

Colorado's Front Range is naturally a semi-arid, shortgrass prairie that would have few trees without irrigation. Growing trees here is difficult in wet years let alone in dry years. Growing healthy trees in this region is challenging and reinforces the value of a majestic shade tree. Properly placed and maintained trees are an asset to the environment and to our community. Following are answers to some of the most common questions you may have regarding caring for trees in a dry climate.

1. What does a tree under drought stress look like?

- Symptoms of stress in trees can be sudden or may take up to two years to be revealed. Drought injury symptoms on tree leaves include wilting, curling at the edges, and yellowing.
- Deciduous leaves may develop scorch, brown outside edges or browning between veins.
- Evergreen needles may turn yellow, red or purple. They may also turn brown at the tips of the needles and browning may progress through the needle towards the twig.
- Leaves may be smaller than normal, drop prematurely or remain attached to the tree even though brown.
- Stress may not kill a tree outright, but set it up for more serious secondary insect and disease infestations in following years.

2. Where do I water my tree?

- Deep watering to a depth of 12" inches below the soil surface is recommended.
- Saturate the soil around the tree within the "dripline" (the outer edges of the tree's branches) to disperse water down toward the roots.
- For evergreens, water 3'-5' beyond the dripline on all sides of the tree.
- The objective is to water slowly, dispersing the flow of water to get the water deep down to the trees roots. Watering for short periods of time only encourages shallow rooting which can lead to more damage.
- Don't dig holes in the ground in an effort to water deeply. This dries out roots even more. A soil needle/deep root feeder attached to a hose is acceptable to insert into the ground if your soil is not too hard and compact.
- Overhead spraying of tree leaves is inefficient and should be avoided. Watering at ground level to avoid throwing water in the air is more efficient.



3. Tree Watering: Amount of water needed and methods to use

During prolonged dry periods, trees must be given top watering priority over your lawn. However, caring for trees requires different watering methods than your lawn. Irrigation systems designed to water turf do not sufficiently water your trees.

- How much water your tree should receive depends upon the tree size. A general rule of thumb for small and medium size trees is to use approximately 10 gallons of water per inch of trunk diameter for each watering. The frequency for small trees (1"-3") is to water weekly throughout the season. Medium size trees (4"-8") will only require watering three times per month throughout the season. Water large trees (10"+) twice per month at a rate of 15 gallons of water per inch of trunk diameter. Measure the trunk diameter at knee height.

General formula

Small and medium tree watering time = (tree diameter x 10 gal/inch divided by gallons per minute of watering device)

- Substitute 15 gallons/inch for large trees. See the "Spring Tree Watering Schedule" and "Fall Tree Watering Schedule" documents for recommended times and devices.
- Example: When you water using a soaker hose or deep root needle, it will produce approximately 2 gallons of water per minute. If you have a 4" diameter tree, it should receive 4" x 10 gallons or 40 gallons of water per watering. Then divide by 2 gallons per minute to equal a total watering time of 20 minutes
- All size trees should be watered April through September according to the guidelines below. All trees should also receive adequate water during the winter months too. For more information on winter watering, see below.
- Water should be distributed evenly under the dripline of the tree.

The best watering method depends upon whether you have a small (1"- 3" diameter), medium (4"- 8" diameter) or large sized (10" + diameter) tree:

Small Trees (1"- 3" diameter) – 4 times per month, April through September

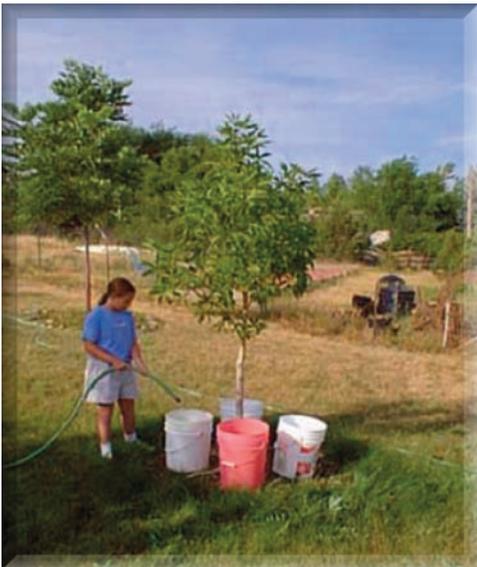
- Newly planted and smaller trees can get adequate water within the existing voluntary watering restrictions by hand watering with a soft spray hose attachment as a separate zone on your designated day.
- Small trees are best watered using the following methods:
 - Automated drip irrigation system/soaker hose.
 - End of the hose using a soft spray attachment at medium pressure.
 - 5-gallon bucket (with ¼" holes drilled in bottom) or watering bags – filled and set under the dripline.
 - Soil needle (deep root feeder) - Work the needle into the soil at an angle to a depth of 8 inches. Use the needle at low to moderate water pressure. For new trees and those planted within five years, place the needle at least three feet from the trunk. Water a minimum of four to six sites around young trees.

Medium Trees (4"- 8" diameter) - 3 times per month, April through September

- Medium sized trees are best watered using the following methods:
 - Soaker hose coiled several times under the dripline of the tree.
 - End of the hose with a soft spray attachment to disperse the flow – use a medium pressure.
 - Soil needle (deep root feeder) - Work the needle into the soil at an angle to a depth of 8 inches. Use the needle at low to moderate water pressure. Water the area under the branches in at least twelve sites. Scatter the sites around the area bordered by the drip line. For new trees and those planted within five years, place the needle at least three feet from the trunk.

