shrub with brilliant scarlet fall color. 'Flame' has fiery red fall color and vivid red seeds, however can be inconsistent due to seed propagation.

### SITE SUITABILITY



**Climate Zones:** Sunset 1-9, 14-16. USDA 3. Some cultivars may be less hardy.

**Rooting:** Shallow rooting; suitable for 3' x 3' cutouts where foot traffic is not present.

**Soil:** Very tolerant of all but the driest conditions and very intolerant of high pH soil.

### CULTURAL CONSIDERATIONS



**Growth Rate:** Slow.

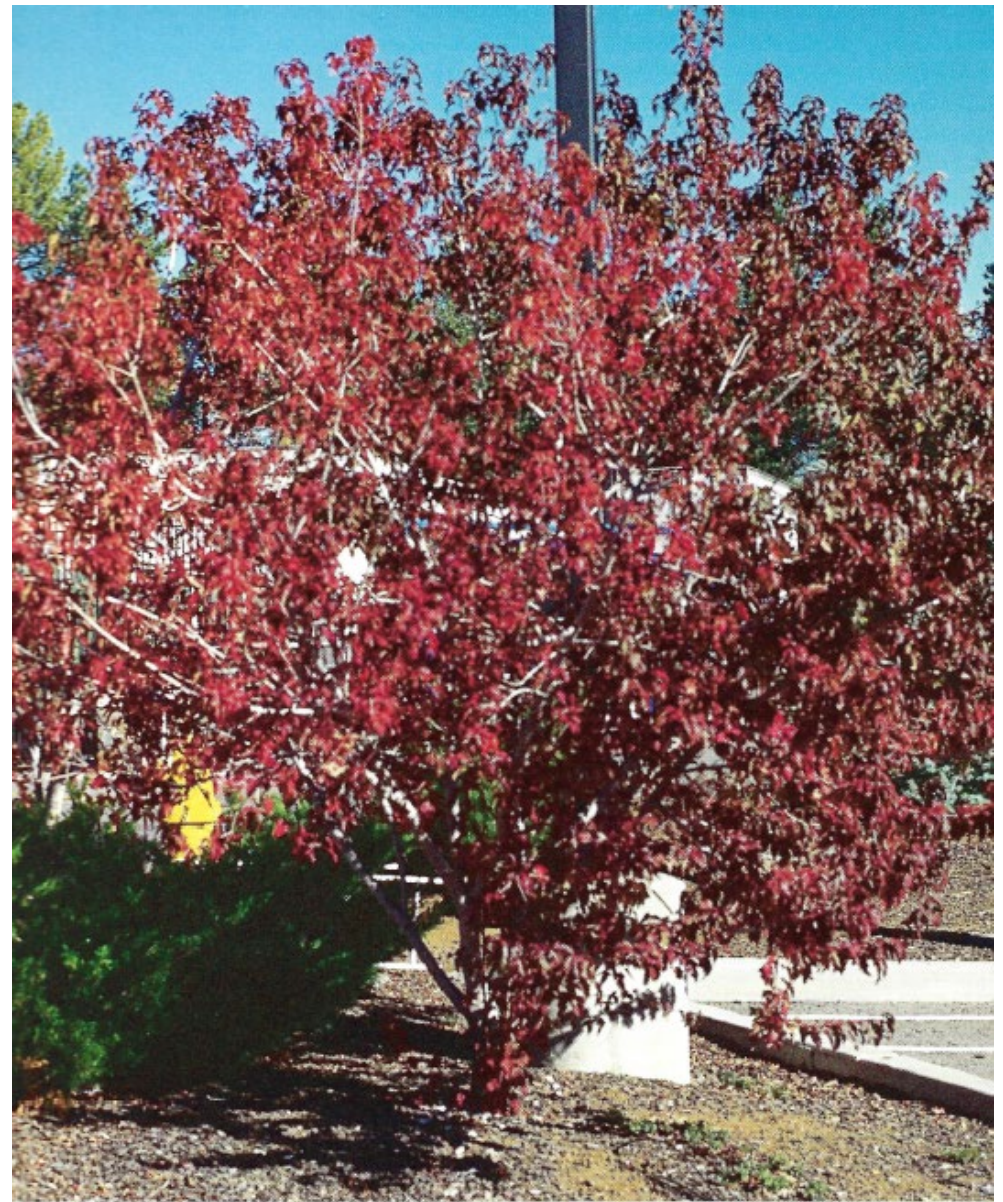
**Longevity:** Moderate.

**Pests:** Sapsuckers, leaf spot.

**Pruning & Training:** Need to prune when young to insure single trunk. Suckers need to be removed.

**COMMENTS** A small, open-growing tree good for small gardens or courtyards with gorgeous fall color and beautiful trunk structure that develops with maturity. Good choice for cold regions and, therefore, one of the best small exotic ornamentals for northern Arizona. Does best when planted in a cool, partially shaded area. Easy to transplant and requires little care other than pruning; often used for bonsai.

*"Color is the incredible key."*







## *Acer negundo* boxelder

AY-ser neh-GUN-doh or neh-GOON-doh

Aceraceae (Maple Family)

Origin: North America

### SPECIES CHARACTERISTICS



**Form:** Small- to medium-sized fast growing tree, 30'-50' tall with 30'-40' crown spread and irregular shape.

**Trunk:** Short trunk with light gray-brown bark; weak wood.

**Foliage:** Deciduous. Leaves pinnately compound, opposite, with 3-7 leaflets 2"-5" long. Leaflets oval to ovate. Early fall yellow color.

**Flowers & Fruit:** Dioecious, non-showy. Seeds are paired in double-winged samara, 1½" long.

**Cultivars:** 'Sensation' is a seedless variety, which does not attract boxelder bugs, has more controlled growth and has beautiful red fall color. 'Variegation', the most common cultivar, has creamy-white and green leaves. 'Flamingo' has pink tinge on new foliage aging to green with white variegation; small tree or large shrub.

### SITE SUITABILITY



**Climate Zones:** Sunset 1-10, 12-24. USDA 2.

**Rooting:** Fibrous invasive roots that grow deeply lateral.

**Soil:** Very tolerant of all but the most poorly drained sites; tolerates flooding.

### CULTURAL CONSIDERATIONS



**Growth Rate:** Fast.

**Longevity:** Moderate.

**Pests:** Female trees are susceptible to boxelder bugs, except 'Sensation' variety. Occasional infestations of noctuid caterpillars and boxelder leaf roller.

**Pruning & Training:** Needs proper training to ensure good form and control suckers.

**COMMENTS** Good choice as a shade tree in windy areas or where summer drought and winter cold prohibit growing other maples. Fertilizing will promote good growth. Easy to transplant. However, this tree is subject to limb breakage under heavy snow loads and is very sensitive to herbicide drift and ozone pollution. Use away from night lighting (will attract boxelder bugs).

*"A cozy tree haven."*



## ***Acer saccharinum*** silver maple

AY-ser sak-kah-REE-num or sak-kah-RY-num

Aceraceae (Maple Family)

Origin: eastern and central United States

### SPECIES CHARACTERISTICS



**Form:** Medium- to large-sized tree, fast growing tree 50'-80' tall with 50'-60' crown spread and open spreading to round form, sometimes with semi-pendulous branches.

**Trunk:** Short, stout trunk with silvery-gray bark. Brittle branches, weak wood, and narrow crotch angles.

**Foliage:** Simple, opposite, 5-lobed. Canopy width equal to height of tree, leaves are 3"-6" wide, green on top and silver on bottom. Early fall colors are usually yellow with some red and orange.

**Flowers & Fruit:** Dioecious flowers appearing before the leaves. Abundant fruit, if not killed by late frost. Double-winged samara, 1½"-2" long.

**Cultivars:** 'Silver Queen' has gold fall color, is seedless and cold hardy with fast upright growth and strong branching. 'Autumn Blaze' forms a dense oval shape with long lasting orange-red fall color.

### SITE SUITABILITY



**Climate Zones:** Sunset 1-9, 12, 14-24. USDA 3.

**Rooting:** Fibrous and invasive roots; avoid planting near water and sewage pipes. Recommended for park-like areas and large yards.

**Soil:** Alkaline soils (pH > 7.5) will cause chlorosis.

### CULTURAL CONSIDERATIONS



**Growth Rate:** Fast.

**Longevity:** Moderate.

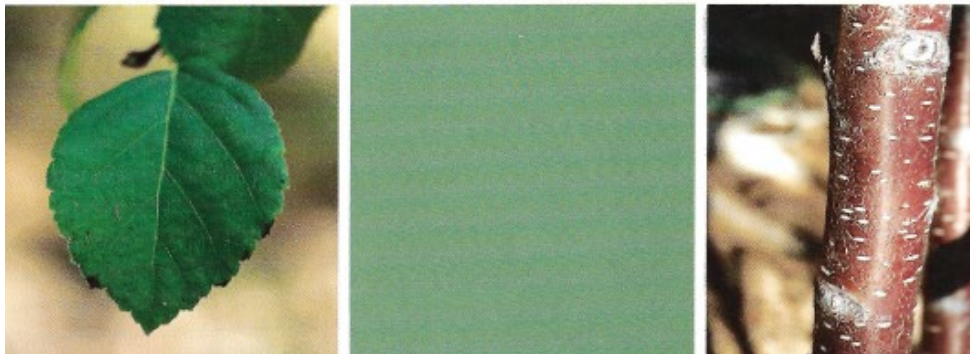
**Pests:** Susceptible to aphids, cottony scale, and thrips.

**Pruning & Training:** Train scaffold branches to wide crotch angles. To avoid breakage, prune out weak crotches.

**COMMENTS** Silver maple has beautiful foliage, rapid growth rates, and is easy to transplant. However, it tends to suffer winter branch die-back and is prone to ice and snow breakage which can be reduced with proper pruning and training. It suffers severely from chlorosis in alkaline soil. Not recommended for very windy areas or areas with ozone pollution.







## ***Betula occidentalis*** water birch, western red birch, or river birch

BET-tyew-luh ok-sih-den-TAH-liss

*Betulaceae* (Birch Family)

Origin: western North America

### SPECIES CHARACTERISTICS



**Form:** Shrub or small tree 30' tall with 15' crown spread and ascending limbs in clumps or v-shaped when grown as single stem.

**Trunk:** Shiny, red to bronze colored bark with pale white horizontal stripes (lenticels) up to 6" long on older trees.

**Foliage:** Alternately arranged ovate leaves that are 1"-2" long and ¾"-1" wide that are sharply toothed and narrow at the tip. Leaves turn yellow in fall; some will turn red.

**Flowers and Fruit:** Monoecious, inconspicuous and 1" long. Cone-like fruit are 1¼" long and narrow.

### SITE SUITABILITY



**Climate Zones:** Sunset 1-3, 10. USDA 2.

**Rooting:** Roots are deep, spreading; suitable for 5' x 5' cutouts and 10' parkways.

**Soil:** Requires soil that is deep, moist, loamy, and well drained.

### CULTURAL CONDITIONS



**Growth Rate:** Fast.

**Longevity:** Short.

**Pruning & Training:** Very little pruning is required if grown in clumps. If grown as a single stem then early pruning and training will help develop good scaffold branches.

**Maintenance:** Leaves and fruits can get messy.

**COMMENTS** An excellent small tree for shady areas with bright yellow fall color and beautiful reddish-brown peeling bark.



## ***Betula pendula*** European white birch

BET-tyew-luh PEN-dyew-luh

*Betulaceae* (Birch Family)

Origin: Europe to Asia Minor

### SPECIES CHARACTERISTICS



**Form:** Medium-sized tree 60' tall with a 20'-30' crown spread round to v-shaped, sometimes with weeping branches. Attractive when grown with either single or multiple trunks.

**Trunk:** White, papery bark with upright branching.

**Foliage:** Deciduous. Simple, alternate, ovate or diamond-shaped leaves 2½" long. Fall color is yellow.

**Flowers & Fruit:** Monoecious. Male and female flowers appear in separate catkins. Cone-like fruit 1"-1½" long and ¼" wide remains on branches during winter.

**Cultivars:** 'Fastigiata' has upright branching and a pyramidal form. 'Purpurea' has purple new foliage turning bronze-green with age. Fall color is a mix of orange, copper and bronze. 'Crispi' is common and cold hardy; strongly weeping, it becomes more so with age.

### SITE SUITABILITY



**Climate Zones:** Sunset 1-12, 14-24. USDA 2.

**Rooting:** Roots are deep, spreading; suitable for 5' x 5' cutouts and 5' parkways.

**Soil:** Requires deep, moist loam.

### CULTURAL CONSIDERATIONS



**Growth Rate:** Moderate.

**Longevity:** Moderate.

**Pests:** Very susceptible to bronze birch borers and aphids.

**Pruning & Training:** Prune in summer or early fall to reduce excessive "bleeding."

**Maintenance Level:** Deciduous leaves, fruit and twig breakage are messy.

**COMMENTS** Very popular tree in western states. However, it is susceptible to top die-back on cold sites in the region and is a poor choice for dry, windy locations. Although this tree requires regular moisture, it is best planted on a slight mound to keep moisture away from trunk.

*"Cheerful, feathery."*







## ***Catalpa speciosa*** northern catalpa

Kuh-TAL-puh spee-CEE-OH-sah

*Bignoniaceae* (Bignonia Family)

Origin: midwestern North America

### SPECIES CHARACTERISTICS



**Form:** A small- to medium-sized tree 25'-60' tall with irregular crown spreading 20'-30'.

**Trunk:** Reddish-brown with thick scaly bark.

**Foliage:** Deciduous. Large, ovate-to-oval leaves, 6"-12" long. Leaves are dull green above, pale with soft hairs beneath, turning yellow in fall.

**Flowers & Fruit:** Large clusters of white, trumpet-shaped flowers in late spring to early summer with orange stripes and purple spots. Fruit is 8"-18" long, dark brown capsule, cigar-like.

**Cultivars:** 'Aurea' has yellow leaves that persist throughout the summer. 'Nana' is a dwarf globe-shaped variety that is grafted to common catalpa (*C. bignonioides*) to form a tree; does not bloom.

### SITE SUITABILITY



**Climate Zones:** Sunset all zones. USDA 5.

**Rooting:** Recommended for park-like areas and large yards. Suitable for 10' x 10' cutouts and 10' parkways.

**Soil:** Any good soil with fine texture and some drainage.

### CULTURAL CONSIDERATIONS



**Growth Rate:** Moderate-fast.

**Longevity:** Short.

**Pruning & Training:** Requires shaping to strong scaffold when young.

**Maintenance:** Seeds and leaf litter can be messy.

**COMMENTS** One of the few hardy (heat and cold) deciduous trees with very showy flowers and large leaves, though it needs to be protected from wind damage by planting near taller trees or buildings. Common catalpa (*C. bignonioides*) is a smaller tree with smaller leaves. Limited availability and not available in large plant material.

*"A gentle giant."*



***Crataegus oxyacantha* (var. *monogyna*)** English hawthorn

kra-TEE-gus OX-ee-ah-can-thah (mah-NAH-jih-nuh)

Rosaceae (Rose Family)

Origin: western Europe, North Africa, Asia

**SPECIES CHARACTERISTICS**



**Form:** Shrub or small tree to 25' tall with 15' crown spread and v-shaped to wide oval shape.

**Trunk:** Scaly gray or brown bark with many thorny branches.

**Foliage:** Deciduous. Small leaves, 3-7 lobes, turning red or yellow in fall.

**Flowers & Fruit:** Known for pretty spring flowers in many colors depending on variety; bees are attracted to flowers. Scarlet fruit attracts birds during most of the summer.

**Cultivars:** 'Paul's Scarlet' has double deep-rose colored flowers. 'Toba' is a Canadian hybrid that is extremely cold hardy with double flowers that age to pink. 'Crimson Cloud' has very large, bright-red, white centered flowers and is thornless.

**SITE SUITABILITY**



**Climate Zones:** Sunset 1-12, 14-17. USDA 3.

**Rooting:** Suitable for 3' x 3' cutouts and 3' parkways.

**Soil:** Limestone or rich, loamy soils with good drainage. Intolerant of flooding.

**CULTURAL CONSIDERATIONS**



**Growth Rate:** Slow-moderate.

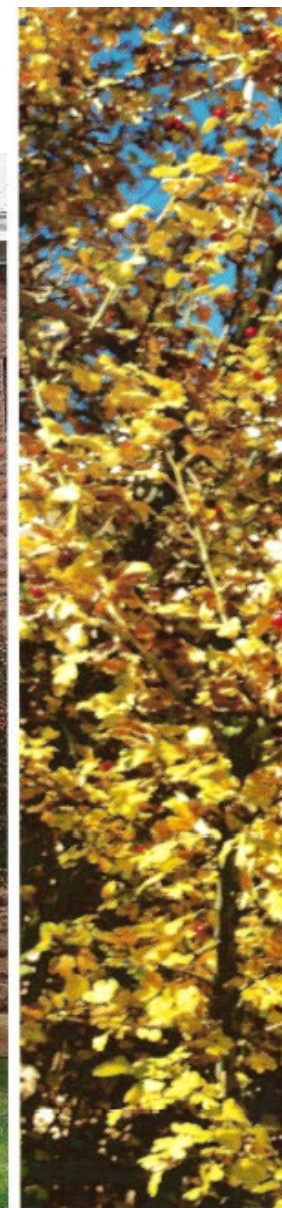
**Longevity:** Moderate.

