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Trees for southwestern Idaho landscapes: Selection and irrigation

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The best time to plant a tree was 20 years ago. The next best time is now. —Chinese Proverb

INTRODUCTION

Climatically, the valley regions of southwestern Idaho are classified as desert, with hot, dry summers and cold, relatively dry winters. Relative humidity is typically very low year-round, which creates high water use by plants, especially during summer months. Annual precipitation is in the range of 9 inches (Mountain Home) to 12 inches (Boise). In contrast, a traditional landscape that includes trees requires more than 40 inches of water during a growing season to remain green and healthy. Add to southwestern Idaho's climate the fact that it stands face-to-face with limited water resources, and the challenge of maintaining a beautiful landscape in the future becomes quickly evident.

Even with sufficient irrigation water, the desert climates of southwestern Idaho are less than ideal for tree survival and health. The combination of hot summer temperature and low relative humidity produces conditions of constant stress, especially if the trees are marginally adapted. If water becomes less available in the future, with concurrent limitations on irrigation, many of the tree species commonly planted in the region will not live.

Ensuring adequate future water resources will require conservation and stewardship on the part of southwestern Idaho's residents. Studies have shown that as much as 60% of the overall water used by homeowners is used outdoors, with the largest portion being applied to landscapes and lawns. Although very few tree species are truly xeric (needing no irrigation), some trees are naturally more water thrifty than others and can help a gardener reduce water usage in the landscape.

Selecting adapted, water-conserving plants, including trees, is the first step in becoming a good water steward. Next is learning how to irrigate trees and landscapes to conserve water while maintaining plant health. This publication provides guidance on choosing adapted tree species for the region and irrigating efficiently.

WHY PLANT TREES?

Water and soil conservation

Trees play a large role in water conservation as they intercept and store water. They stabilize soil with their extensive root systems, reducing soil erosion and runoff and thus improving water quality. Wooded areas conserve and naturally filter water, recharging the ground water supply and preventing the transport of sediments and chemicals into streams.

In Boise, the 23,000-plus publicly managed street trees intercept 19 million gallons of storm water annually, a service worth more than $96,000 to the city. Consider that same service being carried out by thousands of privately owned landscape trees throughout the city of Boise, and you can

appreciate the magnitude of the service trees provide in a single community.

Oxygen production, CO_2 absorption

Trees occupy considerable space and, along with large shrubs, are major components in any landscape. They serve many purposes like providing shade and beauty, but trees are more important than that. Trees are essential to life on earth, since they affect the very air we breathe by producing oxygen and absorbing and removing large amounts of carbon dioxide and other pollutant gases from the atmosphere. According to the U.S. Department of Agriculture (USDA), 1 acre of forest annually absorbs 6 tons of carbon dioxide and releases 4 tons of oxygen, enough to meet the annual oxygen needs of 18 adults.

Energy conservation

Trees contribute many economic benefits such as improving the value of real estate and reducing heating and cooling costs when strategically placed to provide shade or as windscreens around buildings. USDA researchers have established that the net cooling effect of one healthy tree is equivalent to 10 room-sized air conditioners operating 20 hours a day! Trees planted near scorching-hot parking lots can reduce temperatures under their canopies by as much as 12 degrees Fahrenheit. All of this cooling generates an overall energy savings for home and commercial building owners. The hidden benefit of this reduction in energy usage is reduced power plant emissions.

Recreation, relaxation

Woody plants are especially important for restoring the natural harmony that is often lost in urban settings. Landscapes with plenty of trees and shrubs draw in birds and other wildlife, providing them with homes and food. While we accept that trees connect us to the natural environment and improve our surroundings and quality of life, we sometimes forget that trees create the cool, protected sites we seek for recreation and relaxation. They provide pleasant, special places we like to visit such as forests and parks. Stress reduction is an important health benefit that is often forgotten when considering the value of trees.

TREE SELECTION

Use the table on pages 6 and 7 to help you select trees that are suitable for our arid environment. The watering rates in the table will help you make good decisions about watering the trees once they become established.

TREE WATERING

In southwestern Idaho, supplemental irrigation is essential in landscapes using non-native plants. Water is the single most important factor for tree survival and growth. All the metabolic processes that occur within a tree depend on water.

