

# How Much Do I Water?



Jeff Lee

## **What is water management?**

Water management simply means applying only the water that the plant needs.

## **Why do I need to manage my water?**

- To conserve a non-renewable resource.
- To promote better plant health.
- To be able to afford the water bill without a second mortgage.

## **What is irrigation?**

Irrigation is our way of imitating rainfall so we can grow the plants we want when and where we want them. There are many different technologies to do this and we will cover them later.

## **Why do I need to irrigate?**

Water evaporates from the soil and is taken up by the plant and “transpired” through the leaves. This is referred to as “**evapo-transpiration**”. This water needs to be replaced. Typically, because of the plants we like to grow here and the amount of rainfall we normally get, we need to replace this water artificially.

## **What plants do I need to irrigate?**

At one point or another, all of them. Even when we plant cactus, we need to water them long enough so they can get established. Sometimes even after cactus become mature, they will need some supplemental watering in the event of a long hot dry season to keep them looking the way we like.

## **When do I need to irrigate?**

Early in the morning is usually the best time to set your systems to run. This is especially important for overhead irrigation used on lawns. Spray irrigating on a hot windy afternoon can result in as much as a fifty-percent loss of water from drift and evaporation. You will also generally have better pressure at this time of day.

## **Where do I need to irrigate?**

For lawns with spray irrigation, the answer is as evenly as possible throughout the entire area. For shrubs and trees you want to apply the water out at the dripline which is where most of the uptake roots are.

When landscapes are first installed, the emitters are placed right at the base of the plant, which is where the root zone is at that time. Moving the emitters out and adding more emitters as the plant grows is one of the most neglected parts of irrigation maintenance.

## How deep do I need to irrigate?

This varies depending on the type of plant. As a general rule you want to irrigate to these depths for these types of plant material:

- Annual flowers and lawns from six inches to about one foot.
- Small to medium shrubs from one to two feet.
- Large shrubs and trees from about two to three feet.

## How do I know if I'm watering deeply enough?

The best way is to actually probe the soil: For turf areas this can be done simply with a long screwdriver. Just push it into the ground and it will stop when it hits dry soil. If it doesn't stop, at the right depth you will want to adjust your run times accordingly.

With large shrubs and trees, you will obviously need a longer probe. These can be purchased at garden supply stores or made easily using a metal rod with one end bent over for a handle to push on. The principle remains the same though, the probe will stop when it hits the dry soil.

## How often do I need to irrigate?

This depends mainly on two factors that are covered more in depth later in this handout. Generally though this depends on your type of soil and the depth of the root zone. Think of these two factors together as a type of "gas tank".

A large tree with a three-foot deep root zone in a clay soil has a much larger gas tank to draw from than annual flowers in an amended loamy soil. This larger tank means it can go much longer before needing to be re-filled. This is why it's recommended to only irrigate mature desert trees once every ten to fourteen days in the summer.

Another major factor in watering frequency is of course going to be the weather. Soils will let water evaporate much more quickly in June when it's 110 degrees than in December.

## How long do I need to run my irrigation?

We can't tell you!

There are too many things to take into consideration. Landscapes are complex living systems and like people, there are great differences between them. Irrigation systems will vary from system to system as well. So what works for your friends yard may be disastrous for yours.

We can, however, tell you what these considerations are so you can make some better decisions for good water management practices. You don't need a master's degree in horticulture to understand the basic soil/plant/water relationships to get your watering closer to the actual plant needs. Although having that degree certainly would help!

# Four things that determine irrigation needs:

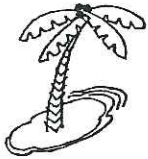
## 1: Weather



**Temperature** will make a big difference on how much water needs to be replaced. We have some pretty wide extremes in temperature in the desert. Yearly, we range from highs in the 110's in June to lows in the 30's in December. Do you drink more water in June than in December? Your plants feel pretty much the same way.



**Wind** will also affect how much water is lost in a given period. Wind is really nothing more than moving air. As the air moves by, it tends to pick up things. For this topic, the most important thing it picks up is moisture. Remember how good a breeze feels to us on a hot day. We perspire to cool off and plants transpire. The more wind, the more water lost that needs to be replaced.