Large Trees (10" + diameter) - 2 times per month, April through September

- Healthy mature trees should be able to withstand a short-term drought.
- Large trees are best watered using the following method:
 - End of the hose with a shower-like sprinkler attachment to disperse the flow – use medium pressure. Move the sprinkler head around the tree to ensure full coverage of the area under the dripline.
 - Soil needle (deep root feeder) - Work the needle into the soil at an angle to a depth of 8 inches. Use the needle at low to moderate water pressure. Water the area under the branches in a grid pattern, spacing each watering site 1 to 2 feet apart. Scatter the sites around the area bordered by the drip line.



5 gallon bucket method



Soaker hose method



Hose with soil needle



Hose with sprinkler attachment

Additional Watering Tips...

- Reuse the water you save waiting for the shower to warm up to water your smaller trees.
- If you drain your kids' pools, pour the water under a tree.
- Redirect your rain gutters toward your trees.

4. Understanding tree roots

Most people do not understand what their trees' root system looks like. Tree root systems consist of large perennial roots and smaller, short-lived, adsorbing roots. The large, woody tree roots and their primary branches increase in size and grow horizontally. At least 90% are located in the top 12" inches of the soil. Root functions include water and mineral conduction, food and water storage, and anchorage. In contrast, adsorbing roots, although averaging only 1/16 inch in diameter, constitute the major portion of the root system's surface area. These

smaller roots grow outward and predominantly upward from the large roots near the soil surface, where minerals, water and oxygen are relatively abundant. The major function of adsorbing roots is the absorption of water and minerals. Large roots and small adsorbing roots occupy a large area under ground. Typically, the root system of a tree extends outward well past the dripline, up to two to four times the height of the tree.



5. Listed below are tree maintenance procedures that will help your trees through periods of drought.

- Mulch around your trees with 4 inches of organic mulch to reduce moisture loss.
 - Use wood chips, shredded bark, leaves or evergreen needles as mulch – avoid the use of stone or rock near trees as this increases air temperatures and moisture loss from leaves and stems.
 - Pull back mulch 6" from the trunk of the tree. Mulch left in contact with the tree trunk can cause decay at the base of the tree.
- Keep your trees healthy and pest free. Postpone any construction activities planned near your tree to reduce impact to the trees' roots. If your tree has any insect or disease problem that may be adding

additional stress, treat them accordingly to reduce the overall stress to your trees.

- Properly prune trees and shrubs to improve structure, limb stability and to remove dead and weakened branches. Leaving broken, dead, insect infested or diseased branches can further weaken a tree during drought and set the tree up for deadly secondary insect and disease problems.
- Many tree species are harmed by herbicides used in the lawn. Trees already stressed by drought can be harmed by a heavy application of herbicide in the root zone.
- Following these guidelines will help preserve our trees, the most valuable assets to our landscapes, and will also meet guidelines for water conservation during dry periods.

6. How do I prioritize watering needs for different types of tree?

The first trees to consider watering are those that will be most vulnerable and affected by dry conditions.

- Newly planted and young trees (1-7" diameter) are not yet established and have a limited root system. These trees generally need supplemental water even when we are not experiencing drought conditions. Generally it will take one full year per inch of trunk diameter to get established. For example, it will take 3 years for a 3" caliper tree to establish itself.
- Trees growing within a restricted root zone. Examples are trees adjacent to a driveway or house, growing within a landscape strip between your sidewalk and the street or growing in a median or traffic circle.
- Trees that have recently received root injury due to construction work will need supplemental watering because the root system has been compromised.

Next to consider are the trees that are generally better equipped to withstand drought conditions.

- In continued dry conditions even older trees will start to show symptoms of drought stress and will need supplemental water although less frequently than younger trees.
- Established drought tolerant species may also need supplemental watering with continued drought.
- Volunteer trees (self-seeded) or "weed" trees typically have extensive root systems and need less water.

7. Do I need to water my tree in the winter?

Winter watering is crucial, especially with evergreen trees! Well-timed fall and winter watering may allow a tree to survive on less water than a regime of plentiful water applications during the growing season. Tree roots continue to grow throughout the winter and need moisture to survive. Generally, water one to two times per month October through March on a warm day when the ground is not frozen.

SHRUB WATERING RECOMMENDATIONS

How much water do shrubs require?

Newly planted shrubs require more water than established shrubs that have been planted for at least one year. The following recommendations assume shrubs are mulched to retain moisture. During the first growing season, a small sized shrub transplanted from a one gallon container will require 4 to 6 gallons per week. Once established, small shrubs will grow well on 2 gallons per week. Larger shrubs may need as much as 10 gallons per week. True low water use shrubs may require less water than this. See the Parker Water & Sanitation District list of Xeriscape Plant material for a list of low water use shrubs. In dry winters, all shrubs will benefit from winter watering from October through March. Apply 5 gallons two times per month for a newly planted shrub. Small established shrubs (less than 3 feet tall) should receive 5 gallons monthly. Large established shrubs (more than 6 feet) will require 18 gallons on a monthly basis. Decrease amounts to account for precipitation. Apply water within the dripline of the shrub and around the base.

This collection of recommendations was prepared by Parker Water & Sanitation District and the Community Tree Alliance, which is comprised of tree professionals from city governments, parks districts, Colorado State University Cooperative Extensions, not-for-profit organizations, and Green Industries of Colorado.