During the growing season, trees constantly lose water to the atmosphere through transpiration — the loss of water vapor through leaf pores (stomata). In the heat of summer, it has been estimated that a large deciduous tree can use more than 100 gallons of water a day! If this water loss is not replaced, it can cause non-recoverable tissue damage and lead to tree decline, making the tree susceptible to pests and diseases. The importance and value of trees in a landscape cannot be overemphasized. Tree health, therefore, should be at the forefront of any irrigation regime.

Nine irrigation tips for promoting tree health and water conservation

- Check soil moisture before watering.
- Irrigate in early morning rather than during the heat of the day.
- Avoid irrigating during windy weather unless you are using a drip system.
- Don't rely on the timings used for turfgrass irrigation to water trees.
- Use drip irrigation and soaker hoses to deliver water to young trees and to flower and shrub beds.
- Irrigate newly planted trees weekly for up to three growing seasons, until they become well rooted.
- Irrigate established trees deeply (12–15 inches) but infrequently to help roots develop to a proper depth, thus promoting better drought tolerance.
- Discourage root and crown diseases by irrigating established trees and shrubs near the dripline and beyond.
- Use mulches on the soil surface to conserve moisture, control weeds, and maintain a uniform soil temperature. Keep mulch 2 inches away from tree and shrub stems to discourage root and crown diseases.

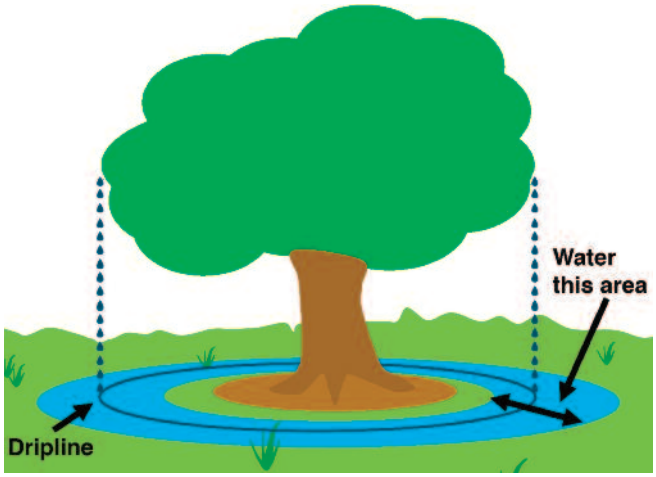

Figure 1. Irrigate established trees starting halfway between the trunk and the dripline and extending well beyond the dripline.

Where to water

To properly design an appropriate irrigation program for trees, it is important to understand the way they access and use water. Roots are the sole source of water for the entire tree. Tree root systems are very extensive, growing well past the tree's dripline—points on the ground directly under the outermost leaves (figure 1). The majority of roots occur in the top 2 feet of soil. Most trees lose their taproots over time but may have a few anchor roots extending as deeply as 6 feet. Even though feeder roots are found close to the surface where oxygen and fertility are readily available, it is important that irrigation water soaks down deep into the soil to reach the entire root system.

The root system of a tree changes with age. A young, newly planted tree has a limited root system that is localized around the root ball. At this stage, irrigation is best concentrated close to the trunk and slightly beyond the root ball to encourage roots to move out into the surrounding soil.

As a tree grows, the area of watering should expand. Irrigate established trees starting halfway between the trunk and the dripline and extending well beyond the dripline. In the case of very large shade trees, the entire yard may need to be watered.

Whenever possible in landscapes, plants should be zoned or grouped during planting according to similar water requirements to help make irrigation more efficient. Setting up the irrigation system to water beds separately from the lawn may be a common practice, but trees develop extensive root systems that underlie lawns as well as shrub or flower beds. As a result, it becomes difficult to water only the lawn or just the flower beds without also watering a portion of a nearby tree's root system.

Methods of irrigation

Sprinkler. Sprinkler irrigation is the most common form of watering for homeowners and is often automated using a clock or timer. However, irrigation schedules designed for lawns are not adequate for trees. To avoid chronic water stress, trees must be watered deeply and infrequently, yet only certain grasses like turf-type tall fescue and the warm-season grasses (zoysia and buffalograss) will live under that type of regime.