**Pests:** Susceptible to aphids and fireblight.

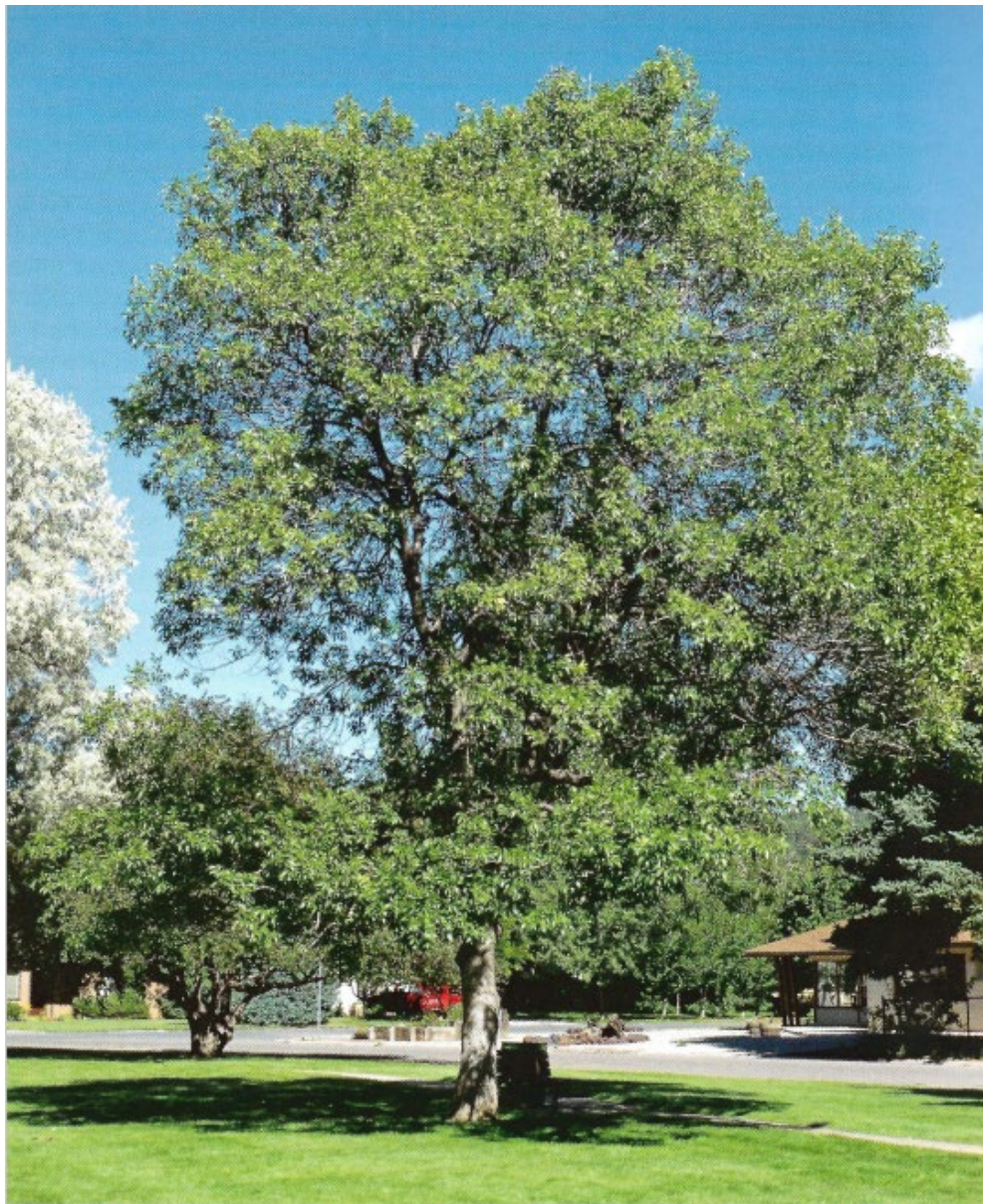
**Pruning & Training:** Pruning required to thin out excess twig growth.

**COMMENTS** Small ornamental tree for seasonal beauty with beautiful spring and stunning fall colors in some cultivars. A great wildlife tree; birds nest in its thick branches and feed on fruit. But watch out, most cultivars have thorns.

*"I aim to please the birds and the bees."*







## ***Fraxinus pennsylvanica*** green ash or red ash

FRAKS-ih-nuss penn-syl-VAN-uh-kuh

Oleaceae (Olive Family)

Origin: eastern and central North America

### SPECIES CHARACTERISTICS



**Form:** Medium tree 30'-40' tall with 30' crown spread, forming a compact, v-shaped to oval crown.

**Trunk:** Grayish-brown bark, dense twig structure.

**Foliage:** Deciduous. Leaves opposite and pinnate, 10"-12" long, divided into 5-9 bright green, ovate to lanceolate leaflets, 4"-6" long. Foliage turns bright yellow in early fall, holds fall color well.

**Flowers & Fruit:** Dioecious. Flowers are very small borne in very small, green or purple clusters. Fruit is a 2" samara.

**Cultivars:** 'Patmore' is a new variety that is very hardy, seedless, and resistant to ice and wind damage. 'Summit' has an upright, to pyramidal shape and is one of the earliest ashes to turn color in the fall. 'Autumn Purple' has slow growth but displays beautiful fall foliage.

### SITE SUITABILITY



**Climate Zones:** Sunset 1-6. USDA 2.

**Rooting:** Shallow, lateral rooting. 'Summit' may be planted in 3' x 3' cutouts and 3' parkways. Other varieties require 5' x 5' cutouts and 5' parkways.

**Soil:** Prefers moist soil with good drainage and coarse texture; tolerates some flooding. Once established, will tolerate high pH, drought, salt and low fertility.

### CULTURAL CONSIDERATIONS

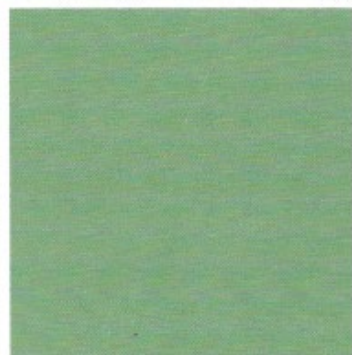


**Growth Rate:** Moderate.

**Longevity:** Moderate.

**Pests:** Thrips and aphids, most species are susceptible to plant bugs. Borers can be a severe problem in many areas. Leaf cutter bees can be a nuisance.

**COMMENTS** Good shade and street tree with bright yellow fall foliage, tolerant of cold and drought and easy to transplant. Plant in well-sheltered sites in colder zones since it is damaged by late spring freezes and performs poorly in windy locations. Sensitive to air pollutants.





***Gleditsia triacanthos* (var. *inermis*) honeylocust (thornless)**

gluh-DIT-see-uh try-uh-CAN-thus (iH-ner-MEES)

*Caesalpinaceae* (Legume Family)

Origin: eastern North America

**SPECIES CHARACTERISTICS**



**Form:** Medium- to large-sized tree 35'-70' tall with 20'-50' crown spread and round spreading shape.

**Trunk:** Bark is gray-brown or black. Upright with arching branches. Native trees have thorns; grafted cultivars are usually thornless.

**Foliage:** Deciduous. Alternate, 6"-10" long, bipinnately compound, 15-30 nearly sessile small, oval-shaped leaflets. Leaves turn a beautiful yellow and are shed early in fall.

**Flowers & Fruit:** Inconspicuous flowers are bell-shaped, greenish-yellow, followed by numerous, foot-long seed pods.

**Cultivars:** 'Shademaster' is particularly well suited for downtown plantings because it is thornless and podless and holds its foliage longer in the fall. 'Sunburst' has new foliage that is yellow, thornless and podless. 'Imperial' has very dense foliage and is an excellent shade tree.

**SITE SUITABILITY**



**Climate Zones:** Sunset 1-16, 18-20 USDA 4.

**Rooting:** Suitable for 10' x 10' cutouts and 10' parkways. 'Shademaster' may be planted in 5' x 5' cutouts or 3' parkways.

**Soil:** Tolerant of most soils with good drainage.

**CULTURAL CONSIDERATIONS**



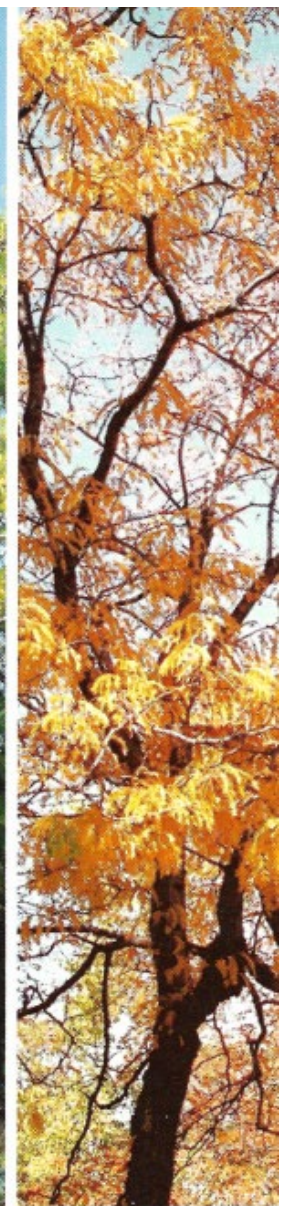
**Growth Rate:** Fast.

**Longevity:** Moderate.

**Pests:** Canker disease is very serious in southern Colorado.

**COMMENTS** Honeylocust is grown for its delicate, beautiful foliage that leafs out late and is one of the earliest trees to give fall color. It transplants well, tolerates very wet and compacted soils, is hardy to heat, wind and some drought. Casts a nice, light shade, that makes it a good patio or lawn tree. However, it does suffer from late spring frosts because new foliage is sensitive to cold temperatures. It is also sensitive to ozone pollution.

*"Call me mellow yellow in late summer."*







## *Juglans major* Arizona black walnut

JOO-glanz MAY-johr

Juglandaceae (Walnut Family)

Origin: southwestern North America

### SPECIES CHARACTERISTICS



**Form:** Medium- to large-sized tree 50'-70' tall with 40'-50' crown spread and spreading branches in a rounded canopy. However, most will not exceed 30' at high elevations of the Southwest.

**Trunk:** Often forked with grayish-brown smooth bark, becoming thick, scaly and furrowed.

**Foliage:** Deciduous. Compound leaves are 8"-12" long with 9-13 lance-shaped leaflets. Early fall yellow color. Drops leaves early in the fall.

**Flowers & Fruit:** Monoecious. Male flowers in inconspicuous catkins. Round, 1" diameter, thick-shelled, edible nuts.

### SITE SUITABILITY



**Climate Zones:** Sunset 10, 12, 13. USDA 5.

**Rooting:** Recommended for use in park-like areas or large yards.

**Soil:** Prefers deep, moist soil, but has some drought tolerance.

### CULTURAL CONSIDERATIONS



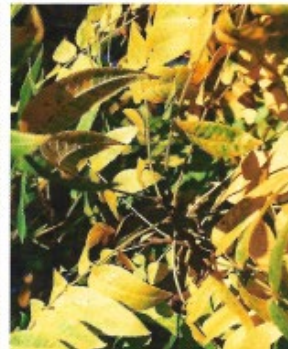
**Growth Rate:** Fast.

**Longevity:** Long.

**Maintenance Level:** Freshly fallen fruit is soft and can cause staining of hardscape. Leaves become problem in the fall.

**COMMENTS** This species is well-suited for warmer sites within the region and can withstand heat and wind. While zone classifications indicate otherwise, experience within the region has shown that this species is common in Sunset zone 2 and can be found in Sunset zone 1. However, planting stock is not readily available and only as small 1-3 year bare root seedlings. As they mature, walnut trees may inhibit some neighboring plants via a chemical contained in leaves and fruits.

*"The nutty professor is alive and well."*





## *Juniperus* spp. junipers

Utah (*J. osteosperma*), one-seeded (*J. monosperma*), alligator (*J. deppeana*)  
joo-NIH-peh-russ  
*Cupressaceae* (Cypress Family)  
Origin: western North America

### SPECIES CHARACTERISTICS



**Form:** Shrubby, slow-growing tree 15'-50' tall with 30' crown spread and varied shapes (broad to pyramidal).

**Trunk:** Short, upright trunk with gray, fibrous and shredding bark on *J. osteosperma* (Utah juniper) and *J. monosperma* (one-seeded juniper). *J. deppeana* (alligator juniper) has strikingly checked pattern resembling alligator hide.

**Foliage:** Evergreen. Leaves are scale-like.

**Flowers & Fruit:** Cones are pea-sized to marble-sized, bluish or brown, and berry-like.

### SITE SUITABILITY



**Climate Zones:** USDA 4-6.

**Rooting:** Roots are spreading and fibrous; suitable for 5' x 5' cutouts and 5' parkways.

**Soil:** Will generally survive on most soils but prefers well-drained conditions.

### CULTURAL CONSIDERATIONS



**Growth Rate:** Slow.

**Longevity:** Long.

**Pests:** Dwarf-mistletoe.

**COMMENTS** All junipers are well suited for hot dry sites and require little maintenance. However, they are typically available only as bareroot seedlings; wild-collected specimens have very poor survival when transplanted. Male flowers produce large amounts of pollen that may affect those with allergies or asthma.

*"The alligator bark always makes me smile."*







## ***Juniperus scopulorum*** Rocky Mountain juniper

joo-NIH-peh-russ skaw-pew-LOH-rum

*Cupressaceae* (Cypress Family)

Origin: western North America

### SPECIES CHARACTERISTICS



**Form:** Pyramidal to oval crown 20'-30' tall with 25'-30' crown spread. Ends of branches have a weeping appearance in some cultivars.

**Trunk:** Straight trunk, slender branches. Reddish-brown, thin shredding bark.

**Foliage:** Evergreen. Yellow-green scaly leaves. Smaller leaf than Utah or one-seeded junipers. Somewhat variable in color but usually blue-green to green.

**Flowers & Fruit:** Cone bearing. Bluish-purple berry-like cones, 1/4" diameter with 2 or 3 seeds, attractive to birds.

**Cultivars:** 'Sky Rocket' has a very narrow columnar form reaching 20 feet, with blue-grey foliage. 'Moonglow' has intense silver-blue foliage and pyramidal form to 20'. 'Cologreen' is bright green, symmetrical with a narrow columnar form. 'Wichita Blue' is tear-drop shaped with grey-blue foliage and 'Gray Gleam' is columnar shaped with blueish foliage. Both will reach 10'-12' tall.

### SITE SUITABILITY



**Climate Zones:** Sunset all zones. USDA 3.

**Rooting:** Roots are spreading, fibrous; suitable for 5' x 5' cutouts and 5' parkways.

**Soil:** Succeeds in most soils; prefers well drained soil.

### CULTURAL CONSIDERATIONS



**Growth Rate:** Moderate.

**Longevity:** Long.

**Pests:** Susceptible to dwarf-mistletoe.

**Fertilizer:** Fertilize only on very nutrient poor sites.

**COMMENTS** Great species for wind breaks and accent trees. Requires little water but will grow quickly when young if watered and fertilized regularly. However, planting stock is limited to 3-4' tall in 1-5 gallon containers. Male flowers produce large amounts of pollen that may affect those with allergies or asthma.

*"Scratch and sniff my wonderfully aromatic wood."*





**Malus spp.** crabapple  
 MAH-lus  
*Rosaceae* (Rose Family)  
 Origin: varies with cultivar

#### SPECIES CHARACTERISTICS



**Form:** Smaller tree 8'-30' tall with 20' crown spread, rounded crown.

**Trunk:** Gray, scaly bark on a small stem.

**Foliage:** Deciduous. Oval-shaped leaves dark green to purple.

**Flowers & Fruit:** Pink, white, or red flowers in spring with small, edible fruit. Some cultivars are biennial flowering.

**Cultivars:** Many excellent cultivars available. 'Prairie Fire' has dark purplish-red flowers, good disease resistance and produces very small apples that stay on the tree. 'Spring Snow' has pure white flowers and produces minimal fruit; semi-dwarf, grows to 18'. 'Profusion' has rose-pink flowers and bronze-green foliage.

#### SITE SUITABILITY



**Climate Zones:** Sunset 1-21. USDA 3.

**Rooting:** Roots are fibrous, spreading; good for small yards, containers and streets or medians. Suitable for 3' x 3' cutouts and 3' parkways when pruned to upright growth habit.

**Soil:** Prefers well-drained soil, but will tolerate coarse or alkaline soil.

#### CULTURAL CONSIDERATIONS



**Growth Rate:** Moderate.

**Longevity:** Moderate.

**Pests:** Fireblight, powdery mildew, scale, spider mites, aphids and tent caterpillars are minor problems depending on cultivar. Cultivars are available that are resistant to most apple diseases.

**Pruning & Training:** Little pruning required if trained and pruned when young to open center or central leader. Prune following flowering to increase next year's flower bud crop.

**COMMENTS** Crabapple is one of the most widely planted and cultured ornamental trees because of its flowers, and is an excellent tree for this region. Fruiting cultivars are great for wildlife though frost will kill flowers/fruits some years and fruit can be messy.

*"Brings out the happy child in me."*







## ***Picea abies* Norway spruce**

PYE-see-uh AY-beez

*Pinaceae* (Pine Family)

Origin: northern and central Europe

### SPECIES CHARACTERISTICS



**Form:** Large, pyramidal tree 80' tall with 25'-40' crown spread and delicate form. Can grow to 150' on exceptional sites.

**Trunk:** Straight trunk with reddish-brown, scaly bark and regular spreading branches.

**Foliage:** Evergreen. Bright green leaves are short needles ½"-1" long and very sharp. Drooping branches.

**Flowers & Fruit:** Cone-bearing; pendulous long, narrow papery cones 4"-6" in length, light brown in color.

**Cultivars:** Many cultivars are available.

### SITE SUITABILITY



**Climate Zones:** Sunset 1-6, 14-17. USDA 2.

**Rooting:** Fibrous, shallow, lateral rooting; recommended for park-like areas and large yards.

**Soil:** Requires moist, well-drained soils.

### CULTURAL CONSIDERATIONS



**Growth Rate:** Moderate.

**Longevity:** Long.

**Pests:** Susceptible to aphids, Cooley spruce gall adelgid, pine needle scale, spider mites and tussock moths.

**COMMENTS** Norway spruce has large, decorative papery cones and nice boughs, making it an excellent accent tree in lawns and parks. It is extremely cold hardy, easy to transplant, wind resistant, and valued for windbreaks and shade.

*"Love the shape, seems so protective."*





## *Picea engelmannii* Engelmann spruce

PYE-see-uh en-gul-MAN-ec-eye

Pinaceae (Pine Family)

Origin: western North America (high elevations)

### SPECIES CHARACTERISTICS



**Form:** Large pyramidal tree 150' tall with 60' crown spread. However, these heights may not be reached at the higher elevations of the Southwest.

**Trunk:** Bark is grayish or purplish-brown, thin and scaly; densely branched.

**Foliage:** Evergreen. Bluish-green linear needles. Needles are short, ½"-1" long, sharp, and somewhat flexible.

**Flowers & Fruit:** Cone-bearing. Cones are narrow and papery 1"-2½" long, light brown in color.

**Cultivars:** 'Argentea' has a drooping form with silvery-gray leaves. 'Glauca' has leaves that are steel blue. 'Microphylla' has shorter than normal leaves.

### SITE SUITABILITY



**Climate Zones:** Sunset 1-6, 14-17. USDA 2.

**Rooting:** Fibrous and shallow, lateral rooting; recommended for park-like areas or large yards.

**Soil:** Prefers fine, moist soils with good drainage, but grows in most soils.

### CULTURAL CONSIDERATIONS



**Growth Rate:** Slow.

**Longevity:** Long.

**Pests:** Susceptible to aphids, Cooley spruce gall adelgid, pine needle scale, spider mites, and tussock moths.

**COMMENTS** Like Norway spruce, this species is excellent for use in large lawn areas, such as parks, as accent trees. It is extremely cold hardy, but is sensitive to drought. Nursery stock is limited.

*"Spruce up your yard with this lovely evergreen."*







## *Picea pungens* Colorado blue spruce

PYE-see-uh PUN-jenz

Pinaceae (Pine Family)

Origin: western North America

### SPECIES CHARACTERISTICS



**Form:** Large, dense pyramidal tree 100' tall with 40' crown spread and layered horizontal branching.

**Trunk:** Bark is gray or brown and scaly; densely branched.

**Foliage:** Evergreen. Bluish-gray or green foliage. Leaves are short needles up to 1½" long, very sharp and stiff.

**Flowers & Fruit:** Cone-bearing. Cones are narrow and papery 2"-4" long, light brown in color.

**Cultivars:** 'Baby Blue Eyes' and 'Fat Albert' are dwarf varieties 12'-20' tall with a 6'-10' spread. 'Glauca' has handsome, symmetrical growth and blue foliage; color can vary with source. 'Hoopsii' has bright silvery-blue foliage and dense conical form. 'Pendula' has weeping form.

