

## **Irrigation - How Best to Water Your Desert Trees**

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How much water do my trees need? How much water is too much? How often should I water? How long should I let the water run? What is deep watering? How do I know when the root zone is fully saturated? What is the best method for watering? How do I water my trees if they are on the same timer station with smaller plants? Can I cut off the water to my desert trees? How can I reduce my water usage? Should I always plant native or desert-adapted tree species?

Watering is sometimes a challenge for plant owners, especially for those who live in the desert where plants have extreme water needs. The questions above are typical of the many inquiries we receive each year in talking with tree owners. In the interest of both conserving water and maintaining healthy and beautiful landscapes, let's look at this sometimes-mystery called irrigation.

It might be helpful to start by discussing how plants process water and how this process protects plants from the sun's intense heat. When temperatures are high and humidity is low, the transpiration rate for plants is high. Transpiration rate describes how fast water vapor is lost to the atmosphere through evaporation, primarily from a plant's leaves. This water loss occurs during photosynthesis when openings called stomata on leaf surfaces open and close for the exchange of oxygen and carbon dioxide. When the stomata are open, water vapor escapes. This evaporation has a cooling effect on leaves and is a critical part of a tree's protection from the sun's heat and light. Healthy plants with adequate water can thrive even under a blazing sun because they are transpiring normally. But when a plant's water reserves are low, transpiration slows down or stops, leaf surfaces heat up and the result is wilting and ultimately sunscald. Sunscald is when leaf, bark or other plant tissues burn from exposure to the sun.

Our challenge is to provide water in quantities sufficient to allow plants to "breathe," that is, to release water vapor in amounts needed to keep leaf surfaces constantly within a temperature range cool enough not to burn.

But it's not only a function of providing adequate water. Desert-adapted plants have special features to help them handle the heat. They sometimes have thick leaf surfaces or reduced leaf areas or other adaptive qualities. Plants without these features have a hard time in the summer heat. Some non-desert adapted plants have large leaf surfaces that transpire at such high rates that they lose water faster than it can be replenished. In spite of having enough water in the soil, they can suffer

from sunscald. The owners of these non-drought-tolerant species have a difficult task keeping them alive, let alone green. Survival is not only a matter of having adequate water. It's also about a plant's genetic functional ability to handle our hot environment. And that is sometimes beyond our control...or even our irrigation controller.

### **How much water do my trees need?**

The amount of water to apply depends on the type of tree. Each has its own water requirement so irrigation needs to be adjusted accordingly. The goal is to provide enough water for normal plant processes, period. With desert plants, this is usually accomplished by saturating the root zone completely and then allowing it to dry out over time as the tree utilizes water stored in the pore spaces between soil particles. When this water is used up and stored reserves in the plant system are depleted, it is time to water again. Because of the high clay content of desert soils, they tend to hold water effectively and release it slowly as plants need it. This is not true of soils in other parts of the country with high loam and sand content. They drain quickly and require more frequent watering. Desert plants are also very efficient in their use of water and often don't need as much as we think they do. It has been said that more trees die of over-watering than under-watering in Arizona. That may be true because we tend to overcompensate for what we think are the high water demands of our plants. And when we waterlog our heavy desert soils we set up conditions far worse than those caused by minor water stress.

### **How much water is too much?**

Plants in typical low desert clay soils can suffer if they have too much water. Oxygen levels drop and plants can suffocate, especially plants that are adapted to dry conditions. They lack the genetic ability to handle mucho agua. The rule of thumb is not to put water on top of water. Let the root zone dry out before watering again. Of course, if you have sandier soil you will need to water more frequently.

### **How often should I water?**

You should water as often as your particular trees require it and that is determined by weather, soil type and plant species and age. If you have typical clay soil common in the Phoenix area and you are saturating the entire root zone each time you water, a rule of thumb is to water every week to ten days in the summer and every 2-3 weeks in the winter. A simple but often overlooked method to determine proper watering frequency is to watch your plants. If you see them begin to wilt in the late afternoon with leaves that curl and turn away from the sun, you will need to water again soon. You may be surprised to see how long your trees can go between waterings. Trees can even be trained to become more drought tolerant by occasionally missing a watering cycle.

### **How long should I let the water run?**

The hose, soaker hose or timer stations should run long enough to allow saturation to the full depth and radius of the root zone.