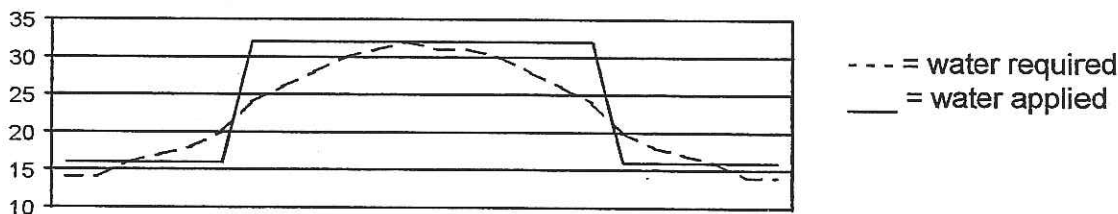
**Humidity** is something we rarely think about here in the desert. That is until our summer monsoon season comes along. If you can't perspire very well, then your plants are pretty much in the same boat. On the other hand, when we have low humidity, the air will pick up the moisture fairly rapidly and your plants will use more water.



The amount of sun will have a pretty dramatic effect as well. The more intense the sun is, the more water the plants use. It's the opposite for cloudy days.

## Remember:

The weather is always changing. If you're only adjusting your watering schedules twice per year, you could be over-watering by as much as 70%. Nature doesn't work in straight lines and you need to try and match the curves of increasing water needs in the spring to keep up with demand. Equally important is the decreasing curve in the fall. To see what a difference this makes, refer to the chart below



As you can see, not only are you over-watering in the winter months but you are also under-watering in the spring and fall.

## 2: Soil type

There are three major definitions of soil types. These are sand, loam, and clay. These different types of soils will accept water at different rates and will also hold onto water usable by the plant for different amounts of time.

**Sandy soils** are loose and will allow water to penetrate very rapidly. They will also give up the water to the plant and evaporation just as quickly so they need to be irrigated more frequently.

**Loamy soils** are kind of the middle ground that have good penetration rates and will hold on to the water for a longer period of time. These types of soils occur naturally in the Midwest and are the best types of soil to grow in. Those of us who have done some digging in our area also know that we are not lucky enough to have these soils naturally.

In small areas like flowerbeds and pots however, it is possible (and desirable) to create these conditions. In larger areas, it isn't very practical to do this. Also if you're using desert plants, they're not used to this type of soil and generally don't want it.

**Clay soils** are made up of finer particles that make it tougher for the water to penetrate. These soils do however keep the water for longer periods of time, which allows for less frequency of irrigation cycles. In most instances this is the soil type that is most commonly encountered here.

### Important!

Two other things about your soil that will affect how you schedule your irrigation are slope and compaction.

- If your soil is compacted, it will accept the water at a much slower rate. It will also make it harder for the plants to take the water that is there from the soil. Aerating the soil is the best solution for this problem.
- If you have a slope that you're trying to water, the water may run off before it has a chance to penetrate to the proper depth. A way to handle this situation is with what is referred to as "cycle and soak".

#### For example:

You know that you need to water for thirty minutes to get the penetration to the depth the plant needs but the water runs off after ten minutes. What you would want to do in this situation is water for ten minutes at a time for three cycles.

Make sure that you allow enough "soak" time in between cycles to let the water penetrate.