### SITE SUITABILITY



**Climate Zones:** Sunset 1-10, 14-17. USDA 2.

**Rooting:** Fibrous and shallow roots; recommended for park-like areas and large yards.

**Soil:** Prefers moist soils with high fertility and good drainage. Sensitive to soil compaction.

### CULTURAL CONSIDERATIONS



**Growth Rate:** Slow.

**Longevity:** Long.

**Pests:** Spruce aphid. Cooley spruce gall adelgid are common when grown near Douglas-fir trees.

**Watering:** Once established is drought tolerant.

**COMMENTS** Colorado blue spruce is another large spruce valuable as an accent tree and well suited for the region. It is available in many varieties with different shapes and colors and transplants well. However, this species is drought-sensitive and sensitive to changes in watering schedule and does not do well where hot, dry winds are common.

*"I just love the color."*





## ***Pinus aristata*** bristlecone pine

PYE-ness a-riss-TAH-tuh

*Pinaceae* (Pine Family)

Origin: southwestern North America (high elevations)

### SPECIES CHARACTERISTICS



**Form:** Small- to medium-sized tree 20'-40' tall with 20' crown spread. Dense and bushy with low ground-sweeping branches. Beautiful specimen tree. Low, round or flat crown in old trees, bushy and symmetrical when young.

**Trunk:** Smooth, whitish-gray bark becoming reddish-brown with age.

**Foliage:** Evergreen. Leaves are needles in bundles of 5, 1"-2" long. Needles last 10-20 years before shedding. Branches are densely foliated. Needles commonly have white dots of natural resin on them.

**Flowers & Fruit:** Cone-bearing. Cones are bristly, 2½"-3½" long and dark purplish-brown.

### SITE SUITABILITY



**Climate Zones:** Sunset 1-6, 14-17. USDA 3.

**Rooting:** Suitable for 10' x 10' cutouts or 10' parkways.

**Soil:** Grows in most soils with good drainage; tolerates rocky soil.

### CULTURAL CONSIDERATIONS



**Growth Rate:** Very slow.

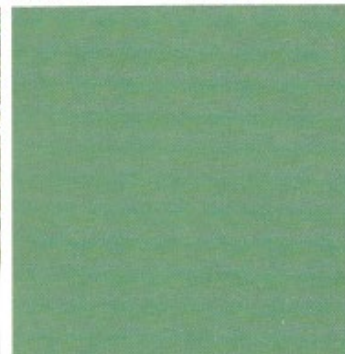
**Longevity:** Very long.

**Pests:** Susceptible to scales.

**Watering:** Grows faster if irrigated after establishment. Tolerates drought.

**COMMENTS** This species is a very unique plant with fun and interesting shapes and is great for rock gardens and a variety of cool sites that require hardy specimens. However, it is sensitive to automobile emissions. It transplants best while small, less than 3' tall, which is good since large sizes are difficult to move and not readily available in nurseries. The oldest living organism, at 2,000 years old, is a bristlecone pine.

*"An incredible senior citizen."*







***Pinus edulis*** pinyon pine

PYE-ness EH-dyew-liss

*Pinaceae* (Pine Family)

Origin: southwestern North America

**SPECIES CHARACTERISTICS**



**Form:** Small tree 20'-30' tall with 15' crown spread; round to oval crown with dense foliage in older trees, bushy and symmetrical in youth.

**Trunk:** Short trunk with gray to reddish-brown bark and horizontal branching.

**Foliage:** Evergreen. Leaves are needles in bundles of 2, 1-2" long.

**Flowers & Fruit:** Cone-bearing. Cones are small, 2" long, reddish-brown, with edible nuts.

**SITE SUITABILITY**



**Climate Zones:** USDA 4.

**Rooting:** Roots are extensive and shallow, but suitable for 10' x 10' cutouts and 10' parkways.

**Soil:** Prefers coarse, well-drained, slightly alkaline soils.

**CULTURAL CONSIDERATIONS**



**Growth Rate:** Slow.

**Longevity:** Very long.

**Pests:** Susceptible to bark beetles when stressed during drought or after transplanting. Pinyon needle scale, needle miner, and sawflies are common.

**COMMENTS** The nuts of pinyon pine are prized by people and birds alike. However, this pine is very resinous and should not be planted near patios, walks or structures. This species is very hardy and drought-tolerant; a good choice for low-water native landscapes.

*"Nut-meister."*





## ***Pinus flexilis*** limber pine

PYE-ness FLEKS-ih-liss

Pinaceae (Pine Family)

Origin: western North America (high elevations)

### SPECIES CHARACTERISTICS



**Form:** Small- to medium-sized pyramidal tree 20'-60' tall with 30' crown spread and dense foliage. Flexible stems make it wind and snow tolerant.

**Trunk:** Short, thick trunk with rough brown bark and many drooping branches. May produce a multiple trunk.

**Foliage:** Evergreen. Leaves are needles in bundles of 5 and 2"-3" long.

**Flowers & Fruit:** Cone-bearing. Cones are long (3"-6"), yellowish-brown and resinous (sticky).

**Cultivars:** 'Vanderwolf's Pyramid' has beautiful blue/green soft needles. 'Pendula' has weeping form. 'Extra Blue' has very blue needles.

### SITE SUITABILITY



**Climate Zones:** USDA 2.

**Rooting:** Recommended for park-like areas and large yards.

**Soil:** Tolerant of most soils but prefers coarse and well drained soil; intolerant of flooding or compaction.

### CULTURAL CONSIDERATIONS



**Growth Rate:** Slow.

**Longevity:** Long.

**Pests:** Susceptible to white pine blister rust if currants (*Ribes*) are in the vicinity.

**Pruning & Training:** Young trees can become straggly if grown in too much shade; shape with shearing and prune to single leader.

**COMMENTS** Limber pine transplants easily and is very hardy and drought tolerant. This semi-formal tree can be used for accent in areas with wide clearances. However, it is not recommended for excessively dry, windy areas.

*"Have always loved shaking hands with this tree."*







## ***Pinus nigra*** Austrian pine

PYE-ness NYE-grah

*Pinaceae* (Pine Family)

Origin: central and southeastern Europe

### SPECIES CHARACTERISTICS



**Form:** Small- to medium-sized tree 20'-60' tall with 20' crown spread. Dark and massive, broad and flat top when mature, pyramidal when young.

**Trunk:** Straight, well branched trunk with gray bark.

**Foliage:** Evergreen. Leaves are needles in bundles of 2, 4"-6" long.

**Flowers & Fruit:** Cone-bearing, 2"-3" long, yellowish-brown.

**Cultivars:** 'Compacta' is common and reliable.

### SITE SUITABILITY

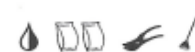


**Climate Zones:** USDA 4.

**Rooting:** Recommended for park-like areas and large yards.

**Soil:** Tolerant of most soils if well-drained.

### CULTURAL CONSIDERATIONS



**Growth Rate:** Moderate.

**Longevity:** Long.

**Pests:** Susceptible to tip moths.

**COMMENTS** This species is an excellent non-native pine for the region and is similar in form to Ponderosa pine. It transplants easily and is readily available in many sizes. Austrian pine is very hardy and withstands winter cold, wind, salt and air pollution making it a good specimen for roadside landscaping or windbreaks. Newly planted trees should be staked.

*"I call it sir!"*





***Pinus ponderosa* (var. *scopulorum*) ponderosa pine**

Pye-ness pon-deh-ROH-suh (skaw-pew-LOH-rum)

Pinaceae (Pine Family)

Origin: southwestern North America

**SPECIES CHARACTERISTICS**



**Form:** Large to very large tree 120' tall with 30' crown spread. Upright, columnar to rounded oval crown. Can reach 200' in some areas of the west.

**Trunk:** Straight, well branched with blackish bark when young becoming reddish-yellow plated bark when older; 36+" diameters possible.

**Foliage:** Evergreen. Leaves are needles in bundles of 2, 3 or 5's (most commonly 3) 7" long.

**Flowers & Fruit:** Cone-bearing, 3"-6" long, reddish-brown, prickly to the touch.

**Cultivars:** 'Arizona' is a rare five-needle variety considered to be a different species by some experts.

**SITE SUITABILITY**



**Climate Zones:** USDA 4.

**Rooting:** Allow for 30' x 30' planting area (wide clearance).

**Soil:** Tolerant of most soils if well drained; intolerant to flooding or compaction.

**CULTURAL CONSIDERATIONS**



**Growth Rate:** Moderate-fast.

**Longevity:** Very long.

**Pests:** Dwarf mistletoe can be a serious problem in some areas and difficult to treat; avoid planting young trees underneath mistletoe infected mature trees. Bark beetles rarely attack a healthy, well-watered tree. Susceptible to shoot moths.

**Watering:** Grows faster if irrigated after establishment but tolerates drought.

**COMMENTS** Ponderosa pine is the ultimate large, formal accent tree for yards and parks in the Southwest. Adhering to 30' x 30' clearances will greatly enhance the longevity of these stately trees. There is good availability of seedling-size trees but larger trees are usually not available commercially and do not transplant easily. Use a hardy southern Rocky Mountain seed source. This pine is sensitive to many air pollutants.

*"I love the butterscotch smell of the bark."*







## ***Platanus x acerifolia*** Sycamore or London plane tree

PLAH-tah-nuss AY-ser-ih-FOH-lih-uh

*Platanaceae* (Sycamore Family)

Origin: hybrid (*P. occidentalis* x *P. orientalis*)

### SPECIES CHARACTERISTICS



**Form:** Medium-sized tree 40'-50' tall with 30'-50' crown spread. Round when young becoming V-shaped with age.

**Trunk:** Straight, stout trunk with smooth patchy brown, green, or gray bark. Older bark sheds in patches revealing new, light bark.

**Foliage:** Deciduous. Simple and alternate maple-like leaves 5"-10" long and equally wide with 3-7 lobes. Leaves are shiny green on top and pale-colored beneath.

**Flowers & Fruit:** Inconspicuous flowers in greenish, ball-like clusters. Fruit is 1" bristly, brown balls that hang on long stalks.

**Cultivars:** 'Pyramidalis' has an upright growth habit, lower branches not drooping. 'Bloodgood' has some resistance to anthracnose.

### SITE SUITABILITY



**Climate Zones:** Sunset 2-24. USDA 4.

**Rooting:** Suitable for 8'-12' parkways or 10'-20' medians.

**Soil:** Prefers rich, moist soil, but tolerates most sites.

### CULTURAL CONSIDERATIONS



**Growth Rate:** Fast.

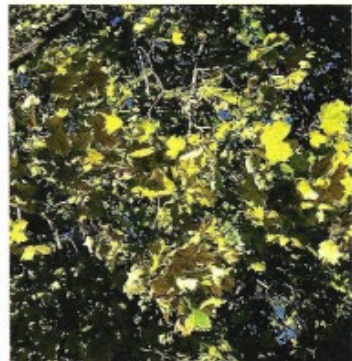
**Longevity:** Long.

**Pests:** Spider mites, scale, anthracnose and powdery mildew. Choose dry sites and dispose of dead leaves to reduce anthracnose infestations.

**Pruning & Training:** Prune to strong scaffold system when young.

**COMMENTS** This species is a good street, park or lawn tree that re-foliates quickly after late frost. While zone classifications indicate otherwise, experience has shown that *Platanus x acerifolia* will tolerate Sunset zone 1. However, it does not perform well in areas with excessively dry, windy spring weather. A related species *P. occidentalis* is the hardiest American sycamore.

*"I'm street smart and proud of it."*





## ***Populus alba*** European white poplar

POP-pew-luss AL-bah

Salicaceae (Willow Family)

Origin: Eurasia

### SPECIES CHARACTERISTICS



**Form:** Large, many-branched tree 80' tall with 40' crown spread. Broad, wide-spreading pyramidal form.

**Trunk:** Bark is whitish-gray and smooth, becoming rough and furrowed at base.

**Foliage:** Leaves 1½"-4" in length and nearly as wide. Ovate, typically 3 or 5 lobed and maple-like. Blunt-tip with scattered teeth. Dark green above, silvery-white hairs and felt-like beneath. Leaves turn yellow in fall. Long leafstalks covered with white hairs.

**Flowers & Fruit:** Dioecious. Flowers in catkins 1½"-3" long and densely covered with white hairs. Male and female catkins appear in early spring before leaves. Fruit are egg-shaped capsules with many tiny, cottony seeds.

**Cultivars:** 'Pyramidalis' and Bolleana are pyramidal/columnar and are a good substitute for Lombardy poplar. It is much hardier, longer lived, more wind tolerant and has a better form.

### SITE SUITABILITY



**Climate Zones:** Sunset all zones, USDA 3.

**Rooting:** Very invasive rooting habits and profuse suckering; not recommended for sites near sidewalks, streets or waterlines.

**Soil:** Tolerates a wide range of soils but prefers moist conditions.

### CULTURAL CONSIDERATIONS



**Growth Rate:** Fast.

**Longevity:** Short-moderate.

**Pests:** Stem canker can be very serious.

**Pruning & Training:** Prune in summer or fall to reduce bleeding. Control suckers.

**COMMENTS** This species is quite hardy in cities and in dry areas and is therefore often planted for shade and ornament. However, deep watering is needed occasionally in dry areas. It makes a good windbreak, but profuse suckering is a problem, as is weak wood that is susceptible to ice and snow damage. Fruitless, male clones are available for most cultivars.

*"A silvery glow in the wind."*







## **Populus** spp. cottonwoods

lanceleaf (*P. acuminata*), narrowleaf (*P. angustifolia*), fremont (*P. fremontii*) and hybrids  
 POP-pew-luss  
*Salicaceae* (Willow Family)  
 Origin: southwestern North America

### SPECIES CHARACTERISTICS



**Form:** Medium- to large-sized trees 40-70' tall with 20'-40' crown spread.

**Trunk:** Bark is smooth and light colored when young, becoming thick, gray and rough with age.

**Foliage:** Deciduous. Leaves are simple; variable shaped with toothed margins and 2"-5" long. Foliage is shiny yellowish-green, turning bright yellow in fall.

**Flowers & Fruit:** Dioecious. Small, greenish-yellow flowers in long catkins. Female trees of some cultivars produce masses of cottony fibers around seeds to aid dispersal.

**Cultivars:** 'Siouxland' (*P. canadensis*) is disease and drought resistant. Narrowleaf (*P. angustifolia*) is hardy to USDA zone 1. Lanceleaf (*P. acuminata*) is very hardy. Fremont or Western (*P. fremontii*) is hardy to USDA zone 6.

### SITE SUITABILITY



**Climate Zones:** Sunset 1-24. USDA 1-6. (Refer to Table 1 in Tree Care Section.)

**Rooting:** Roots are invasive; not recommended near sidewalks, streets or water lines.

**Soil:** Prefers moist, well-drained soils.

### CULTURAL CONSIDERATIONS



**Growth Rate:** Fast.

**Longevity:** Short-moderate.

**Pests:** Oystershell and armored scale. Stem canker disease is common on wounded or cold damaged plants. Stressed plants attract clearwinged American hornet moth.

**Pruning & Training:** Excessive twigs and suckers.

**COMMENTS** Poplars are all fast-growing and good for windy areas; many hybrids are available. While most common, 'Lombardy' (*P. nigra*) is not recommended. Most poplars outgrow sites quickly so their location should be well planned. Cottony seeds from female trees require extra maintenance.

*"I love to play in a blizzard of it's snowy seeds."*



## ***Populus tremuloides*** quaking aspen

POP-pew-luss treh-mew-LOY-deez

Salicaceae (Willow Family)

Origin: North America

### **SPECIES CHARACTERISTICS**



**Form:** Small- to medium-sized tree 20'-60'+ tall with thin crowns (15' spread) that are oval to broadly columnar.

**Trunk:** Smooth, whitish to gray, thin bark.

**Foliage:** Deciduous. Bright green rounded leaves turn golden-yellow in fall and shimmer in the wind.

**Flowers & Fruit:** Dioecious, showy catkins in early spring.

**Cultivars:** Clones from the Kaibab Plateau in Arizona are highly prized for their vigor and red fall color. 'Pendula' has drooping branches.

### **SITE SUITABILITY**



**Climate Zones:** Sunset 1-7. USDA 2.

**Rooting:** Roots are invasive and sucker freely; not recommended for streets or near water lines. Too invasive for small yards.

**Soil:** Requires moist, well-drained soils; intolerant of flooding and compaction.

### **CULTURAL CONSIDERATIONS**



**Growth Rate:** Fast.

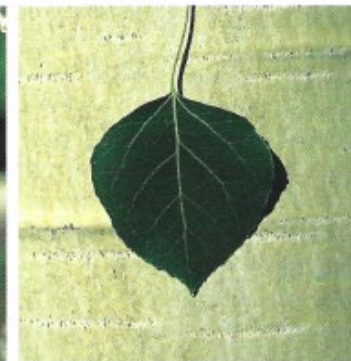
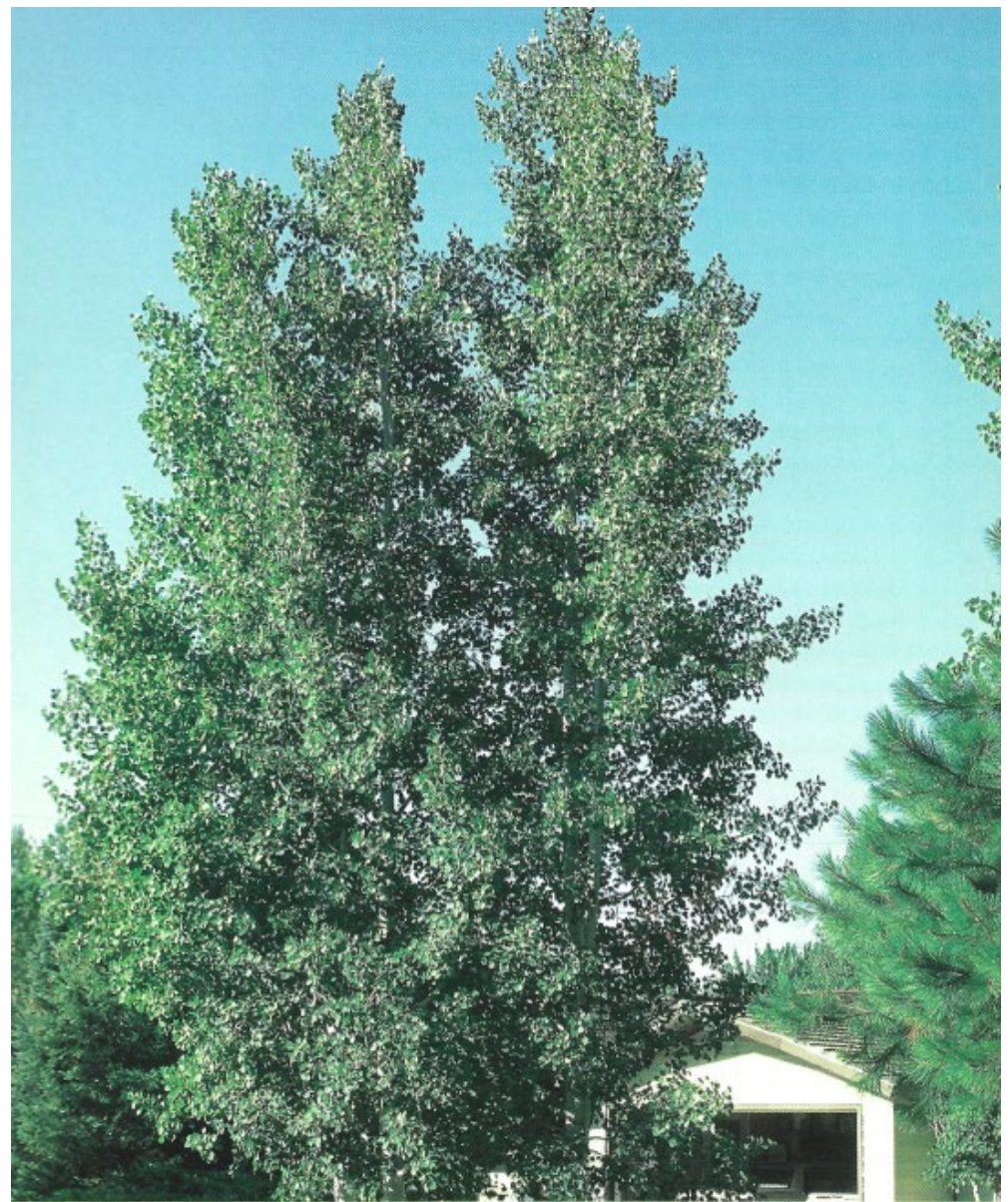
**Longevity:** Short.