Depending solely on an automated sprinkler clock to time irrigations can become an unreliable or wasteful method of watering, especially when the weather changes, bringing very hot, windy, or rainy days. Furthermore, since most clocks are set to run at night, clogged sprinkler heads, underground line breaks, or head blockages due to plant growth can be overlooked for long periods, resulting in major plant damage and water loss before the problem is noticed. Occasionally, turning the sprinkler system on during the day to check for breaks and head blockages is a good idea that may help avoid costly surprises.

Some homeowners successfully use garden hoses with attached sprinklers that they drag around the landscape. Although very time consuming, this method of irrigating is efficient in so far as water is applied only where and when it is needed. An extra benefit to this method is that the homeowner is keeping a close watch on the landscape and is no doubt aware of developing problems and can address them in a timely fashion.

Flood. Allowing enough time between irrigations for oxygen to refill soil pores encourages healthy root growth. Flood irrigation of a yard does this, as it applies an ample amount of water to the entire landscape. This method is by far the best for tree health. Unfortunately, few homeowners in subdivisions have water rights allowing them to draw from an irrigation ditch nor are their yards correctly graded and equipped for successful flood irrigation.

Drip and soaker hoses. Using drip and soaker hoses are popular ways to keep water close to the

ground for more efficient irrigation. On newly planted trees, soaker hoses or drip lines work well when arranged on the soil surface around the outer edge of each tree's root ball.

Several drip lines or soaker hoses may be necessary for keeping a larger tree alive. Arrange the drip lines or soaker hoses starting halfway between the tree's dripline and the trunk then continue spreading them beyond the tree's dripline.

How far apart to position the lines or hoses will be determined by the soil and the distance the water moves laterally. Clay soils allow water to spread out, while in sandy or gravelly soils water tends to go straight down without much spread.

Drip and soaker hose irrigation methods are difficult to use with established large trees as part of the existing root system may be in the neighbor's yard, and often the tree is surrounded by lawn which will need mowing. Consequently, this type of irrigation equipment is best kept in beds and out of the lawn. It is not advisable to try to convert trees that have been under a flood or sprinkler irrigation system to a drip system due to the trees' extensive root systems.

Timing of irrigation

Morning watering. Irrigating in the early morning limits evaporative water loss. Irrigating early in the morning before sunrise, instead of late in the evening, is also considered best for reducing the risk of disease since plants will dry off during the day and not remain wet and surrounded by high humidity all night long.

Watering evergreens. We usually think of watering in summer, but lack of water in winter can be destructive to evergreen trees and shrubs since they do not lose their leaves in the fall like deciduous trees. Evergreens will continue to lose moisture from their needles or leaves (on broadleaf evergreens) all winter long, especially on the sunny southern side and windward side of the landscape. Consequently, watering late into the fall will benefit evergreens. Taking the time to water during a January thaw may also help reduce the foliage drying that often shows up in spring.

Frequency of watering. Tree selection and size will determine the frequency of irrigations. For example, for the first 3 years after planting, new trees (even water thrifty ones) will need to be irrigated weekly to encourage the development of healthy root systems, while an established tree may thrive with a deep irrigation every other week. In addition, a high or moderate water-use tree with a 2-inch diameter trunk may need an application of water every 2 weeks, while a low water-use or xeric tree with the same trunk diameter may need an application only once a month.

Watering deeply once every month may work for some trees, but it might not be frequent enough for other landscape plants. Consequently, a compromise needs to be reached when recommendations are made for watering trees in landscapes.

How much water to apply

Rules of thumb. Homeowners often use rules of thumb or time-honored gardening recommendations when irrigating landscapes. "Water a tree with 2 inches of water per week" is a commonly heard rule of thumb. This suggestion is useful, but only if you add the words "over the entire tree's root system."

It is also important to note that during the growing season, the tree's need for water is determined by the weather, with the highest amount of water (2 inches per irrigation) being needed during the heat of summer. Less than an inch of water will be needed during cool or wet conditions such as early spring or late fall. Suggested minimum watering requirements for specific trees appear in the table on pages 6 and 7.