### 3: Plant type and size

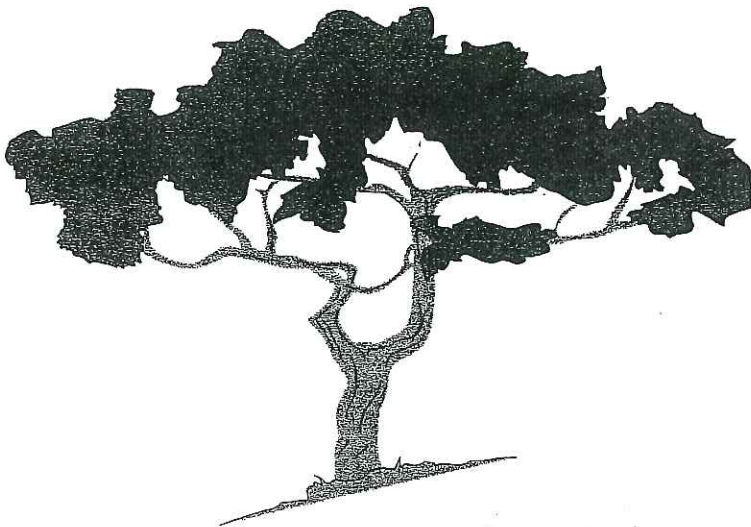


**Plant species** always has a direct role in how much water you need to give your plants. Genetically speaking, a Hibiscus will always want more water than an Agave. This is one of the reasons that we try to use native or at least “desert adapted” plants in our area.



Not only do the native plants require less water but they will also have a healthier appearance because they belong here. There are some plants that are just unable to cope with our climate and soil conditions and will never look good no matter how much water you give them.

We’re not saying to not use some of these species. Some people have an absolute passion about certain plants and will go to extreme lengths to get them to grow here. We’re just saying to be cautious about which plants you choose and understand what it will take to keep them healthy.



**Plant size** will also make a difference in how much water a plant needs. It

stands to reason that the bigger the plant gets the more water its going to need. Yet how often have we seen the twenty-foot Mesquite tree with one emitter at the base? When the tree was first planted the size of the plant, and therefore the size of the rootzone, one or two emitters were appropriate.

As the tree grew though, more emitters were not added to keep up with the additional water needs. More than likely the tree is now getting its water from other sources such as under-story plants around it. Or because the tree is native, it’s surviving on natural rainfall.

#### 4: Irrigation type and efficiency

There are many different types of irrigation products and they all apply the water at different rates. Also the way that they are installed will affect the application rate and their efficiency.

We normally measure the application in what's called "precipitation rate". In other words, how much rainfall are we imitating. This is usually measured in inches per hour.

**Lawn irrigation** systems are fairly easy to measure this precipitation rate. Simply put out some catch devices in the area and run the system for a known amount of time. Tuna fish cans work well for this. The more devices you put out, the more accurate the test will be. Next you want to measure how much water fell in the cans in tenths of inch increments. Then you want to get the average of all the amounts and translate it to inches per hour.

**Example:**

If you ran the system for 15 minutes and the average measurement was 3/10 of an inch, multiply by four to get 1.2 inches per hour.



#### News you can use!

Now that you know how much water your system is applying, you can use the information on the weather page of the newspaper. This information is set for the water requirements of lawns when watering every three days.

**Bubbler irrigation** is basically a miniature type of flood irrigation. The areas being watered have to be contained to hold the water in. Because you are applying the water quickly to spread it out and then letting it stand to soak in, you are losing a lot to evaporation. This type of irrigation should only be used in small areas with special needs. Bubbler irrigation, however, does work well for mature citrus trees. They are such heavy water users that it's difficult to apply enough water with a drip system.

**Drip irrigation** is very difficult to translate into precipitation rates. They are applying the water very slowly and they aren't throwing the water up into the air where we can catch it. This is also exactly what makes them so efficient. The important thing to remember with drip irrigation is that the emitters put out the water very slowly. Typical emitters will have output rates of one to two gallons per hour. This is why you need to run these systems for long periods of time.