**Pests:** Susceptible to the clearwinged American hornet moth, oystershell scale and tent caterpillars. Highly susceptible to stem canker diseases when wounded. Protect from sapsuckers, elk and deer when young to avoid scarring bark.

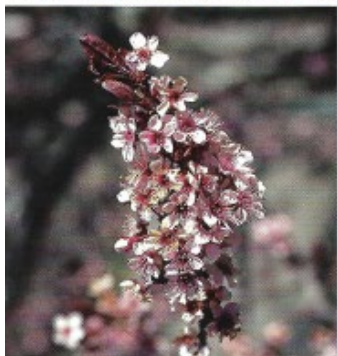
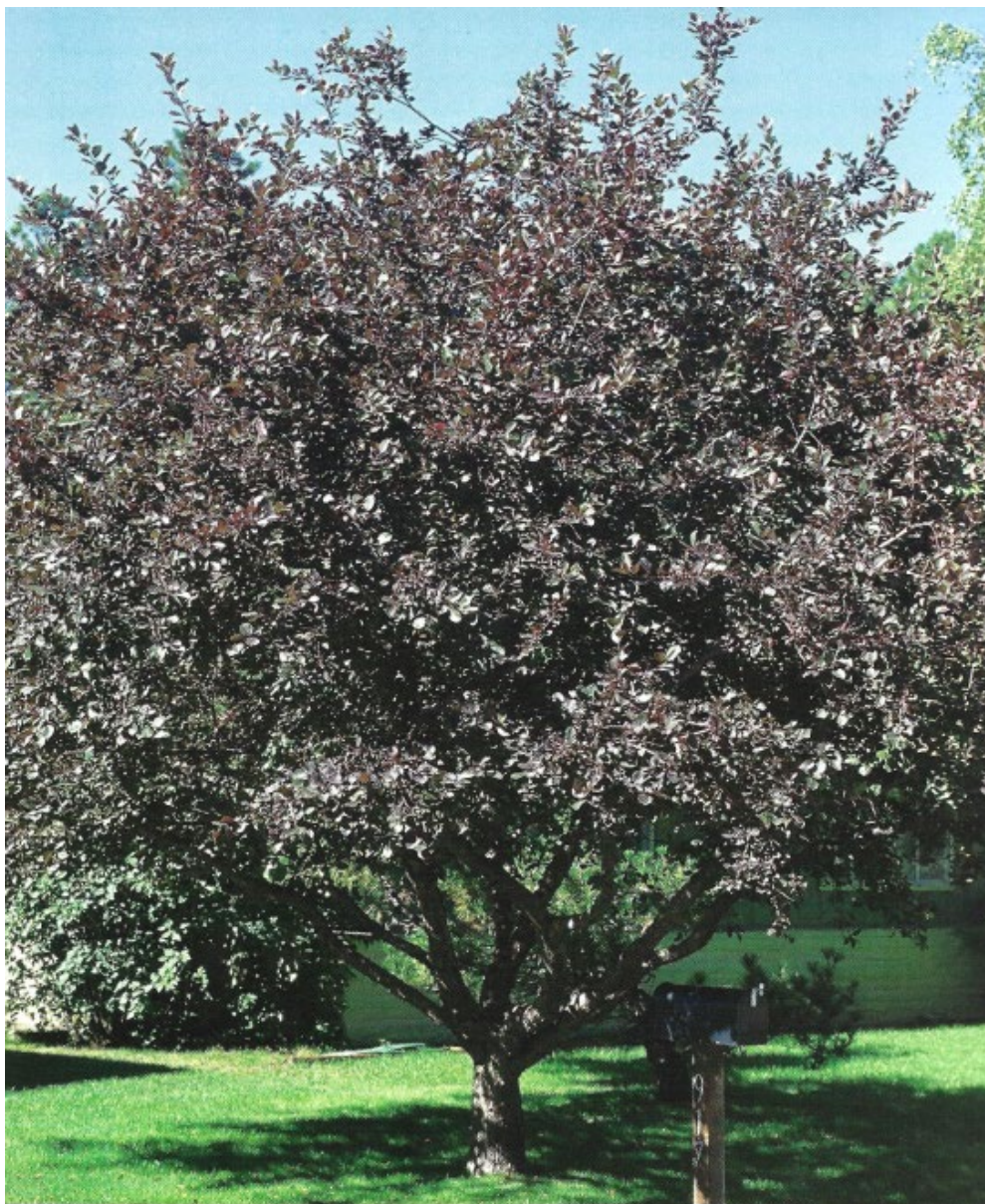
**Pruning & Training:** When planted in clumps of 2 to 5 trees, space at least 3'-5' apart. Prune to remove suckers.

**COMMENTS** These beautiful trees are highly prized for their white bark, fluttering leaves and fall color. Excellent as an accent tree singly or in clumps in yards; good for naturalized areas where spreading is desired. Do not use in parks or other public access areas where bark can be damaged or where suckering will ruin lawns and gardens. Provide mulch or shade to roots to improve growth. Quaking aspen is the most widely distributed deciduous tree in North America. Aspen is sensitive to air pollutants.

*"I love the water sound the leaves make."*







## *Prunus cerasifera* flowering plum

PREW-nuss sur-ruh-SIF-fuh-rah or sair-ruh-SIF-fah-rah

Rosaceae (Rose Family)

Origin: southeastern Europe, central and southwestern Asia

### SPECIES CHARACTERISTICS



**Form:** Small tree to 30' tall with 25' crown spread, rounded to oblong and can be wider than it is tall.

**Trunk:** Purplish-brown, thinly scaled bark, with horizontal orange lenticels.

**Foliage:** Deciduous. Simple, alternate leaves, 3" long, serrated margin, elliptical to ovate. Leaf color is dark green or purple.

**Flowers & Fruit:** Flowers are showy and white, edged in deep pink or pure white, 1" diameter, either single or double. Fruit is purplish-red, but most varieties are fruitless.

**Cultivars:** 'Newport' is hardier than most other varieties and has dark-purple leaves. 'Thundercloud' has dark purple foliage from spring to fall; pinkish-white flowers in spring and red fruit in fall.

### SITE SUITABILITY



**Climate Zones:** Sunset 2-22. USDA 5.

**Rooting:** Fibrous roots; suitable for 5' x 5' cutouts or 10' parkways

**Soil:** Tolerates any well-drained soil and a wide range of soil pH.

### CULTURAL CONSIDERATIONS



**Growth Rate:** Fast.

**Longevity:** Moderate.

**Pests:** Susceptible to sawflies.

**Fertilizer:** Apply manure in fall and balanced fertilizer in spring.

**Pruning & Training:** Requires pruning when mature to maintain an open center. Green sports need to be removed as soon as they appear. Prune following flowering to increase next years flower bud crop.

**COMMENTS** This species is widely planted, with distinctive purplish leaves making it an excellent accent tree in lawns or as a street tree. However, flowering may be diminished by late spring frosts and trees do not do well in excessively dry, windy locations. Select hardy cultivars to prevent winter kill on colder sites.

*"For purple lovers everywhere."*



## ***Prunus padus*** Mayday tree or bird cherry

PREW-nuss PAH-duss

Rosaceae (Rose Family)

Origin: Eurasia, Korea, Japan

### SPECIES CHARACTERISTICS



**Form:** Small tree 15'-20' tall with 15' crown spread and an open growth habit when young.

**Trunk:** Bark is dark gray, smooth, cracking into scales with age.

**Foliage:** Deciduous. Dark, dull green oval leaves 3"-5" long. Leafs-out early in spring. Fall color is yellow.

**Flowers & Fruit:** Small, star-shaped fragrant white flowers in slender, drooping, 3"-6" clusters are showy in spring, nearly hiding foliage. Small, pea-shaped black fruit is bitter, but attractive to birds.

**Cultivars:** 'Watereri' is large and has long raceme of flowers from mid to late spring. 'Plena' has long-lasting double flowers with no fruits.

### SITE SUITABILITY



**Climate Zones:** Sunset 1-3, 10. USDA 3.

**Rooting:** Suitable for 5' x 5' cutouts or 5' parkways.

**Soil:** Tolerates most soils if well-drained.

### CULTURAL CONSIDERATIONS



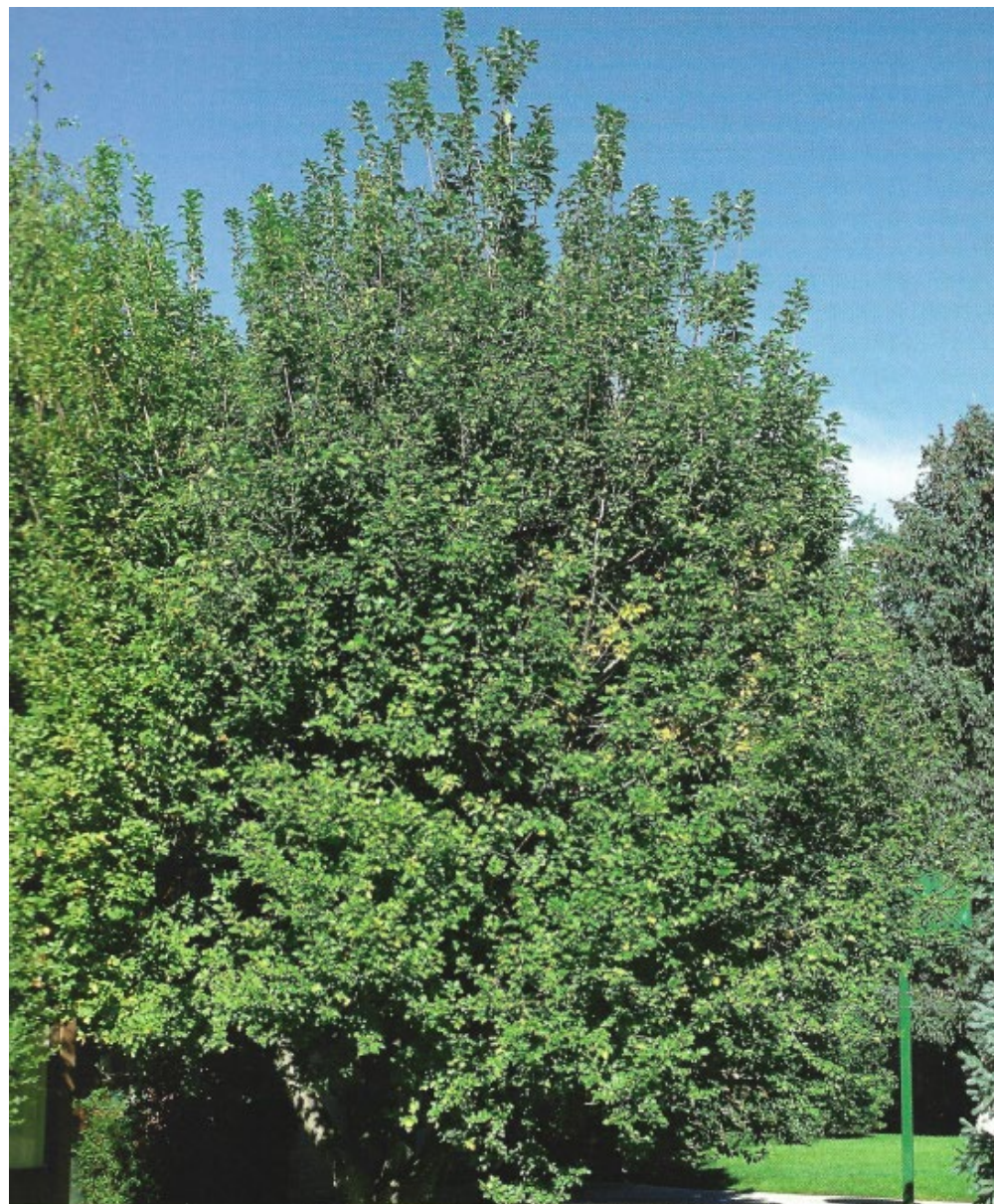
**Growth Rate:** Fast.

**Longevity:** Short-moderate.

**Pests:** Tent caterpillar.

**COMMENTS** This species is a good overall flowering tree that tolerates cold weather and late frost damage, blooming reliably. Good for parks and lawns as an accent tree.

*"Stars shine through my fantastic flowers."*







## *Pseudotsuga menziesii* (var. *glauca*) Douglas-fir

soo-doh-TSOO-guh men EEZ-eye or men-ZEE-sih-eye (GLAW-ca)

Pinaceae (Pine Family)

Origin: western North America

### SPECIES CHARACTERISTICS



**Form:** Large-sized tree 100' tall with 30' crown spread. Sharply pyramidal form when young. Drooping branches swing upward at tips.

**Trunk:** Bark is reddish-brown, very thick when mature.

**Foliage:** Evergreen with needles 1"-1½" long, soft to touch. Dense, soft needles, flat and flexible; dark green or bluish-green in color. Unlike true firs, needles surround stems as with spruce.

**Flowers & Fruit:** Cone-bearing. Cones are reddish-brown, oval-shaped, 3" long with obvious 3-pronged bracts.

**Cultivars:** 'Pendula' is a weeping form. 'Little Jon' is a dwarf form.

### SITE SUITABILITY



**Climate Zones:** Sunset 1-10, 14-17. USDA 4.

**Rooting:** Recommended for open, park-like settings with lots of room to grow.

**Soil:** Prefers coarse, well-drained soils. Intolerant of flooding.

### CULTURAL CONSIDERATIONS



**Growth Rate:** Moderate.

**Longevity:** Long.

**Pests:** Western spruce budworm, scales, and aphids.

**COMMENTS** Douglas-fir trees are easy to transplant, wind tolerant and grow quickly into beautiful specimens. Available in 1-5 gallon size; larger specimen trees are not available. Use a hardy interior Rocky Mountain seed source; seed sources from lower elevations or coastal areas do not do well here.



## ***Pyrus calleryana*** Callery or flowering pear

PYE-russ kah-LAR-ih-ay-nuh

Rosaceae (Rose Family)

Origin: central and southern China

### SPECIES CHARACTERISTICS



**Form:** Small- to medium-sized tree grows 25'-50' high with 15'-30' crown spread, depending on variety. Broadly pyramidal to oval when young becoming v-shaped with age.

**Trunk:** Bark is dark gray, cracking into scaly ridges. Strong, horizontal branching.

**Foliage:** Deciduous. Dark green leaves are glossy and leathery; ovate to elliptic to 3" long and 2" across. Rich purple to brilliant red fall color depending on cultivar.

**Flowers & Fruit:** Small, 3/8" showy white flowers. Early spring blooms may be damaged by late frosts. Small, inedible fruit rarely occur.

**Cultivars:** 'Chanticleer' has brilliant red fall color and a very narrow pyramidal shape. 'Redspire' has dense pyramidal form with large flowers and are well suited to city conditions. 'Autumn Blaze' is more cold hardy than other pear cultivars, has broad canopy and excellent fall color. 'Bradford', the oldest cultivar, is still commonly used. 'Cleveland Select' has dense columnar form to 30'.

### SITE SUITABILITY



**Climate Zones:** Sunset 1-11, 14-18. USDA 5.

**Rooting:** Roots are deep and spreading, suitable for 5' x 5' cutouts or 5' parkways and medians

**Soil:** Tolerant of most soil types but prefers neutral to slightly acidic.

### CULTURAL CONSIDERATIONS



**Growth Rate:** Moderate.

**Longevity:** Moderate.

**Pests:** Fairly resistant to fireblight.

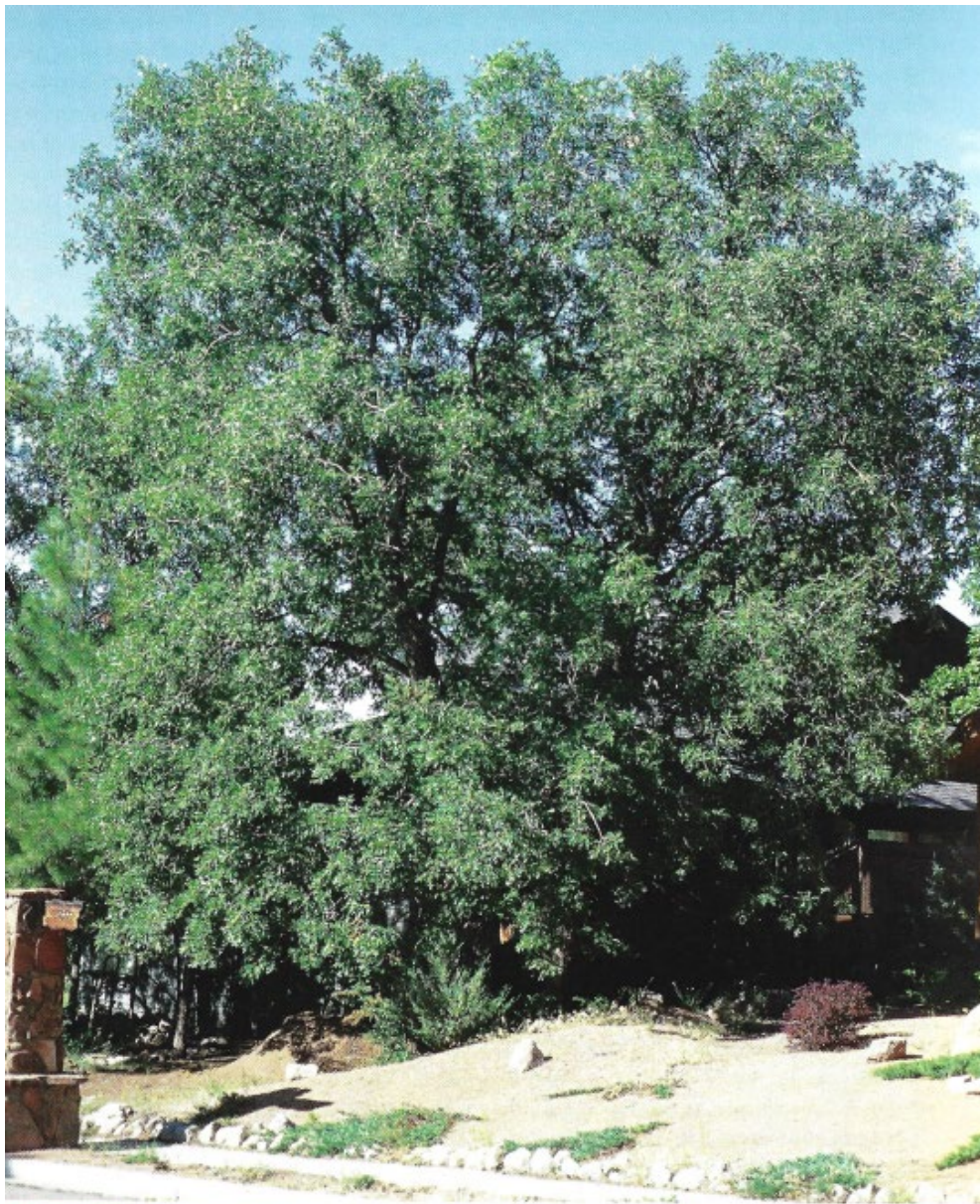
**Fertilizer:** Fertilize in early spring.