Seasonal and weather-related effects on watering. The amount of water applied should fluctuate with time of year and weather conditions. All too frequently however, irrigation settings are timed to apply small amounts of water several times per week. This shallow watering may keep turf alive, but longer periods of watering with larger amounts of water are usually necessary for water to penetrate deeper into the soil profile to reach tree roots. The goal for tree watering is to irrigate to a depth of 12 to 15 inches with however much water it takes. Deep watering helps roots develop to a proper depth to promote better drought tolerance in the future.

Cycle watering. Another gardening recommendation is to water intermittently — sometimes called "cycle watering." Intermittent watering is a method whereby water is applied twice or more in one day to the same area, thus allowing time between irrigations for the water to penetrate deeper into the soil. This method works especially well on slopes or compacted soils where water has a tendency to run off. To mimic flood irrigation using the intermittent system, plan to water to a minimum depth of 12 inches with however many cycles it takes, without allowing water to run off. Once the 12-inch depth is reached, do not water again for a week. A soil probe will be useful for checking moisture depth.

Because there are site variables like soil texture and structure, slope, compaction, tree spacing and plant competition, and different irrigation systems to consider, it is difficult to give one recommendation that fits all situations. Therefore, any recommendations given in this publication are strictly suggestions. Combining timed irrigations, regular observations of your trees and other landscape plants, and checks of soil moisture through probing (discussed below) will provide a more complete picture regarding water requirements for keeping your landscape healthy.

Probing

Some homeowners use a long screwdriver to check the depth of soil moisture down to 8 to 10 inches. The screwdriver driven through moist soil moves easily until it hits dry soil. This method works well on wet clay soils since dry clay will resist penetration. However, loose, sandy, or well-amended soils may easily be penetrated even when dry, so the screwdriver technique may not work under all circumstances.

A soil probe is more accurate and can be readily purchased from most nurseries or a garden equipment catalog. Using a shovel is another way to check the depth of water penetration, but the soil probe is quickest. Seeing a soil core sample taken from the surface down to 12 inches, and feeling it to determine wetness, is an excellent practice to help understand how well your irrigation timings and method are working.

Underwatering and Overwatering

A quick indicator of water stress is leaf wilting. This can be due to dry soil or to overly saturated soil. Waterlogged soil can cause root rots and oxygen depletion in the root zones of trees and other landscape plants and is often expressed as wilted leaves, yellowing, or tip dieback. Excessive watering also causes the nitrogen fertilizer applied to soil to be washed away more quickly, which can cause nitrate-contaminated groundwater and unnecessary expenditures for more fertilizer applications.

Irrigation water should never leave your property in the form of runoff. This kind of irrigation is unacceptable and is an indication of one of the following: (1) water being applied faster than the soil can absorb it, (2) already-saturated soil, or (3) very compacted soil.

In a situation where water is not being absorbed, try one of the following: (1) turn down the irrigation time, especially on shaded areas, (2) change sprinkler heads to more-efficient heads, (3) aerate and amend compacted soil to encourage water absorption, or (4) begin using intermittent irrigations on problem areas.

Exposed Tree Roots and Watering

Mature trees showing exposed roots radiating out along the soil surface are often evidence of a sprinkler-type irrigation system being employed. Water droplets flung into the air by sprinklers hit the ground like millions of tiny hammers, causing soil compaction and surface erosion over time. The more the sprinkler is on, the more compaction and erosion occur. Reducing the frequency of irrigations and keeping the surrounding turfgrass an inch taller during the summer will help to conserve moisture and also aid in reducing soil compaction around tree roots.

Roots growing near the soil surface can be a sign of compacted soils or shallow irrigation. On the other hand, waterlogged soil will also force tree roots to develop close to the surface because oxygen is excluded from soil pores farther down. Changing your irrigation schedule so that you are watering deeply and less frequently will help newly planted trees develop healthy root systems at a proper depth and allow oxygen to return to soil pores between irrigations.