### **What is deep watering?**

*Deep watering* is a term used to describe watering to a sufficient depth to reach a plant's deepest roots. A tree's root zone can be 2 to 3 feet deep and extend 2-3 times as wide as the tree's canopy. Ideally this entire zone should be saturated each time you water.

### **How do I know when the root zone is fully saturated?**

You can determine the depth of your watering very easily by taking a long screwdriver or thin metal rod and pushing it into the soil after watering. The rod will slide easily through wet soil and become difficult to push when you hit dry soil. You can also buy a soil probe at some nurseries for under \$20. They can also be useful in determining how wet your soil is several days after watering. Even when the soil surface is dry, a soil probe can be pushed past this crust of topsoil to find if there is still water holding in lower soil levels.

### **What is the best method for watering?**

In spite of the new innovations in irrigation technology, there is little improvement over flood irrigation which best mimics nature's method of water delivery. But flood irrigation is costly and sometimes wasteful if not monitored carefully and used judiciously. Modern irrigation systems are quite flexible allowing different dispersal methods and dispense rates for different plants, even for plants on the same timer station. If an emitter-type system is used, it is important to use adequate numbers of emitters and increase their number and distance from your plants as they mature. As with any delivery method, the emitter saturation patterns should overlap each other to cover the entire the root zone.

### **How can I give my trees enough water if they are on the same timer station with other smaller plants?**

This is a serious problem, especially if you have trees on the same station as flowers, ground cover or small shrubs. These smaller plants have shallow root systems and need daily watering. Trees need less frequent, deeper watering that often floods smaller plants. If you can put your trees on their own timer station, that is the best solution. A retrofit can be expensive but is worth the investment if you have important trees and cannot find other ways to supply them with the deep watering they need. If you can't retrofit your irrigation system, try to eliminate the plants that require daily watering so your tree root zones can be watered for longer duration. If they are on a station with only shrubs, at least the trees will have a

chance to dry out between 3-5 days watering cycles. You can also supplement the water to your trees using a soaker hose spiraled around each tree, running slowly overnight every 3-4 weeks.

### **Can I cut off the water to my desert trees?**

There is a notion that desert trees don't need to be watered. Although desert trees are drought tolerant and can survive without water for extended periods of time, like all living things, they need water to live. Some are located in the landscape where they receive natural rainfall and don't need supplemental watering. Other trees in our built landscapes don't enjoy the benefit of natural rainfall runoff and need at least intermittent supplemental deep watering. All young trees, desert-adapted or not, need to be watered regularly for a year or two until they are established. Water can then be reduced or cut off entirely if there are other surrounding plants within the tree's dripline that provide some additional water for the tree roots. Then only an occasional deep soaking may be needed.

### **How can I reduce my water usage?**

There are several things you can do to help reduce your water usage and corresponding water bill. First, apply a 3-4 inch layer of mulch under your trees. Mulch comes in many forms: decomposed granite, wood chips, leaves or composted yard waste. Mulch reduces soil temperature and evaporation, cuts down weeds, prevents runoff and in the case of organic mulches, encourages nitrogen cycling. It's good stuff. Second, prevent runoff by maintaining basins around plants and by watering slowly to allow full saturation.

### **Should I always plant native or desert-adapted tree species?**

I think there is a place for non-native trees in the desert oasis we call Phoenix. These introduced species from around the world provide a diversity of shape, size, color, fragrance and beauty that are a welcome addition to many landscape plans. Because of our sunny climate, good soil and the availability of water, we can successfully propagate and plant many tree species that would not normally grow in the desert. But these trees come with an unwritten disclaimer! It says, "No warranty. User beware!" Because we have the ability to grow plants that would not normally survive here, we are lured into thinking they will always do well. But our margin of error in caring for them is sometimes narrower than we think. Many non-native or introduced species have special water and other cultural requirements. They need real nurturing and sometimes excessive work to keep them alive and healthy. In conclusion, my recommendation is to plant native or desert-adapted trees whenever possible. They not only require less water. They also have far fewer pest and disease problems and provide a long lifetime of shade, beauty and pleasure.

Given the variety of plants available and their different parameters for survival, it is no mystery that irrigation is so challenging in the low desert. Add to that the diversity of micro-climates and soil conditions in our built environments and it can be downright confusing. But with some inspiration and a little effort, we can figure it all out...and take the irritation out of irrigation.

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