**Pruning & Training:** Prune and train to a central leader with good scaffold system. Train branches to wide crotch angles to avoid included bark.

**COMMENTS** This species holds up well to wind and late frosts and is well suited for residential or commercial settings. Easy to transplant.







## *Quercus gambelii* Gambel oak

KWUR-kuss gam-BEH-lih-eye

Fagaceae (Beech Family)

Origin: southwestern North America

### SPECIES CHARACTERISTICS



**Form:** Small tree 20'-30' tall with 15' crown spread and irregular shape. Colonizes from underground creeping root system, forming thickets. Can grow to 60' tall under good conditions.

**Trunk:** Thick bark, gray or brown, scaly and very rough.

**Foliage:** Deciduous. Dark green lobed leaves 2"-6" long turn yellow, orange or red in fall.

**Flowers & Fruit:** Produces egg-shaped acorns, 1/2"-3/4" in length.

### SITE SUITABILITY



**Climate Zones:** Sunset 1-3, 10. USDA 4.

**Rooting:** Expansive root systems; recommended for park-like areas and large yards.

**Soil:** Prefers coarse, well-drained, slightly alkaline soil.

### CULTURAL CONSIDERATIONS



**Growth Rate:** Very slow.

**Longevity:** Long.

**Pests:** Powdery mildew, particularly on new growth.

**Fertilizer:** Light applications of fertilizer improve growth rate.

**Pruning & Training:** Pruning can help develop desired form. Remove suckers early if single stem is wanted.

**COMMENTS** Gambel oak is often used as a screen in thickets or as an individual accent tree in landscapes. This is a very nice tree in native landscapes but is very slow growing; may take centuries to reach 60'. If it occurs on property to be developed, all effort should be made to preserve and protect as much as possible. Mature specimens will take decades to replace. It is readily available in 1-5 gallon plants up to 30" tall; smaller plants are usually more successful transplants due to the development of a long taproot. Large plants (wild collections) do not survive transplanting well.

*"Reminds me of friendly old men with stories to tell."*





## *Quercus rubra* northern red oak

KWUR-kuss REW-bra

*Fagaceae* (Beech Family)

Origin: eastern North America

### SPECIES CHARACTERISTICS



**Form:** Large tree 90' tall with 60' crown spread. Young trees are pyramidal, older ones are broadly spreading with round-topped crown.

**Trunk:** Bark is gray and smooth, becoming deeply furrowed.

**Foliage:** Deciduous. Leaves are elliptic, ovate or obovate, 5"-8" long and 3"-5" wide with slender-toothed lobes. New leaves are red turning to dark green. Leaves turn dark red, brown, or orange in fall.

**Flowers & Fruit:** Flowers are inconspicuous. Large acorns up to 1¼" long.

### SITE SUITABILITY



**Climate Zones:** Sunset 1-12, 14-24. USDA 4.

**Rooting:** Deep rooting allows planting near sidewalks and foundations. Suitable for 5' x 5' cutouts or 5' parkways.

**Soil:** Requires fertile soil that is well drained, but may show chlorosis on high pH soils.

### CULTURAL CONSIDERATIONS



**Growth Rate:** Moderate.

**Longevity:** Long

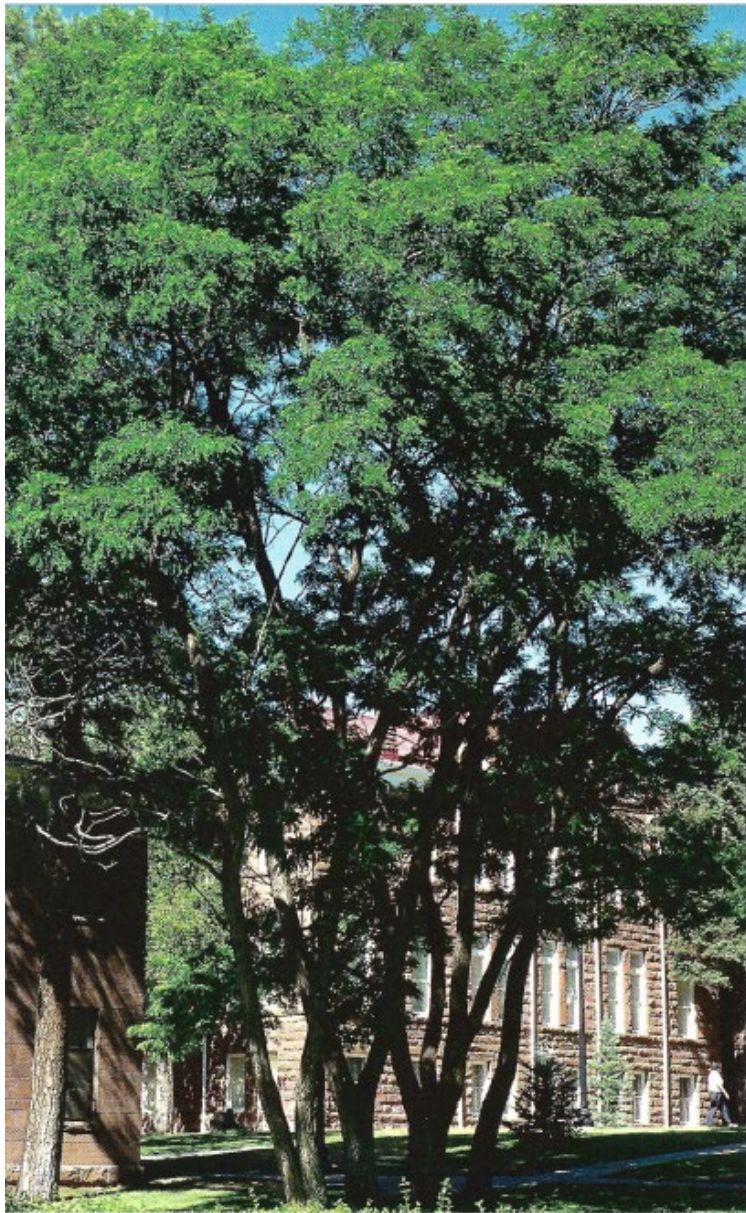
**Pruning & Training:** Young plants may require staking.

**COMMENTS** This species is good for large lawns, parks, and downtown plantings where space is available. It transplants easily and is readily available, though not recommended for colder sites or dry, windy areas.

*"Gives me that oaky glow."*







## ***Robinia pseudoacacia*** black locust

roh-BIH-nee-uh soo-doh-a-KAY-shih-uh

*Fabaceae* (Pea Family)

Origin: eastern North America



### SPECIES CHARACTERISTICS



**Form:** Large-sized tree 75' tall with 40'-50' crown spread. Open, sparse branching creates a spreading top.

**Trunk:** Light gray to brown, thick bark that is deeply furrowed with scaly ridges. Upright with arching, spiny branches; often grows with multiple stems.

**Foliage:** Deciduous. Pinnate to 12" long with 11-21 elliptical to oval-shaped leaves. Leaf-out late in spring. Leaves turn yellow and are shed early in fall.

**Flowers & Fruit:** Showy, fragrant pea-like white flower clusters in early summer followed by 4" long bean-like seed pods. Flowers are good source of nectar for bees and are considered a delicacy in Eastern Europe.

**Cultivars:** 'Frisia,' has leaves that stay golden all season. 'Pyramidalis' is a columnar form. 'Purple Robe' has magenta-pink flowers. 'Umbraculifera' is a thornless, large shrub or small tree good in small spaces.

### SITE SUITABILITY



**Climate Zones:** Sunset all zones. USDA 3-5.

**Rooting:** Shallow, aggressive roots; avoid placing near water lines and sewers. Recommended for parkways and 5' x 5' cutouts.

**Soil:** Tolerant of coarse, poor soils, but must have good drainage. Intolerant of flooding or compaction.

### CULTURAL CONSIDERATIONS



**Growth Rate:** Fast.

**Longevity:** Short.

**Pests:** Aphids, flower thrips and leafhoppers are common but rarely cause significant damage. Stem attacking bark beetle may cause damage. This tree is not attacked by locust borer in Arizona and New Mexico as in other parts of the United States.

**Pruning & Training:** Requires early pruning for attractive form. Remove suckers.

**COMMENTS** Black locust is a common shade tree along streets and in parks, though we recommend spineless varieties in lawns or where children play. It is a good choice for windy locations and is very drought-tolerant once established. This nitrogen-fixing tree needs little or no supplemental nitrogen fertilizer but may benefit from applications of phosphate fertilizer. Easy to transplant and readily available, but sensitive to night lighting. The native *R. neomexicana* (New Mexican Locust) is generally a large shrub with beautiful pink or white flowers.

*"This tree is greener than green."*



***Salix matsudana*** Hankow willow or globe willow

SAY-likes mat-soo-DAN-nuh

Salicaceae (Willow Family)

Origin: China

**SPECIES CHARACTERISTICS**



**Form:** Large-sized tree 70' tall with round spreading canopy 60' wide, can be wider than it is tall.

**Trunk:** Short, stout trunk with brown to light gray bark that becomes furrowed and darker with age; brittle branches.

**Foliage:** Deciduous. Narrow, lanceolate, bright green leaves.

**Flowers & Fruit:** Flowers are yellow in early spring and are borne in catkins.

**Cultivars:** 'Navajo' is hardy and commonly grown in the Southwest. 'Umbraculifera' has upright branches that create an umbrella shape to 40'. 'Pendula' has a weeping form.

**SITE SUITABILITY**



**Climate Zones:** Sunset all zones. USDA 4.

**Rooting:** Invasive roots not suitable for sites near water lines; recommended for park-like areas or large yards.

**Soil:** Tolerant of most soils (including poorly drained sites) except for extremely dry conditions.

**CULTURAL CONSIDERATIONS**



**Growth Rate:** Very fast.

**Longevity:** Short.

**Pests:** Susceptible to tent caterpillars, aphids, borers, spider mites and slime flux.

**Maintenance Level:** Lots of clean-up after wind storms and winterkill.

**COMMENTS** Globe willow works well in dry, windy areas (at least for a willow) though susceptible to heavy tip die-back and winter kill. Winter form provides attractive yellow twigs. However, mature specimens require regular pruning to ensure open, attractive form.

*"The cheery yellow twigs keep me glowing in winter."*







## ***Sequoiadendron giganteum*** giant sequoia

seh-COY-yuh-DEN-dron jye-GAN-tee-um

*Taxodiaceae* (Redwood Family)

Origin: California

### SPECIES CHARACTERISTICS



**Form:** Large, full tree 200' tall with a 60' crown spread where native, though smaller in this region. Conical crown of short, horizontal branches.

**Trunk:** Thick, reddish-brown bark that is deeply furrowed and fibrous; extremely large diameters with time (10' +).

**Foliage:** Evergreen with scale-like leaves, bluish-green in color. Dense foliage.

**Flowers & Fruit:** Cone-bearing. Reddish-brown cones 2"-3" long, elliptical. Zero to three seeds under cone-scale, light brown, 2-winged, falling gradually.

**Cultivars:** 'Pendulum' has weeping form with pendulous side branches. 'Pygmaeum' is a dwarf variety.

### SITE SUITABILITY



**Climate Zones:** Sunset all zones. USDA 6.

**Rooting:** Large tree with lots of taper (buttressing) requiring lots of room; recommended for park-like areas or large yards.

**Soil:** Requires well-drained, deep soil.

### CULTURAL CONSIDERATIONS



**Growth Rate:** Moderate.

**Longevity:** Long.

**Watering:** Requires deep but infrequent watering.

**COMMENTS** Sequoia is a popular, large ornamental tree for moist, cool microclimates and is an excellent accent tree for large yards and parks. One of the world's largest trees in its native range, it requires fertile soil or regular fertilization. Select an appropriate seed source from the high elevations of the California Sierra Nevada mountains to ensure survival in the dry Southwest.

*"I'd love to share my secrets for a long, happy life."*



## ***Sorbus aucuparia*** European mountain-ash

*SOR-buss aw-cue-PEHR-rih-uh*

*Rosaceae* (Rose Family)

Origin: Eurasia



### SPECIES CHARACTERISTICS



**Form:** Small- to medium-sized tree 20'-60' tall with 15'-20' crown spread. Oval to broadly conical with up-reaching branches.

**Trunk:** Gray and smooth bark.

**Foliage:** Deciduous. Foliage turns red, orange, or yellow in fall. Alternate, pinnately compound with 9-15 leaflets, 2" long, smallest leaflet is at end of leaf.

**Flowers & Fruit:** 5" clusters of tiny, white flowers in spring. Small, ¼" red, berry-like fruit attractive to birds.

**Cultivars:** 'Asplenifolia' has deeply toothed leaflets making the foliage fern-like. 'Cardinal Royal' has brilliant red berries. 'Edulis' is extremely hardy and has large berries that are edible though lack flavor. 'Fastigiata' is slow growing and shrubby, but leaves are variegated with yellow.

### SITE SUITABILITY



**Climate Zones:** Sunset 1-10, 14-17. USDA 2.

**Rooting:** Roots are fibrous and spreading; suitable for 10' x 10' cutouts and 10' parkways.

**Soil:** Requires moist, well-drained soil with neutral to acidic pH.

### CULTURAL CONSIDERATIONS



**Growth Rate:** Moderate-fast.

**Longevity:** Short.

**Pests:** Susceptible to fireblight and cankers when under stress. Relished by sapsuckers.

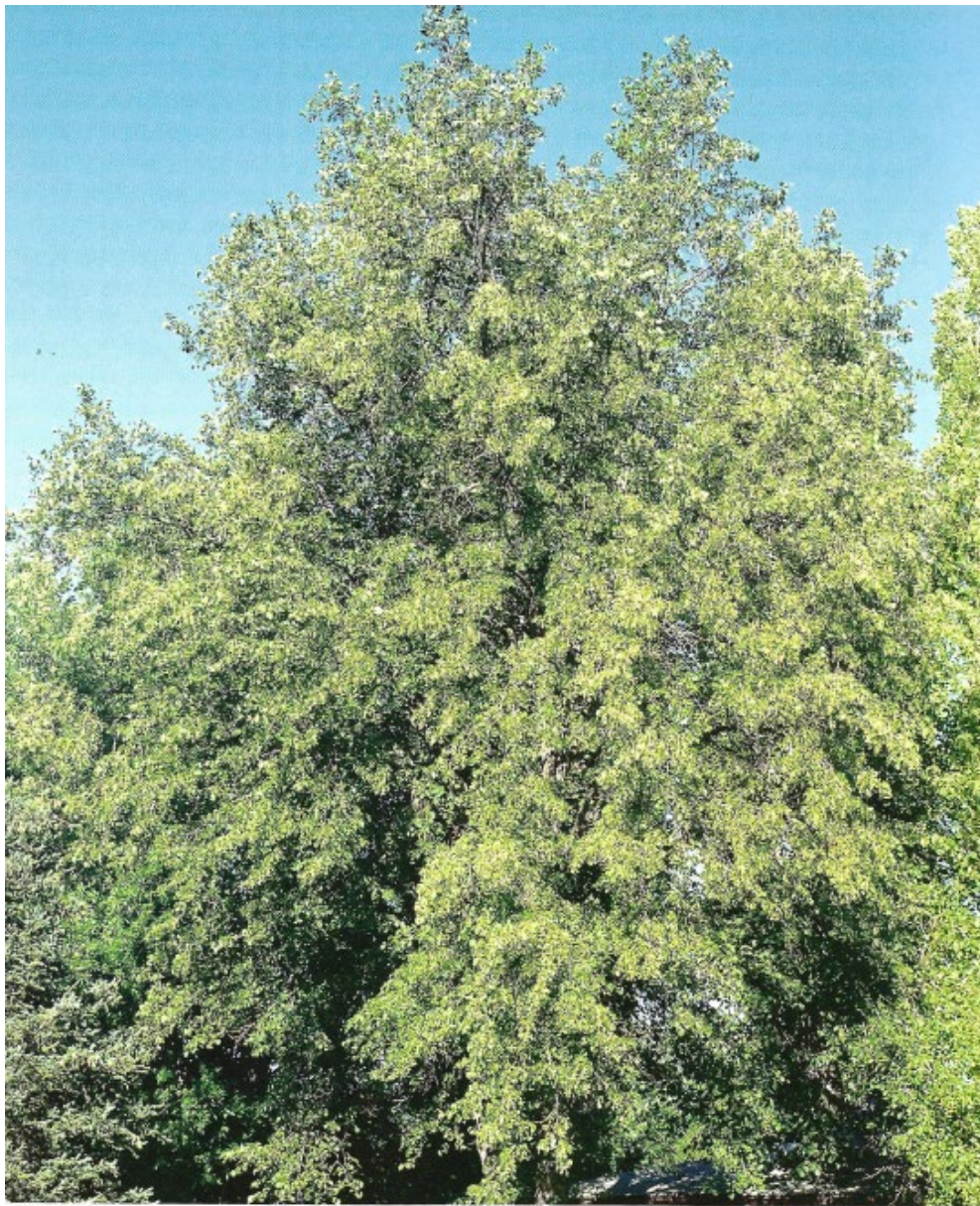
**Pruning & Training:** Requires some pruning and training while young.

**COMMENTS** Mountain-ash provides delicate shade and beautiful fruits for wildlife. However, the berries can get messy and are poisonous if consumed raw before the first hard frost, and therefore is not appropriate around play areas with small children.

*"For my bird buddies."*







## *Tilia* spp. basswood

American basswood (*T. americana*), littleleaf linden (*T. cordata*)

TEH-lee-uh uh-meh-rih-KAY-nuh

*Tiliaceae* (Basswood Family)

Origin: eastern North America (*T. americana*);

Europe (*T. cordata*)

### SPECIES CHARACTERISTICS



**Form:** Medium-sized tree 40'-60' tall with 20'-35' crown spread. A dense, compact, oval to v-shaped tree.

**Trunk:** Trunk is straight with fibrous grayish-brown bark.

**Foliage:** Deciduous. Leaves are heart-shaped, dark green in color and 4"-6" long. Margin is coarsely serrate and base is unequally cordate.

**Flowers & Fruit:** Yellowish-white fragrant leaf-like flowers hang in clusters. Nut-like rounded fruit ½" in diameter with persistent bract.

**Cultivars:** 'Fastigiata', 'American Sentry' have a broad pyramidal shape. 'Redmond' has a similar shape and glossy foliage.

