

How to Water Trees
One size does not fit all
By: Walter Passmore, Austin's Urban Forester

Due to recent droughts the question of how to water trees has been a frequent topic of conversation. Tree care advocates convey a variety of answers ranging from a duration formula to gallons per diameter inch. So how much water is the correct amount and how should it be applied?

How much and where to apply water depends on many factors. The first considerations are the site and species of the tree. A native tree growing in ideal natural site conditions is able to obtain all of its water requirements from rainfall. Native trees have adapted to weather conditions including droughts, soil types, and other native vegetation. They have root systems, water storage capacity, and defense mechanisms that allow them to survive despite adverse conditions. Conversely, trees in urban areas usually are not growing in ideal conditions and often are not native. Applying supplemental water may be beneficial to adjust to a condition which is closer to ideal.

Conditions for a tree range from ideal to tolerable to harmful along a continuum. Conditions which adjust the amount of water a tree is able to capture, store, and utilize are influenced by the following:

- Weather factors such as rainfall, temperature, wind, and humidity
- Soil factors such as texture, structure, volume, and compaction
- Other trees and plants on site (turf grass in particular)
- Buildings and obstructions
- Proximity to a water source such as a stream, lake, or groundwater
- Tree factors such as condition, structure, position, tolerance, health, leaf size, canopy size and shape, lean, bark texture, and prior impacts/stresses

Each individual tree has a unique range where conditions are ideal, tolerable, and harmful. Since so many factors influence water needs most recommendations start from a standard formula that is then adjusted to suit the unique tree and site conditions.

Diameter based formulas are easy to use, but diameter does not consistently correlate to canopy, species, roots, or the many factors which influence the amount of water a tree needs, or can uptake. Water applied according to any simple formula should be carefully monitored and adjusted to the tree's individual needs. A common standard is to target the tree to receive the equivalent of a 1 inch rainfall worth of water per week. Logically not every tree across the United States receives this amount of rainfall naturally so consider adjusting to local rainfall estimates. Another recommendation is to apply 5 gallons per diameter inch per week that a 1 inch rainfall does not occur. This estimate should likewise be adjusted. The National Tree Benefit Calculator developed by the USDA Forest Service and private tree care partners allows some customization and can be found at, <http://www.arboday.org/> then click on the logo for the tree benefits calculator. It does provide an adjustment for tree species, size, and region of the country. Recognize the categories are still broad estimates and the reference cities used to establish models for Texas are located in either Southern cities in North and South Carolina that receive

substantially more rainfall, or Southwest Desert cities that receive less rain. The storm water interception estimate for Southern cities for the year can be divided by 52 weeks then adjusted downwards by about 2/3 to compensate for Austin receiving about 2/3 the rainfall of the reference cities in the model. The table below illustrates the differences between regions, species, and diameter of trees based on the models of the National Tree Benefits Calculator.

Tree Species	Ref Region	Diameter	Gal. Stormwater intercepted/Year	Gallons/week/diameter inch
Mesquite	SW Desert	10	750	1.44
Mesquite	SW Desert	21	2167	1.98
Mesquite	SW Desert	45	3081	1.31
Crape Myrtle	SW Desert	10	430	0.83
Crape Myrtle	Southern	10	601	1.16
Live Oak	SW Desert	21	2174	1.99
Live Oak	SW Desert	45	3215	1.37
Live Oak	Southern	21	6192	5.67
Live Oak	Southern	45	22306	9.53
Juniper	SW Desert	10	458	0.88
Juniper	Southern	10	733	1.41
Juniper	SW Desert	21	895	0.82
Juniper	Southern	21	2497	2.29
Juniper	SW Desert	45	895	0.38
Juniper	Southern	45	4824	2.06
Pecan	SW Desert	21	1971	1.80
Pecan	Southern	21	6075	5.56
Pecan	SW Desert	45	2646	1.13
Pecan	Southern	45	16401	7.01

Adjustments should be estimated based on inspection of the tree and soil conditions. Dig a small hole three inches deep within the area near the edge of the canopy. If the soil is moist at a depth of three inches delay or reduce watering. Inexpensive soil moisture meters may provide a more consistent measure. Too much water can be as harmful as too little for the trees health. Too much water may result in weak root systems, shallow roots, rotting roots, more water usage, and less water storage in the tree. Too little water may result in early leaf drop, dying branches, poor health, brittle wood, and other stresses to the tree.

Apply water to tree roots to obtain a slow and deep soaking. Less frequent watering such as every two weeks may obtain better results than the same total amount applied in smaller more frequent intervals. Slow soaking allows water to penetrate deeper into the soil where tree roots dominate and can utilize more of what is applied. Deeper soil moisture also resists evaporation more than shallow applications typically applied to lawns. Turf grass is a non-native plant that competes aggressively for water and should be accounted for when developing a watering plan for your trees. More information

about the conflict between trees and turf can be found at www.treesaregood.com. Ideally, watering will increase soil moisture to a depth of 12 inches in an area expanding two to three times as far as the edge of the canopy. Watering is most effective when proper tree care is provided and a group of practices are correctly applied such as mulch, compost, fertilization, pruning, soil aeration, and pest control. Proper tree care practices may reduce or even eliminate the need for supplemental watering. Consult a professional arborist and invest both time and assets into customizing care to your unique tree and site. One size does not fit all for tree care.