If tree roots are exposed on mature trees, apply a few inches of soil over the top of them to minimize damage from lawn mowers and foot traffic. Removing turfgrass in a 3- to 4-foot-wide circular ring around trees and covering the area with 2–4 inches of mulch will help reduce compaction close to the trunk and minimize bark damage from lawnmowers and string weeders. Keep mulch 2 inches away from the trunk to avoid collar rot. Using mulches to protect the soil surface will help conserve moisture, control weeds, and maintain a uniform soil temperature for better root growth, especially on young trees.

WATER THRIFTY TREES FOR SOUTHWESTERN IDAHO

Common name	Scientific name	Height in feet	Minimum moisture needed[1]	Shape or interesting fact
		Deciduous trees		
Small Trees				
Buckeye	*Aesculus arnoldiana* 'Autumn Splendor'	10–20	💧💧	Rounded to broad-rounded form.
Crabapple	*Malus* 'Indian Summer'	18	💧💧	Rounded form. Rose-red flowers. Fruit bright red. Many of the crabapples are excellent choices.
Hackberry, Netleaf	*Celtis reticulata*	10–30	💧	Hardy and long lived. Tolerates very dry conditions.
Hawthorn, LaValle	*Crataegus* x *lavallei*	15–30	💧💧	Resistant to leaf rusts. Persistent, copper-red fruit.
Maple, Tatarian	*Acer tatarica*	15–18	💧💧	Off-white fragrant flowers. Fall color varies. Red samara seeds.
Mountain Ash, American	*Sorbus americana*	10–30	💧💧	White flowers. Fruit is brillant orange-red.
Mountain Mahogany, Curl-leaf	*Cercocarpus ledifolius*	20	💧	Rounded form, erect. Xeric.
Oak, Gambel	*Quercus gambelii*	15–30	💧	Native to western U.S.
Oak, Wavy-leaf	*Quercus undulata*	10–15	💧	Shrubby with small leathery leaves. Xeric.
Medium Trees				
Catalpa, Western	*Catalpa speciosa*	40–60	💧	White flowers. Long, bronze seedpod (8–20 inches).
Chokecherry	*Prunus virginiana* 'Canada Red'	20–30	💧💧	Pyramidal. Foliage starts green turns reddish-purple. Edible fruit.
Goldenrain Tree	*Koelreuteria paniculata*	30–40	💧💧	Yellow flowers. Yellow to orange-yellow fall color. Triangular seedpod.
Hawthorn, Downy	*Craetaegus mollis*	20–30	💧	White or red flowers in April. Reddish-bronze fall color.
Hawthorn, Thornless Cockspur	*Craetaegus crus-galli* var. *inermis*	20–30	💧	Persistent fruit. Red fall color.
Hawthorn, Washington	*Crataegus phaenopyrum*	15–25	💧💧	Pyramidal form.
Honeylocust, Thornless	*Gleditsia triacanthos* var. *inermis*	35–70	💧💧	Fast growing. Long brown seedpods (7–8 inches).
Locust	*Robinia* 'Idaho'	25–40	💧	Rose-pink, fragrant flowers.
Maple, Big-tooth	*Acer saccharum* var. *grandidentatum*	25–50	💧💧	Rounded form.
Pear, Aristocrat	*Pyrus calleryana* 'Aristocrat'	25–40	💧💧	Pyramidal form. White flowers. Yellow to red fall color.
Pear, Chantilceer	*Pyrus calleryana* 'Chanticleer'	25–40	💧💧	Pyramidal form. White flowers. Reddish-purple fall color.
Pear, Fauriei	*Pyrus fauriei*	30–40	💧💧	Pyramidal form. Fast growing.
Pear, Ussurian	*Pyrus ussuriensis*	40–50	💧💧	Rounded form. Red to reddish-purple fall color.
Large Trees				
Coffeetree, Kentucky	*Gymnocladus dioicus*	60–70	💧	Latest to leaf out. Female tree has fragrant flowers. Large seedpods.
Elm, Lacebark	*Ulmus parvifolia*	40–50	💧	Rounded form. Small leaves turn yellow in fall. Exfoliating orange bark.
Ginkgo (Male Only)	*Ginkgo biloba*	50–80	💧💧	Pyramidal form. Unusual fan-shaped leaves. Yellow fall color.
Hackberry, Common	*Celtis occidentalis*	40–60	💧💧	Broad, vase-shaped form. Seed relished by birds and wilflife.
Linden, Silver	*Tilia tomentosa*	50–70	💧💧	Pyramidal to oval form. Fragrant, off-white flowers.
Maple, Black	*Acer nigrum*	60–75	💧💧	Oval to rounded form. Yellow fall color.
Oak, Bur	*Quercus macrocorpa*	70–80	💧	Adapted to alkaline soils. Slow growing.
Oak, Chestnut	*Quercus prinus*	60–70	💧💧	Rounded form.
Oak, Columnar English	*Querucs robur* 'Fastigiata'	50–60	💧💧	Columnar form.
Oak, English	*Quercus robur*	40–60	💧💧	Rounded form.
Oak, Red	*Quercus rubra*	60–70	💧💧	Rounded form. Fast growing. Russet-red fall color.
Oak, Shingle	*Quercus imbricaria*	50–60	💧💧	Pyramidal to oval form. Russet-red fall color.
Oak, Swamp White	*Quercus bicolor*	50–60	💧💧	Rounded form. Yellow to red-purple fall color.
Oak, White	*Quercus alba*	50–80	💧💧	Pyramidal to rounded form. Rich red to wine fall color.
Pagoda Tree, Japanese	*Sophora japonica*	50–70	💧💧	Rounded form. Off-white, fragrant flowers.
Zelkova, Japanese	*Zelcova serrata* 'Green Vase'	60–70	💧💧	Graceful, upright arching vase-like form. Orange to bronzy red fall color