### SITE SUITABILITY

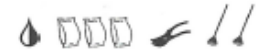


**Climate Zones:** Sunset 1-17. USDA 2.

**Rooting:** Deep, lateral rooting; suitable for 10' x 10' cutouts and 10' parkways.

**Soil:** Requires moist, well-drained soils of neutral pH; intolerant of flooding or compaction.

### CULTURAL CONSIDERATIONS



**Growth Rate:** Moderate.

**Longevity:** Medium.

**Pests:** Aphids may cause problems. Susceptible to leaf scorch during hot, dry conditions.

**COMMENTS** These species are excellent lawn trees (deepshade) and tolerate frequent watering typical in many yards, though the fruit can be a little messy. The littleleaf linden (*T. cordata*) is slightly smaller and has smaller leaves than *T. americana* but has similar cultural needs. *T. cordata* is hardier and more drought tolerant than *T. americana*. Wood of these trees is highly prized by wood carvers. Both are sensitive to road salts and drought. Easy to transplant.

*"The leaves win my heart."*





## *Ulmus americana* American elm

ULL-mus uh-meh-rih-KAY-nuh

*Ulmaceae* (Elm Family)

Origin: eastern North America

### SPECIES CHARACTERISTICS



**Form:** Large tree 120' tall with 40' crown spread and classic vase shape.

**Trunk:** Large trunk with medium gray bark with deep crevices and many large, upright branches.

**Foliage:** Deciduous. Leaves are simple, alternate, 3"-6" long, 1"-3" wide, oblong to obovate to elliptical, serrate. Yellow fall color.

**Flowers & Fruit:** Flowers are inconspicuous. Flowers before leaves, are 3-4 on individual stalks. Fruit develops in spring as leaves unfold, ½" long, oval, fringed with hairs, can be messy.

**Cultivars:** 'Independence' was introduced in 1988 and is Dutch elm disease resistant. Other Dutch Elm resistant cultivars are 'Delaware #2' and 'Washington'.

### SITE SUITABILITY



**Climate Zones:** Sunset 1-11, 14-21. USDA 2.

**Rooting:** Roots can lift pavement if crowded; requires 70'-75' diameter spread-width for lateral root system. Suitable for 10' parkways and medians.

**Soil:** Prefers moist, deep soil of neutral or basic pH.

### CULTURAL CONSIDERATIONS



**Growth Rate:** Moderate.

**Longevity:** Moderate.

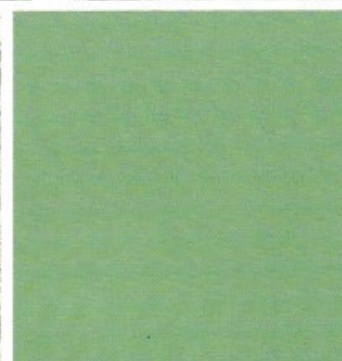
**Pests:** Susceptible to leaf beetles, elm scale, and sooty mildew. Susceptible to Dutch elm disease.

**Pruning & Training:** Suckers need to be removed.

**Maintenance:** Seeds and branch litter can be messy.

**COMMENTS** American elm is well suited for extreme weather conditions, including windy sites, is easy to transplant, and makes good shade trees for parks and large yards. Some places have existing American elms only because they have not been exposed to Dutch elm disease. Resistant varieties have only been developed in the past 10 years and there is some debate whether they are truly resistant.

"A classic."







## *Ulmus pumila* Siberian elm

ULL-mus pooh-MIL-uh

*Ulmaceae* (Elm Family)

Origin: eastern Siberia, northern China

### SPECIES CHARACTERISTICS



**Form:** Small- to medium-sized tree to 60' tall with 30' crown spread and classic vase shape that may reach greater heights on warm sites.

**Trunk:** Dark gray bark with deep crevices. Brittle wood, weak crotches.

**Foliage:** Deciduous, leaves are smaller than American Elm, 1"-2" long, dark green and smooth.

**Flowers & Fruit:** Papery, winged seeds disperse seedlings over wide areas.

**Cultivars:** 'Coolshade' is a slower-growing tree that is more resistant to ice damage than most in the species. 'Greenking' is a hybrid that has glossy green foliage turning yellow in the fall. 'Park Royal' is extremely fast growing.

### SITE SUITABILITY



**Climate Zones:** Sunset 1-3, 10, 11. USDA 4.

**Rooting:** Roots will heave sidewalks and spread aggressively into gardens.

**Soils:** Tolerates poor soil, but requires drainage.

### CULTURAL CONSIDERATIONS



**Growth Rate:** Moderate-fast.

**Longevity:** Short.

**Pests:** Elm scale, elm leaf beetle and slime flux.

**Pruning & Training:** Prune to maintain evenly spaced branches when young. Suckers need to be pruned if used as an ornamental. Sprouts and suckers readily.

**Maintenance Level:** Abundant spring seeds and seedlings. Strong tendency for branch litter and sap drip.

**COMMENTS** Siberian elm is resistant to Dutch elm disease and grows quickly with little water under the worst conditions (cold, heat, and drought) making this tree the only suitable choice for difficult sites. However, branch breakage can be a problem making this tree species best suited to wind breaks and other locations away from buildings and traffic. This tree may naturalize and become weedy.

*"This elm is at the helm of true tree happiness."*





*What does he plant who plants a tree  
He plants, in sap and leaf and wood,  
In love of home and loyalty,  
And far-cast thought of civic good  
His blessing on the neighborhood.*

*— Charles Lathrop Pack*

## **TREE CARE GUIDE**



## TREE SELECTION GUIDE

Many factors are important when matching a tree to a site. Indeed, the initial step of selecting the proper species for a site is probably the most important decision you will make. Information in Table 1 should help significantly in your selection. Species chosen should match the site on which it will be placed and the degree of care that will likely be provided for it while it matures.

At the nursery, choose a "good looking" tree. Good trees are proportional in size to the container or root ball supporting them. Inspect for girdled or exposed surface roots; if girdled roots are present, another plant should be selected, because exposed roots are likely dried out and damaged. The root ball of balled-and-burlapped (B&B) trees should be solid; a loose trunk may indicate that the plant has been mishandled. If using bareroot plants, inspect them upon arrival for dead roots and broken branches. Most nurseries will allow for credit if the tree does not arrive in good condition.

Trees should be vigorous and healthy with no evidence of insects, diseases, cultural problems, or wounds. They should have a natural form with well-spaced and arranged branches. Trunks should be narrower at the first branch than at the root collar. Foliage should be evenly distributed in the upper two-thirds of the tree, not concentrated at the top. Selecting a tree that has well-developed branches and good crotch angles will require less future care.

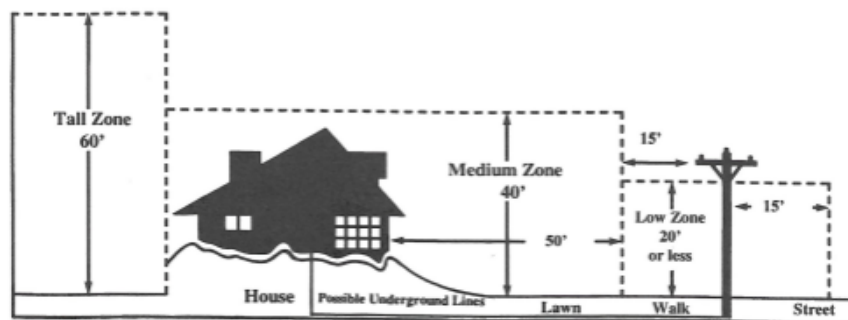


Figure 1. Proper places for trees around homes and buildings.

Species	Lowest Zone	Sun/shade	Watering	Maximum Height	Maximum Width	Minimum Cutout
Narrowleaf cottonwood	1	Full sun	Frequent	60	20	N/A
American linden	2	Shade tol.	Moderate	60	35	10x10
Boxelder	2	Shade tol.	Frequent	50	40	N/A
Englemann spruce	2	Shade tol.	Moderate	150	60	N/A
Water birch	2	Shade tol.	Moderate	30	15	5x5
White fir	2	Shade tol.	Moderate	100	30	N/A
American elm	2	Intermed.	Moderate	120	40	10x10
Colorado blue spruce	2	Intermed.	Moderate	100	40	N/A
European mountain-ash	2	Intermed.	Moderate	60	20	10x10
European white birch	2	Intermed.	Frequent	60	30	5x5
Norway spruce	2	Intermed.	Moderate	80	40	N/A
Siberian elm	2	Intermed.	Infreq.	60	30	N/A
Aspen	2	Full sun	Frequent	60	15	N/A
Green ash	2	Full sun	Moderate	40	30	5x5
Limber pine	2	Full sun	Infreq.	60	30	N/A
Corkbark fir	3	Shade tol.	Moderate	100	20	N/A
Amur maple	3	Intermed.	Moderate	20	10	3x3
Black locust	3	Intermed.	Infreq.	75	50	5x5
European white poplar	3	Intermed.	Moderate	80	40	N/A
Rocky Mtn juniper	3	Intermed.	Infreq.	30	30	5x5
Silver maple	3	Intermed.	Frequent	80	60	N/A
Bristlecone pine	3	Full sun	Infreq.	40	20	10x10
Crabapple	3	Full sun	Moderate	30	20	3x3
English hawthorn	3	Full sun	Moderate	25	15	3x3
Lanceleaf cottonwood	3	Full sun	Frequent	60	40	N/A
Mayday tree	3	Full sun	Moderate	20	15	5x5
Douglas-fir	4	Intermed.	Moderate	100	30	N/A
Gambel oak	4	Intermed.	Infreq.	30	15	N/A
Alligator juniper	4	Full sun	Infreq.	50	30	5x5
Austrian pine	4	Full sun	Moderate	60	20	N/A
Globe willow	4	Full sun	Moderate	70	60	N/A
Honeylocust	4	Full sun	Moderate	70	50	10x10
Northern red oak	4	Full sun	Moderate	90	60	5x5
Pinyon pine	4	Full sun	Infreq.	30	15	10x10
Ponderosa pine	4	Full sun	Infreq.	200	30	N/A
Sycamore	4	Full sun	Moderate	50	50	10x10
Arizona black walnut	5	Intermed.	Moderate	70	50	N/A
Northern catalpa	5	Intermed.	Moderate	60	30	10x10
Flowering pear	5	Full sun	Moderate	50	30	5x5
Flowering plum	5	Full sun	Frequent	30	25	5x5
Utah juniper	5	Full sun	Infreq.	30	20	5x5
Fremont cottonwood	6	Full sun	Frequent	60	40	N/A
Giant sequoia	6	Full sun	Moderate	200	60	N/A
One-seeded juniper	6	Full sun	Infreq.	30	20	5x5

Table 1. Selection guidelines for trees to match with your growing and site conditions.  
N/A – Not appropriate for cutouts. Allow maximum width for above ground planting area.



## SITE SELECTION

Probably the most important factor in site selection is the condition of the soil. Good soil will promote root growth and trees will respond to care in an optimal way. The best way to test soil for its suitability is with a drainage test. To determine internal drainage of a soil, dig a hole 8-inches square by 32 inches deep and fill it with 5 gallons of water. Let the soil absorb the water for an hour then fill it again. If the hole is empty in 24 hours, then the soil has good internal drainage. Heavy clay soils may require 48 hours to drain, indicating that internal drainage is poor but adequate. If any water remains after 48 hours reconsider planting at this site. A raised planting bed can be constructed to help alleviate this poor drainage.

If suitable soil is available, the next step is to determine the mature size of the tree. Consider overhead clearances, distance from buildings, streets and sidewalks, and location of underground sewer and water lines (Figure 1). For example, don't plant a tree that will be over 25 feet tall under powerlines. Don't be discouraged if the desired tree will not fit the location, a smaller tree or tall shrub may achieve similar results without creating undue future problems.

## NEW PLANTINGS

Planting is generally most successful if it coincides with high precipitation and cool temperatures. However, at elevations above 6000 feet in the Southern Rocky Mountain region, these conditions are rare. March and April are generally good months to plant seedling-size bareroot, B&B, and containerized stock. May and June are the driest, windiest months and extra care is needed to keep plants from drying out during this time. July and August is monsoon season over most of the Southern Rocky Mountain region and can be an excellent time to plant. September and October can also be an excellent time to plant if summer rains persist.

Planting holes should be dug 3 to 5 times wider and as deep as the root ball. (Figure 2). Plants should be placed gently in the center of each hole. For containerized and B&B stock, carefully cut and fold back the top half of baskets, fold back burlap, and remove any twine or wire so as not to damage the root ball. Back-fill material should consist of native soil filled to the top of the root ball; if additional soil is needed then it should be of similar texture. Burying root balls too deep can stunt or kill many trees. **Caution: Containerized and**

**B&B trees need to be handled with care; dropping, rolling, and prying can cause severe damage. Back-fill around the roots while removing twine, and when folding back burlap and wire baskets.**

Root balls should be moist when planted. Water them immediately following planting to ensure good root and soil contact and remove large air pockets. After watering, but prior to mulching, it may be necessary to add additional back-fill. Water wells formed directly over the root ball ensure adequate wetting of the root ball, but areas outside of wells should also be watered. Newly planted trees will need more frequent watering than mature trees. It may be necessary to water daily for the first 3-4 weeks. In general, one can slowly decrease frequency but increase amount and width of watering over the first few months. In contrast to trees, fast-growing annuals will become established more quickly than slow growing trees. A fast-growing annual may put roots down 12 inches within 3 to 4 weeks, whereas some trees may take a full growing season to achieve as much new root growth. It is not necessary to dig up a plant to determine root growth, one can judge by vegetative growth. New leaf and shoot growth generally corresponds to new root growth.

Bareroot plants, since they are planted in native soil, generally require less frequent watering than do plants transplanted from pots with soil. Potting soil often forms a barrier to available water in native soil. In contrast, bareroot plants have access to this water.

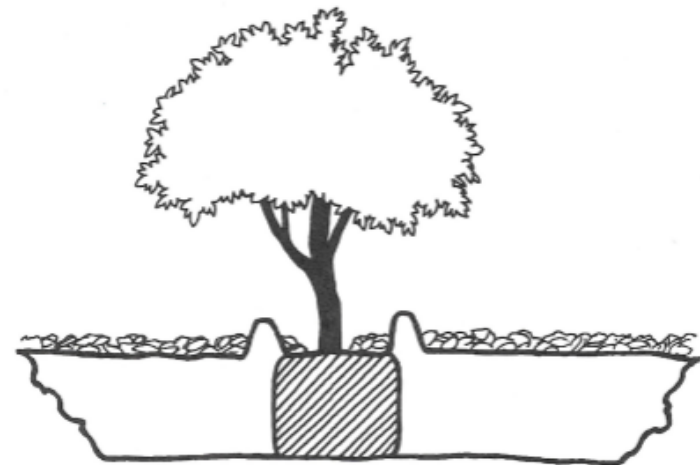


Figure 2. The planting hole is dug 3 to 5 times wider and as deep as the root ball. Water well is placed directly over the root ball. Mulch is applied to the entire backfill area.



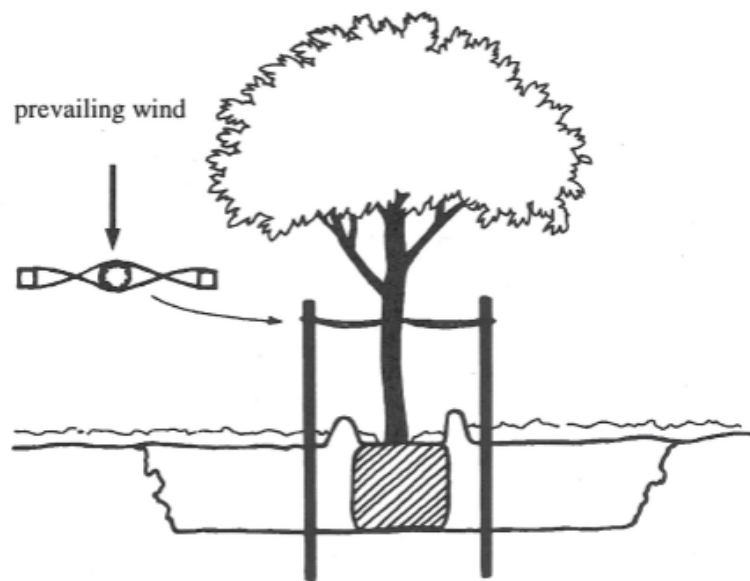


Figure 3. Two stakes should be placed perpendicular to prevailing winds, below the canopy, and outside the root ball. Ties should be snug at the tree and stake but left with slack for tree movement. Wide non-abrasive fabric tie material is preferred over traditional hose and wire.

## MULCHING AND WATER WELLS

Mulch is the best way to maintain soil moisture within the zone of actively growing roots. The entire back-filled area of a newly planted tree should be mulched with a 2" to 4" layer of gravel, pine needles, leaves, bark, wood chips, straw or other coarse organic material. Mulch should not come in direct contact with tree trunks and should be extended outward as trees grow. If it is not extended, root growth may be reduced.

A water well should be constructed directly over the outer edge of the root ball (Figure 2). For the first year, water a tree in and outside the well. After one year, a tree should have root growth extending beyond the ball and into the back-filled area and the well can be removed. Beginning with the second year, water as indicated in the section on irrigation.

## STAKING

Stakes may be used to support tree trunks and to aid in root anchorage, but not every newly planted tree needs to be staked. Tree shape determines if staking is required. Many small conifers do not need stakes whereas most fast-growing deciduous trees and large conifers do. Tree trunks should be supported as low as possible but high enough to allow the trunk to return to upright when bent over by the wind. According to Richard Harris, Department of Environmental Horticulture, U.C. Davis, "to find the proper height, hold the trunk in one hand, pull the top to one side, and release. The height at which the trunk will just return to upright when the top is released is the height at which to attach the ties." (This method is not recommended for B&B conifers.)

If staking is needed, two short stakes should be placed outside the root ball and perpendicular to prevailing winds. Trees should be allowed to sway but not to rub against stakes. (Figure 3). Stakes should be left in place only long enough to allow a tree to support itself, usually one year. To stake large trees, use three guy wires attached snugly to the trunk at the three lowest scaffold branches and attached to anchors with springs. This system will support a large tree, yet allow it to sway in the wind above the guy wires.

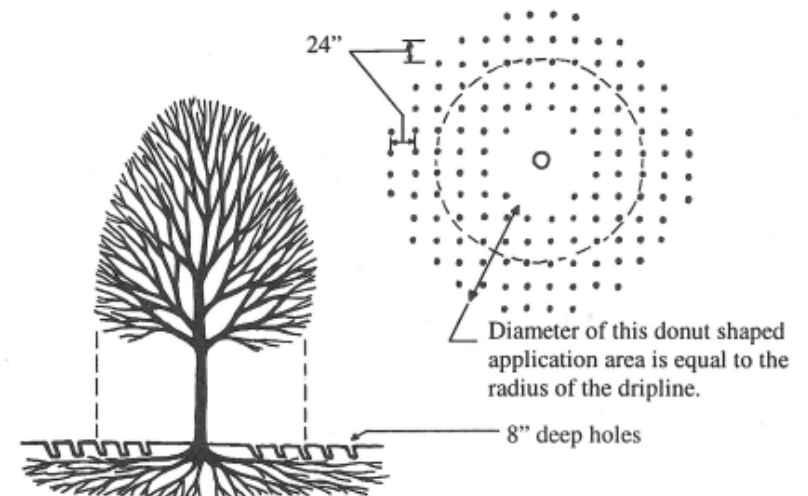


Figure 4. Fertilizer is incorporated into the soil at the zone of actively growing roots.