#### Remember:

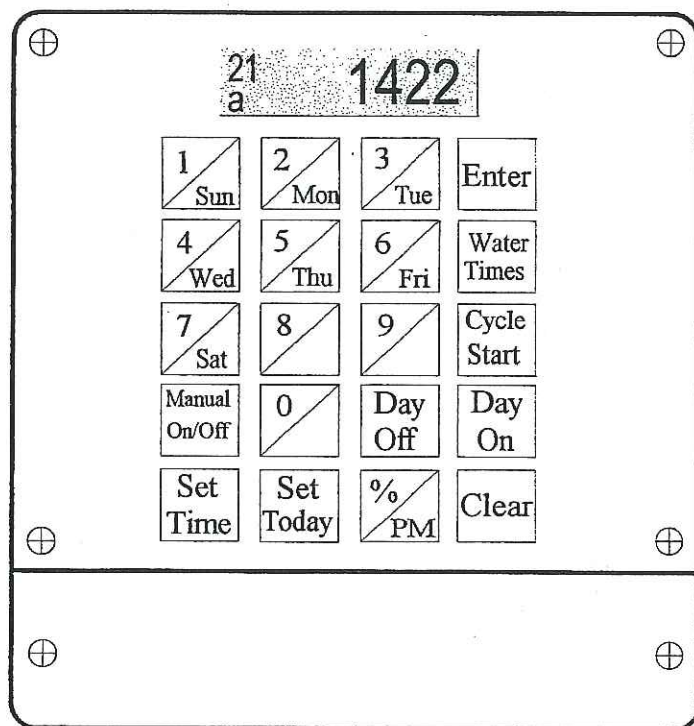
A one-gallon per hour emitter will take fifteen minutes to apply approximately the same amount of water a garden hose applies in two seconds. Is this how you would water your plants?

## Putting all the pieces together

- Irrigate early in the morning to limit losses from wind and evaporation.
- Irrigate where the roots are, not at the base of a mature tree.
- Irrigate to the proper root depth for the plant. Watering deeper than this is lost water.
- Irrigate less frequently. The soil needs to dry out somewhat to let oxygen back in.
- Irrigate according to the output of your particular system. Every one is different.
- Irrigate according to the season. When can be as important as how much.
- Irrigate according to the soil type. Clay soil needs less frequent watering.
- Irrigate according to plant type and size. Don't water an Agave like a Hibiscus.
- Irrigate with long run times with drip irrigation. One gallon per hour is pretty slow.

## How do I make my controller do this?

That is the topic of a whole new handout and is covered in the second part of this workshop. On the following page however are some tips to make sure you select a controller that will work for you and your water management needs.





## Tips for Selecting an Irrigation Controller

### Type of controller

Electro-mechanical controllers are probably the easiest to program and have a higher tolerance for electrical surges. The drawbacks are that they are not very accurate, not as flexible with programming, and usually cost more. Digital controllers usually just have a display and a keypad on the faceplate. These can be a little intimidating but are very accurate and flexible. Hybrid controllers have a dial that you point to the different functions and then a couple of buttons for adjustment purposes. These combine the ease of programming of the electro-mechanical style with the accuracy and flexibility of the digital types.

### Maximum station run times

Since drip irrigation runs at flow rates of 2 gallons per minute or less, you want a controller that can run stations for at least two hours. Some controllers will have longer run time capabilities and that's a plus when considering schedules for tree zones. There may be times in the future when the landscape is mature that you will want to run tree zones for up to six hours.

### Number of Programs

This depends on the flexibility you need for your own system. Different programs on a controller let you run stations on different schedules. It's like having several controllers in one box. If you have flowerpots that will need to be watered every day and a shrub zone that needs to be on an every 3<sup>rd</sup> day schedule, you will need at least two programs on your controller. If you add into that a tree zone that you want to water every fourteen days, you will need a third program. Remember that the more programs a controller has, the greater the cost.

### Start Times

Since drip is a slow application and run-off isn't a problem, this isn't very critical and usually one start time is all you will use. With most multiple program controllers, you normally get three possible cycle starts per program should you need them.

### Water budgeting

Many controllers offer this feature now that will allow you to change all the station run times by a percentage with one adjustment. This makes seasonal adjustments much easier. This is probably one of the most under-utilized features on irrigation controllers.

### Sensor Inputs

Some models will allow you to wire a rain shut-off device directly to the controller rather than interrupting the common wire to the control valves. Both ways work equally well, but it's a lot easier to bypass when it's at the controller if you need to diagnose a problem. Also some models will alert you on the display if the sensor is interrupting a normal irrigation cycle.

### Indoor/Outdoor

Indoor mount controllers are typically less expensive and easier to install. The power supply part is usually a transformer that plugs into a wall outlet. If other people need access to the controller such as friends monitoring the system while you're away or a landscape maintenance contractor, you will want to use an outdoor mount type.