[1]Suggested minimum watering requirement during the growing season after 3 years or once established: 💧 rated — Up to 2" every month over the entire root zone (beyond natural precipitation). 💧💧 rated — 2" every two weeks over the entire root zone (beyond natural precipitation).

WATER THRIFTY TREES FOR SOUTHWESTERN IDAHO (CONT.)

Common name	Scientific name	Height in feet	Minimum moisture needed[1]	Shape or interesting fact
		Coniferous trees		
Small Trees				
Juniper, Common	*Juniperus communis*	5–10	💧	Slow growing. Gray-green to blue-green. Many forms available.
Juniper, Utah	*Juniperus osteosperma*	10–20	💧	Pyramidal to rounded form.
Pine, Bristlecone	*Pinus aristata*	8–20	💧	Very slow growing. Xeric.
Pine, Pinyon	*Pinus monophylla*	15–20	💧	Bushy habit. Xeric.
Medium Trees				
Juniper, Rocky Mountain	*Juniperus scopulorum*	30–40	💧	Pyramidal form. Slow growing. Color varies from green to bluish-green.
Pine, Japanese White	*Pinus parviflora*	25–50	💧	Pyramidal to wide spreading form. Slow growing.
Pine, Limber	*Pinus flexilis*	30–50	💧	Broad pyramidal form. Slow growing. Dark blue-green.
Pine, Scots (Scotch)	*Pinus sylvestris*	30–60	💧💧	Irregular to wide spreading.
Spruce, Colorado Blue	*Picea pungens* var. *glauca*	30–60	💧	Broad pyramid form. Gray-green to blue-green.
Large Trees				
Juniper, Western	*Juniperus occidentalis*	50–60	💧	Varied form.
Pine, Austrian	*Pinus nigra*	50–60	💧💧	Pyramidal to broad form. Will succeed in heavy clay or alkaline soils.
Pine, Eastern White	*Pinus stobus*	50	💧💧	Fast growing. May develop chlorosis in high pH soils.
Pine, Jeffrey	*Pinus jeffreyi*	40–90	💧💧	Oval, pyramidal. Blue-green, twisted needles.
Pine, Ponderosa	*Pinus ponderosa*	60–100	💧	Only native, long-needled pine in Idaho.
Pine, Southwestern White	*Pinus strobiformis*	40–60	💧	Pyramidal form.
Pine, Western White	*Pinus monticola*	50–75	💧💧	Pyramidal to oval form.

[1]Suggested minimum watering requirement during the growing season after 3 years or once established: 💧 rated — Up to 2" every month over the entire root zone (beyond natural precipitation). 💧💧 rated — 2" every two weeks over the entire root zone (beyond natural precipitation).

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