## FERTILIZING

Soils in the Southern Rocky Mountain region, where ponderosa pine is native, are generally low in nitrogen and phosphate and have a pH ranging from 6.7 to 7.3. Because the soils are approximately neutral, nutrient deficiencies are rare. Newly planted trees may not need fertilizing for several years. Established trees lacking vigorous growth can benefit from applications of nitrogen and possibly other elements if deficiency symptoms are indicated.

Fertilizer can be detrimental to the roots of young trees at planting. Furthermore, the shock of transplant can make it difficult for trees to utilize fertilizer to benefit both roots and foliage. Foliage will often grow without corresponding root growth. Fertilizer, at planting, can generally be deferred one year for each inch of stem diameter.

A fully-established tree should be growing rapidly. If vigor (measured by amount of new stem growth), is reduced from the previous year, then the tree would probably benefit from yearly applications of nitrogen. Other nutrients, such as phosphorous and potassium, may only be needed every 5 to 10 years. When the tree reaches full maturity, fertilizer will likely have little effect on the vigor of the tree and fertilizing may be a wasted effort.

Nutrient deficiency symptoms may include stunted or distorted leaves, abnormal leaf color, dead spots on leaves, and early leaf drop. However, insect and disease damage may cause similar symptoms. If deficiency symptoms persist after applying nitrogen, phosphorus, and potassium and you are unable to ascertain the exact deficiency, a broad-spectrum fertilizer may solve the problem.

Fertilizer should be applied below the soil surface for maximum effectiveness. Fertilizers containing phosphorous and potassium should be applied below the soil surface through 8-inch-deep holes. Nitrogen fertilizer is mobile in the soil and can be applied to the soil surface and watered-in. Whether applied on or below the soil surface, fertilizers should be placed at the zone of actively growing roots. This zone is a donut-shaped area under and beyond the drip line with its center at the drip line. The outer boundaries are half the distance to the trunk and equidistant beyond the drip line (Figure 4).

The best time to apply fertilizer is in the spring prior to the start of new growth; however, applications in early summer can also be effective. Late summer applications of nitrogen can promote unhardened late-season growth that will be more susceptible to damage from cold fall temperatures, and should be avoided.

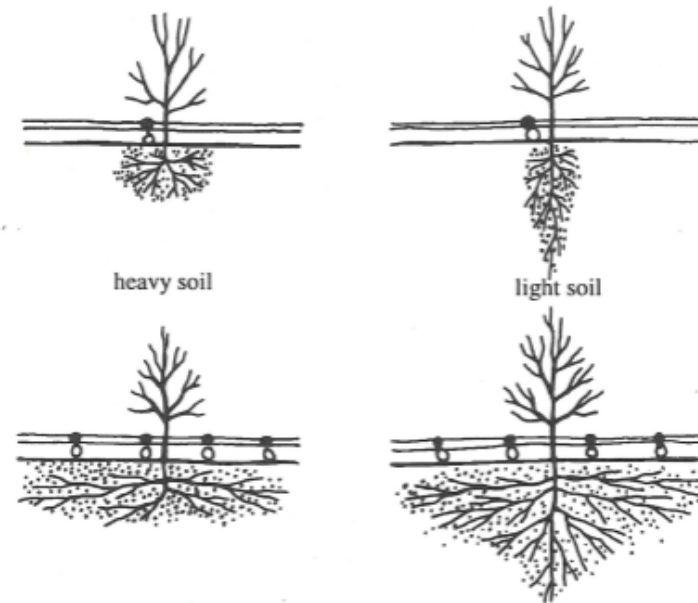


Figure 5. Wetting patterns of single and multiple drip emitters on light and heavy soil. A single emitter covers approximately 1 square foot on light soil and 4 square feet on heavy soil. One emitter may be sufficient only for small plant material.

## IRRIGATION

Deep watering uses less water due to less surface evaporation. It also encourages deep and wide rooting so that roots can draw water and nutrients from a greater amount of soil. Roots grow deep into soils with deep, infrequent watering. Shallow, frequent watering leads to surface rooting and trees that suffer during hot dry periods, require more fertilizing and may even blow over during wind storms. Also, if soils remain saturated for extended periods due to frequent watering, then roots do not have access to air and diseases are more common.

Trees usually need to be watered to a depth of 2-3 feet within the zone of actively growing roots. It takes about 1 to 1 ½ inches of water to sufficiently moisten each foot of loam soil, more if it is a heavy clay-like soil. An easy way to determine the depth of the water after irrigating is to push a steel rod into the soil, the rod should push easily where a soil is saturated.



Frequency of watering is just as important as depth. The frequency of watering is determined by the interaction of weather conditions, soil type, site, and tree species and maturity. It is necessary to water more often during the dry, windy weather of June than in the cloudy and calm weather of August, even though temperatures are often similar in both months. Shallow, sandy, and/or rocky soil will require more frequent watering than soil that is deep, loamy, claylike, rock free, and/or high in organic matter. Compacted soils take longer to water than loose soil, with compacted clay soils taking many hours of slow watering for deep saturation. Plants use more water if grown in full sun, windy locations, or southern sides of buildings. Conversely, plants use less water if they are on northern sides of buildings, under other trees, or sheltered from the wind. Different micro-climates can occur within a few feet of each other causing plants to have varying water requirements.

Finally, plants with leaves that are small, narrow, leathery, fuzzy, resinous and/or succulent will tend to use less water and will need less frequent watering than those with other types of leaves. However, even such drought tolerant species will need watering during their first year after planting and during extreme drought. Most other tree species will typically need to be watered every three weeks. It may be necessary to water more often if temperatures exceed 90° F. Drip irrigation is an efficient method of irrigation for small, young trees since little water is lost due to evaporation and runoff. However, drip irrigation cannot effectively meet the needs of a mature tree. Wetting patterns show that a mature tree may need hundreds of drip emitters to adequately saturate the zone of ac-



Figure 6. The trees on the top were pruned when young, whereas the ones on the bottom were not pruned. At planting, 3-4 years after planting, 5-7 years after planting, and 15 years after planting, from left to right.

tively growing roots (Figure 5). Mature trees are more efficiently watered with low-pressure sprayers which are easily substituted when the plant outgrows the drip emitters or with soaker type hoses.

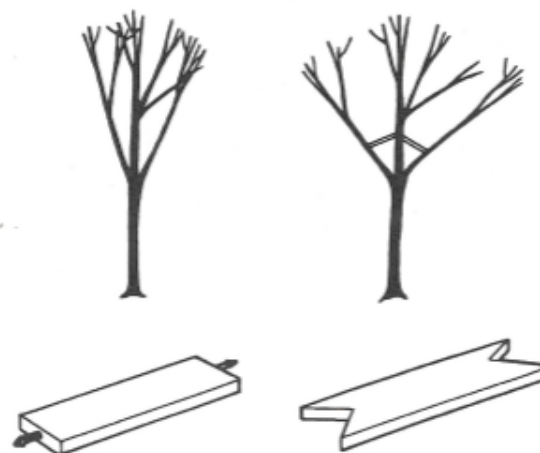


Figure 7. Spreaders can be used to adjust the angle of scaffold branches to improve the strength and health of the tree and its branches.

## TRAINING YOUNG TREES

Training and pruning young trees is very important for some species. Training helps to avoid poor crotch angles that, later in the life of the tree, will be susceptible to breakage. Pruning with training promotes good form, preventing multiple leaders and competing branches and ensures proper shape and longevity not seen in trees left to grow naturally (Figure 6).

A good crotch angle is between 45 and 60 degrees. The best way to train young limbs is to physically move them with mechanical spreaders such as wooden lath cut with notches or cut nails (Figure 7). Limbs can also be spread with weights hung on the end of a limb or with tie downs. **Caution: Care should be taken not to spread limbs too far because they will break. Also do not leave mechanical devices on trees for more than two months without adjustment.**



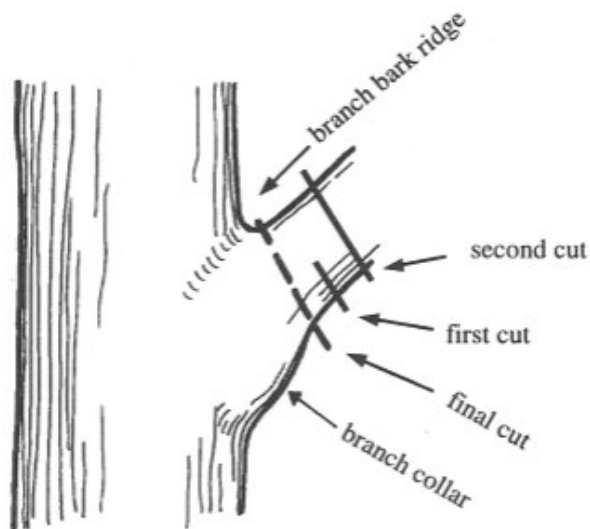


Figure 8. The branch collar is generally a swollen area that connects the stem to the main branch. The branch collar contains specialized cells to promote healing. Cuts should be made leaving just the branch collar.

## PRUNING

Proper pruning of young and mature trees ensures their long-term health. Improper pruning promotes unwanted sprouting and/or death and disease of wood in the interior of the remaining branch or trunk.

Thinning cuts that remove unwanted branches at their collar (Figure 8) are the most common prunings. When a cut is made leaving just the branch collar, the wound heals naturally and quickly.

Heading cuts can be used on one-year-old stems to encourage lateral branching. When heading cuts are made on older wood, trees develop excessive sprouting and/or the stubbed branches become diseased and die (Figure 9). In either case, such trees become hazardous and additional corrective pruning is often necessary to reduce the hazard.

Pruning sealers are not recommended. Research has shown that sealers are of no benefit and may hinder healing in some trees.

## RURAL INTERFACE WITH “NEIGHBORWOODS”

An increasing number of property owners are moving into areas that are characterized by continuous canopy cover of native trees and/or adjoin forested properties. This situation creates new issues associated with fire protection and forest health (insects and disease). Fire and forest health problems may originate in your backyard and spread to the property of others, or vice-versa.

The key preventative measure you can take is to reduce the number of trees and other fuel near your home. A lower tree density lessens the amount of fuel available for wild fire and improves individual tree vigor needed for insect and disease resistance.

In the arid Southwest, tree crowns should not overhang or come in contact with buildings. Ideally trees should be 20-30 feet from a structure. If you have a particularly nice tree close to your house that you want to retain, isolate its crown from those of its neighbors by 20-30 feet. This markedly increases the chances of saving your home in the event of wild fire by breaking the continuity of crown fuels. Further away from your house, thin your trees such that the crowns do not touch one another or preferably are separated by 5-10 feet. As a rule of thumb, multiply the diameter of your tree trunk (in inches) by 2 to get the minimum distance (in feet) that should be maintained between tree trunks. Historically, trees in the Southwest grew at very low densities; this promotes “fire resistance” and good health.

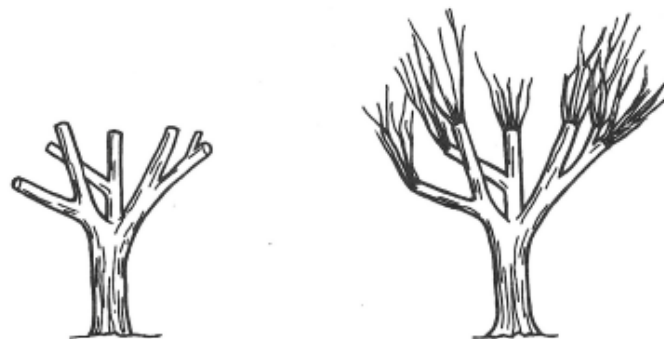


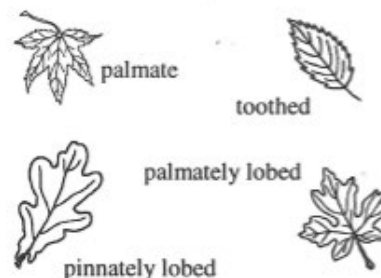
Figure 9. Trees that have had heading cuts made on old wood are unsightly and hazardous.



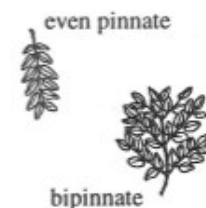
## WHERE TO FIND HELP WITH TREES

Cooperative Extension offices are located in most counties. Cooperative Extension is a division of the State Land Grant University System and offers research-based information to the public. Most offices have staff that is trained in the care of trees and other landscape plants suitable for their county. They also offer workshops that are open to the public on the proper selection and care of trees. If a college or university is located near your home then you may be able to find help from departments of forestry, horticulture, agriculture, and/or biology. Local nurseries and certified arborists also can be very helpful. Your community may have a "tree board" or council that is concerned with trees much like the Flagstaff Community Tree Board in Flagstaff, Arizona. Any of these resources may be able to offer advice on the proper care of trees in your area.

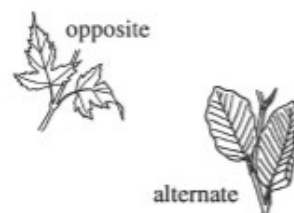
## ILLUSTRATIONS OF BOTANICAL TERMS REFERENCED IN THE TEXT



**SIMPLE LEAVES**



**COMPOUND LEAVES**



**ARRANGEMENT OF LEAVES**



**LEAF EDGES/MARGINS**



**LEAF SHAPES**



**LEAF BASE**



## GLOSSARY

**Accent tree.** A tree with some outstanding quality such as flowers, leaves, fruit, or branching habit that is located as a focal point in a landscape. (pp. 28, 32, 33, 36, 45, 53, 56, 57, 64, 72)

**Acidic soils.** Soils with a pH below 7.0, generally associated with areas that have over 20" annual precipitation.

**Adelgid.** A small aphid-like insect that has a complex life cycle. (pp. 32, 33, 36)

**Alkaline soils.** Soils with a pH above 7.0, generally associated with areas that have under 20" annual precipitation. (pp. 9, 29, 40, 64)

**Annual.** Living one year or less, including growth, flowering, and seeding. (p. 86)

**Aphid.** Small soft bodied insects that suck liquid from leaves and stems. (pp. 1, 4, 9, 13, 17, 20, 29, 32, 33, 36, 60, 68, 69, 76)

**Arboriculture.** The culture of trees, shrubs, woody vines, and groundcovers.

**Armored scale.** Small sucking insects protected by a shield-like covering. (p. 52)

**Backfill.** Soil put back into the hole when planting a tree or other plant.

**Balsam twig aphid.** Aphid species associated specifically with fir trees. (p. 1)

**Bareroot seedling.** A small plant sold with their roots bare (i.e., no soil attached). (p. 4, 24, 25, 83, 85, 86)

**Bark beetle.** Beetle that bores through the bark of certain trees to feed, mate and rear young in the zone between the cambium and the bark. (pp. 40, 45, 68)

**Biennial.** A plant that requires two years to complete its life cycle. Flowering is generally delayed until the second year. (p. 29)

**Bipinnate.** Twice or doubly pinnate. See illustration p. 96. (p. 21)

**Bonsai.** A Japanese word for the art of growing dwarfed trees and shrubs in small shallow pots. (pp. 4, 5)

**Bough.** Tree branch, typically from a conifer species. (p. 32)

**Boxelder bugs.** A true bug 3/8"-1/2" long, black with reddish-orange markings on its wing covers. This insect is more of a nuisance to humans than to trees. (p. 8)

**Bracts.** Modified leaves, from the base of which a flower or fruit arises. (p. 60)

**Broadcast.** Scattering of seed or chemicals uniformly over the soil.

**Bronze birch borers.** A beetle that bores into birch trees. (p. 13)

**Bud break.** When buds begin to open up in the spring.

**Buttressing.** When the base of a tree is of significantly greater diameter than at breast height (4 1/2 feet); widening of a tree's trunk at its base. (p. 72)

**Cambium.** The ring of dividing cells inside the bark of trees responsible for stem diameter growth.

**Canopy.** The leaves and living branches of a tree; the tree crown. (pp. 9, 24, 61, 69, 94)

**Canker disease.** A disease that attacks the inner bark and cambium of trees and can slowly kill the tree over many years. (pp. 21, 52, 53)

**Catkin.** A hanging spike of flowers of many trees, as in birches, poplars, willows, and oaks. (pp. 13, 24, 49, 52, 53, 69)

**Chlorosis.** A reduction in chlorophyll leading to a yellow color, caused by nutritional imbalance or disease. (pp. 9, 65)

**Clay soil.** Soils that contain more than 35% clay particles. (pp. 85, 91)

**Clearwinged moth.** A moth with clear wings and may resemble a wasp, the larvae of which bores into trees. (pp. 52, 53)

**Climate Zone.** A geographical area with a similar set of climatic features that allow certain plants to succeed.

**Coarse soil.** Soils that contain a high percentage of sand and/or gravel. (p. 1)

**Cold hardy.** Not damaged when exposed to below freezing temperatures. (pp. 9, 13, 17, 32, 33, 61)

**Conifer.** Cone-bearing tree or shrub, typically evergreen. (p. 88)



**Cone-bearing.** Having a cone-like fruiting structure. (pp. 1, 4, 32, 33, 36, 37, 40, 41, 44, 45, 60, 72)

**Cordate.** Heart-shaped, basally rounded with a deep notch. See leaf illustration p. 96. (p. 76)

**Corky bark.** Bark that is cork-like. (p. 4)

**Crotch angles.** Angles made between the main stem and a branch. (pp. 9, 61, 83, 92)

**Crown.** The leaves and living branches in the uppermost part of a tree. (pp. 1, 5, 8, 9, 13, 16, 17, 20, 21, 28, 29, 32, 33, 36, 41, 44, 45, 48, 49, 52, 53, 56, 57, 60, 61, 68, 69, 72, 73, 76, 77, 80, 94)

**Cultivar.** Short for "cultivated variety", and may be used in place of the word "variety" to indicate a specific horticultural selection. (pp. 1, 4, 5, 8, 9, 12, 13, 16, 17, 20, 21, 24, 25, 28, 29, 32, 33, 36, 37, 40, 41, 44, 45, 48, 49, 52, 53, 56, 57, 60, 61, 64, 65, 68, 72, 73, 76, 77, 80)

**Cutouts.** Open sections of sidewalk or street used to grow trees or other plants. (pp. 5, 12, 13, 16, 17, 20, 21, 25, 28, 29, 37, 40, 56, 57, 61, 65, 68, 73, 76)

**Deciduous.** Dropping leaves annually. (pp. 5, 8, 13, 16, 17, 20, 21, 24, 29, 48, 52, 53, 56, 57, 61, 64, 65, 68, 69, 73, 76, 66, 80, 88)

**Defoliate.** Premature loss of leaves due to wind, drought, frost, insects, disease, or improper chemical applications.

**Deltoid.** Broadly triangular and attached at the base. See leaf illustration p. 96.

**Die back.** When a branch dies from the top down, caused by excessive cold, drought, insects or diseases.

**Dioecious.** Having male and female flowers on separate plants. (pp. 8, 9, 20, 49, 52, 53)

**Double-winged samara.** A dry, two-seeded, wing-like fruit. (pp. 5, 8, 9)

**Drip irrigation.** Watering a plant so that only soil in the plant's immediate vicinity is moistened. Water is supplied from a thin plastic tube at a low flow rate. The technique sometimes is called "trickle irrigation". (p. 91)

**Drip line.** The outer edge of a tree canopy. (p. 89)

**Drought-tolerant.** Can withstand lower than average soil moisture levels. (pp. 40, 68)

**Dwarf mistletoe.** A parasitic plant without true leaves that must get all nutrition from a host plant. (pp. 1, 45)

**Dwarf variety.** A variety that, due to genetics or grafted rootstock, is smaller than normal. (p. 72)

**Elliptical.** Longer than wide and rounded at both ends, the widest part near the middle. See leaf illustration p. 96. (pp. 56, 68, 72, 77)

**Established.** When a young plant has grown sufficient roots out of the original root ball into native soil, and top growth is vigorous. (pp. 20, 36, 68, 86, 89, 90)

**Evergreen.** Remaining green year round. (pp. 1, 4, 25, 28, 32, 33, 36, 37, 40, 41, 44, 45, 60, 72)

**Fibrous.** Roots consisting mostly of threadlike roots. (pp. 8, 9, 25, 28, 29, 32, 33, 36, 56, 72, 73, 76)

**Formal tree.** A tree that has balanced form top to bottom, left to right. (p. 41)

**Furrowed bark.** Bark that has deep grooves or furrows.

**Girdling.** Destroying of bark and cambium around the trunk of a tree, by insects, diseases, animals, or mechanical devices.

**Grafted (ing).** The propagation technique of cutting a branch with vegetative buds. (pp. 16, 21)

**Guy wires.** Wires used to secure a newly planted tree from falling over. (p. 88)

**Hardy.** Adapted to harsh climatic conditions (i.e. dry or cold). (pp. 5, 9, 13, 16, 17, 20, 21, 32, 33, 37, 40, 41, 44, 45, 49, 52, 56, 60, 61, 69, 73)

**Herbaceous.** Dies back to the ground each winter.

**Herbicide drift.** When a chemical used to control weeds or undesirable vegetation is accidentally wind blown onto desirable vegetation. (p. 8)

**Hybrids.** Plants originating from the crossing of two dissimilar parents to produce qualities such as insect or disease resistance. (pp. 17, 48, 52, 80)



**Ice damage.** Damage to tissue caused by freezing and thawing of water (e.g. splitting branches away from main stem). (pp. 1, 80)

**Included bark.** When the angle between the main stem and a branch is so small that the bark unites to form a weak attachment of the branch. (p. 61)

**Inconspicuous flowers.** Flowers that are not readily noticeable. (pp. 21, 48)

**Invasive roots.** Roots that aggressively grow into areas not generally associated with roots (e.g. sewer pipes). (pp. 8, 9, 69)

**Lanceolate.** Lance-shaped, several times longer than wide, widest in the basal third, tapering gradually towards the tip, more rapidly towards the base. See leaf illustration p. 96. (pp. 20, 69)

**Lateral branching/rooting.** Branches or roots that grow somewhat parallel to the ground. (pp. 1, 20, 32, 33, 76, 93)

**Lava outcrop.** An area with a predominance of lava rocks.

**Leaders.** Dominant tree or shrub stems or trunks from which side branches develop. (p. 92)

**Leafhoppers.** Small insects that suck liquid from leaves and resemble grasshoppers. (p. 68)

**Leaf litter.** The accumulated leaves that have fallen off plants and onto the ground. (p. 16)

**Leaf mold.** Fallen leaves that are in the process of decomposition.

**Legumes.** Plants that use nitrogen from air via symbiotic nitrifying bacteria living on their roots.

**Limestone soils.** Soils derived from limestone parent material and thus high in calcium carbonate. These soils in the Southwest are generally high in pH (i.e., alkaline).

**Linear.** Long and narrow with parallel margins. See leaf illustration p. 96.

**Loamy soils.** Soils that consist of less than 52% sand, 28% to 50% silt, and 7% to 27% clay, resulting in a soil texture that is ideal for gardening. (p. 17)

**Locust borer.** A beetle that bores into the stems of black locust trees causing them to become weak and to break at the point of the bore holes. (p. 68)

**Micro-climate.** Climate in a small area or locality (e.g., adjacent to the north side of a home or influenced by a lake). (pp. 72, 91)

**Mistletoe.** A parasitic plant that derives nutrition from a host plant. (p. 45)

**Monoecious.** Having both male and female flowers on one plant. (pp. 12, 13, 24)

**Mulch.** Materials such as straw, leaves, lawn clippings, sawdust, wood chips, plastic sheets, or newspapers laid on the soil to conserve moisture, maintain a moderate soil temperature, and control weeds. (pp. 53, 86, 87)

**Multiple trunk.** With more than one main stem. (pp. 13, 41)

**Native.** Originating from the region in reference. (pp. 21, 40, 44, 64, 68, 72, 85, 86, 89, 94)

**Needle.** See leaf illustration p. 96.

**Nitrogen fixation.** Transformation of atmospheric nitrogen into useful nitrogen compounds by symbiotic bacteria on root nodules.

**Oak root fungus.** A fungus that attacks the roots of oak trees and destroys tissue.

**Obovate.** Inversely ovate, with the outline of an egg, attached at the narrower end. See leaf illustration p. 96. (pp. 65, 77)

**Organic material.** Portion of the soil resulting from decomposition of animal or plant material. Helps to maintain good structure and micro-organisms in the soil and tends to give soil a darker color. (p. 87)

**Ornamentals.** Plants grown for their beauty. (p. 5)

**Oval.** Broadly elliptic, narrowing somewhat from the middle to rounded ends. See leaf illustration p. 96. (pp. 8, 16, 21, 29, 57, 68, 77)

**Oystershell scale.** Small sucking insects protected by a shield-like covering that resembles an oystershell. (p. 53)

**Palmate.** Radially lobed or divided like the fingers of a hand. See leaf illustration p. 96.

**Palmately lobed.** See leaf illustration p. 96.



**Papery bark.** Bark that can be peeled off in thin sheets resembling paper. (p. 13)

**Papery cone.** A cone that has very thin cone scales (e.g., spruce or fir). (p. 32)

**Pendulous.** Hanging. (pp. 9, 32, 72)

**Perennials.** Plants that normally live more than two years.

**pH.** Chemical symbol used to give the relative acidity or alkalinity of the soil. The scale ranges from 0 to 14, with 7 the neutral reading. Readings of less than 7 indicate acid soil, readings above 7 indicate alkaline soil. (pp. 1, 5, 9, 20, 56, 65, 73, 76, 77, 89)

**Pine needle scale.** Small sucking insects protected by a cottony covering and found on the needles of pine trees. (pp. 32, 33)

**Pinnate.** See leaf illustration p. 96. (pp. 8, 20, 21, 68, 73)

**Pinnately lobed.** Compound, with leaflets or pinnae, arranged in a single row each side of the common rachis. See illustration p. 96.

**Pod litter.** Fallen fruits of trees (e.g. honeylocust) considered a mess.

**Powdery mildew.** A powdery, white fungus that damages tree leaves. (pp. 29, 48, 64)

**Pruning sealers.** Compounds applied to pruning cuts in an effort to enhance wound healing. (p. 93)

**Raceme.** Flowers born along a central axis. (p. 57)

**Resinous.** Containing high levels of resin (sap). (pp. 40, 41, 91)

**Rhizome.** Horizontal underground stem distinguished from a root by the presence of nodes and internodes, buds and scale-like leaves.

**Rock gardens.** Gardens which use rocks for accent and beauty. (p. 37)

**Rootbound.** When root and plant growth are limited by a confined space.

**Rootstock.** Root systems grown to be grafted onto another plant.

**Runners.** Slender, elongated and prostrate branches containing buds from which roots can form.

**Samara.** Simple, dry, one- or two-seeded indehiscent fruit; winged seed. (p. 20)

**Sapsucker.** A bird that removes the bark of a tree to encourage sap flow to attract insects which it feeds upon. (pp. 5, 53, 73)

**Scaffold branches.** The main lateral branches of a tree. (pp. 9, 12, 88)

**Scale.** Small sucking insects protected by shield-like or cottony coverings. (pp. 29, 48)

**Scaley bark.** Bark that forms scales rather than smooth surfaces or furrows.

**Seed pod.** A dry fruit that contains more than one seed. (pp. 21, 68)

**Seedless variety.** A plant variety that produces flowers and fruit but does not produce seed. (p. 8)

**Serrate.** See leaf illustration p. 96. (pp. 56, 76, 77)

**Sessile.** Directly attached; lacking petiole (leaves) or pedicel (fruit). (p. 21)

**Shade tolerant.** Able to grow well in full shade.

**Shearing.** To prune one-year-old stems on a plant to cause lateral buds to grow. (p. 41)

**Showy flowers.** Large flowers prized for their beauty. (p. 16)

**Single trunk.** Having one main stem. (p. 5)

**Slime flux.** A tree disease characterized by expelled sap that is colonized by bacteria and yeast, causing foaming and strong odors. (pp. 69, 80)

**Soil compaction.** When soil has had much of its air space removed due to excessive pressure from above. (pp. 1, 4, 36)

**Specimen tree.** A tree with some outstanding quality such as flowers, leaves, fruit, or branching habit and located as a focal point in the landscape. (pp. 37, 60)

**Sport.** A bud that has mutated causing unusual growth. (p. 56)

**Spruce aphids.** Small soft bodied insects that suck liquid from the needles of spruce.



**Succulent leaves.** Leaves that are thickened due to high content of water.

**Sucker.** A rapidly growing vertical stem that arises from stems or rootstock, which often should be removed. (pp. 5, 8, 49, 52, 53, 64, 68, 77, 80)

**Species.** A group of individuals that have similar characteristics and interbreed freely. (pp. 20, 24, 28, 33, 36, 37, 40, 44, 45, 48, 49, 56, 57, 61, 65, 76, 80, 83, 91, 92)

**Spider mites.** Small 8-legged insect-like arthropods that suck liquid from leaves and other plant parts. (pp. 29, 32, 33, 48, 69)

**Surface roots.** Roots that grow just below or on the soil surface of the soil. (p. 83)

**Taproots.** Roots grow directly downward for support and water.

**Tent caterpillars.** Insects that form a protective fibrous tent and feed upon leaves when not resting in the tent. (pp. 29, 53, 69)

**Thinning.** The removal of entire branches at their collar to reduce the number of stems in a tree's canopy. (p. 93)

**Thrips.** Small flying insects that suck the liquid from leaves and flowers. (pp. 9, 20, 68)

**Toothed.** Having small notched projections along the margin of a leaf. (pp. 12, 52, 65, 73)

**Tuberous root.** Thickened roots, differing from stem tubers in that they lack nodes and internodes, and buds are present at the stem end.

**Tussock moth.** A uniquely-hairy caterpillar that feeds upon the foliage of both conifers and deciduous trees. (pp. 32, 33)

**Weak wood.** When the limbs or trunk of a tree are susceptible to breakage due to wind, snow or ice.

**Windbreak.** The planting of trees and shrubs in specific patterns to reduce wind speeds. (pp. 32, 44, 49)

**Wind damage.** Damage to trees caused by excessively strong winds. (p. 61)

**Winter kill.** When plants are killed by one or more of the effects of winter weather. (p. 56, 69)

## BIBLIOGRAPHY

Burns, Russell M., and Barbara H. Honkala, Tech. Coords. 1990. *Silvics of North America: 1. Conifers*. Agriculture Handbook 654. U.S. Department of Agriculture, Forest Service, Washington, DC. Vol. 1, 675 p.

Burns, Russell M., and Barbara H. Honkala, Tech. Coords. 1990. *Silvics of North America: 2. Hardwoods*. Agriculture Handbook 654. U.S. Department of Agriculture, Forest Service, Washington, DC. Vol. 2, 877 p.

Taylor, Norman. 1961. *Taylor's Guide to Trees*. Houghton Mifflin Company, Boston.

Petrides, George A. 1992. *A Field Guide to Western Trees*. Houghton Mifflin Company, Boston.

Preston, Richard J. 1967. *North American Trees*. The Iowa State University Press, Ames, Iowa.

Crittenden, Mable. 1977. *Trees of the West*. Celestial Arts, Millbrae, California.

Nelson, Ruth Aston. 1977. *Handbook of Rocky Mountain Plants*. Skyland Publishers, Estes Park, Colorado.

Yunker, Gordon L. 1990. *Urban & Community Forestry, A Guide for the Interior Western United States*. USDA Forest Service, Intermountain Region, Ogden, Utah.

Coombs, Allen J. 1992. *Eyewitness Handbooks Trees*. Dorling Kindersley, Inc., New York.

*Street Trees Recommended for Southern California*. 1994. Street Tree Seminar, Inc., Anaheim, California.

Jacobsen, Authur Lee. 1996. *North American Landscape Trees*. TenSpeed Press, Berkeley, California.

*Sunset Western Garden Book*. 1991. Sunset Publishing Corp. Menlo Park, California.

Johnson, Warren T. and H. H. Lyon. 1991. *Insects That Feed on Trees and Shrubs*. Cornell University Press., Ithaca, New York.

Dirr, Michael, A. 1977. *Manual of Wood Landscape Plants: Their Identification, Ornamental Characteristics, Culture, Propagation, and Uses*. Stipes Publishing Co., Champaign, Illinois.

Watson, Gary W. 1992. *Tree and Shrub Fertilization*. Grounds Maintenance, Jan 1992.

Wandell, Willet N. 1994. *Handbook of Landscape Tree Cultivars, 2nd edition*. East Prairie Publishing Co., Gladstone, Illinois. 394 p.

Elias, Thomas S. 1980. *The Complete Trees of North America; Field Guide and Natural History*. Gramercy Publishing Co. New York, New York.



## INDEX OF PLANT NAMES

SCIENTIFIC NAME	COMMON NAME	PAGE
<i>Abies concolor</i>	White fir	1
<i>Abies lasiocarpa</i> var. <i>arizonica</i>	Corkbark fir	4
<i>Acer ginnala</i>	Amur maple	5
<i>Acer negundo</i>	Boxelder	8
<i>Acer saccharinum</i>	Silver maple	9
<i>Betula occidentalis</i>	Water birch	12
<i>Betula pendula</i>	European white birch	13
<i>Catalpa speciosa</i>	Northern catalpa	16
<i>Crataegus oxyacantha</i>	English hawthorn	17
<i>Fraxinus pennsylvanica</i>	Green ash, red ash	20
<i>Gleditsia triacanthos</i> var. <i>inermis</i>	Honeylocust	21
<i>Juglans major</i>	Arizona black walnut	24
<i>Juniperus</i> spp.	Junipers	25
<i>Juniperus scopulorum</i>	Rocky Mountain juniper	28
<i>Malus</i> spp.	Crabapple	29
<i>Picea abies</i>	Norway spruce	32
<i>Picea engelmannii</i>	Engelmann spruce	33
<i>Picea pungens</i>	Colorado blue spruce	36
<i>Pinus aristata</i>	Bristlecone pine	37
<i>Pinus edulis</i>	Pinyon pine	40
<i>Pinus flexilis</i>	Limber pine	41
<i>Pinus nigra</i>	Austrian pine	44
<i>Pinus ponderosa</i> var. <i>scopulorum</i>	Ponderosa pine	45
<i>Platanus x acerifolia</i>	Sycamore or London plane tree	48
<i>Populus alba</i>	European white poplar	49
<i>Populus</i> spp.	Cottonwoods	52
<i>Populus tremuloides</i>	Quaking aspen	53
<i>Prunus cerasifera</i>	Flowering plum	56
<i>Prunus padus</i>	Mayday tree or bird cherry	57
<i>Pseudotsuga menziesii</i> var. <i>glauca</i>	Douglas-fir	60
<i>Pyrus calleryana</i>	Callery or flowering pear	61
<i>Quercus gambelii</i>	Gambel oak	64
<i>Quercus rubra</i>	Northern red oak	65
<i>Robinia pseudoacacia</i>	Black locust	68
<i>Salix matsudana</i>	Hankow or globe willow	69
<i>Sequoiadendron giganteum</i>	Giant sequoia	72
<i>Sorbus aucuparia</i>	European mountain-ash	73
<i>Tilia</i> spp.	Basswood	76
<i>Ulmus americana</i>	American elm	77
<i>Ulmus pumila</i>	Siberian elm	80

## INDEX OF COMMON NAMES

COMMON NAME	SCIENTIFIC NAME	PAGE
Ash, green or red	<i>Fraxinus pennsylvanica</i>	20
Aspen, quaking	<i>Populus tremuloides</i>	53
Basswood	<i>Tilia</i> spp.	76
Birch, European white	<i>Betula pendula</i>	13
Birch, water	<i>Betula occidentalis</i>	12
Boxelder	<i>Acer negundo</i>	8
Catalpa, northern	<i>Catalpa speciosa</i>	16
Cottonwoods	<i>Populus</i> spp.	52
Crabapple	<i>Malus</i> spp.	29
Douglas-fir	<i>Pseudotsuga menziesii</i> var. <i>glauca</i>	60
Elm, American	<i>Ulmus americana</i>	77
Elm, Siberian	<i>Ulmus pumila</i>	80
Fir, corkbark	<i>Abies lasiocarpa</i> var. <i>arizonica</i>	4
Fir, white	<i>Abies concolor</i>	1
Hawthorn, English	<i>Crataegus oxyacantha</i>	17
Honeylocust	<i>Gleditsia triacanthos</i> var. <i>inermis</i>	21
Junipers	<i>Juniperus</i> spp.	25
Juniper, Rocky Mountain	<i>Juniperus scopulorum</i>	28
Locust, black	<i>Robinia pseudoacacia</i>	68
Maple, amur	<i>Acer ginnala</i>	5
Maple, silver	<i>Acer saccharinum</i>	9
Mayday tree or bird cherry	<i>Prunus padus</i>	57
Mountain-ash, European	<i>Sorbus aucuparia</i>	73
Oak, Gambel	<i>Quercus gambelii</i>	64
Oak, northern red	<i>Quercus rubra</i>	65
Pear, Callery or flowering	<i>Pyrus calleryana</i>	61
Pine, Austrian	<i>Pinus nigra</i>	44
Pine, bristlecone	<i>Pinus aristata</i>	37
Pine, limber	<i>Pinus flexilis</i>	41
Pine, pinyon	<i>Pinus edulis</i>	40
Pine, ponderosa	<i>Pinus ponderosa</i> var. <i>scopulorum</i>	45
Plum, flowering	<i>Prunus cerasifera</i>	56
Poplar, European white	<i>Populus alba</i>	49
Sequoia, giant	<i>Sequoiadendron giganteum</i>	72
Spruce, Colorado blue	<i>Picea pungens</i>	36
Spruce, Engelmann	<i>Picea engelmannii</i>	33
Spruce, Norway	<i>Picea abies</i>	32
Sycamore or London plane tree	<i>Platanus x acerifolia</i>	48
Walnut, Arizona black	<i>Juglans major</i>	24
Willow, Hankow or globe	<i>Salix matsudana</i>	69