Watering Strategies and Tips

On the subject of when and how much to water, you're likely to hear two pieces of advice most often. One is that you should make sure established plants get about an inch of water a week, whether from rain or irrigation. The other is that you should take no advice about how much water to give your plants — personal observation of your own garden is the only way to judge. Keep both of these rules in mind as you plan and carry out your watering strategies. One fact about which there is more agreement: the ideal is to maintain constant moisture, not a cycle of wet soil followed by dry soil.

Deciding how much water your plants need

Although watering too much can be as big a problem as watering too little, most gardeners err on the side of too little. If you are just beginning to garden and want to know how much water your garden requires, you could start with the 1-inch-per-week guideline. But remember, you'll need to learn to adjust this based on the needs of your plants. These needs will vary through the year depending on the rate of evapotranspiration (ET) in your garden.

Evapotranspiration refers to the two ways that plants lose water. One way is through evaporation, the natural loss of water to the air from soil, water, and other surfaces. The other way is through transpiration — water lost by the plant itself, primarily from leaves and stems. You can often obtain evapotranspiration rates for local areas from water departments and other agencies. When you look at an evapotranspiration curve, you see a graphic description of how a plant's natural need for water changes during the growing season.

How long should the water run?

How do you translate the amount of water that comes out of your garden hose into inches of water in the garden? Let's say you have a garden that is roughly 20 by 20 feet, and you want to use sprinklers to water it. Here's one way to estimate the appropriate duration of watering time:

Determine the area of your garden in square feet. In our example, it's 400 square feet.
Multiply the number of inches of water you need to apply by 0.6. The result is the number of gallons that you need to apply per square foot. (1 × 0.6 = 0.6 gallons per square foot, or 240 gallons for 400 square feet.)

Next, compensate for the inefficiency of your watering technique. Do this by dividing the gallons needed by an "efficiency fraction": 0.85 for drip irrigation; 0.70 for sprinklers. (240 gallons ÷ 0.70 = approximately 343 gallons.)

To determine how long you need to run the water to achieve this number of gallons, place the hose in an empty 1-gallon or 5-gallon bucket and time how long it takes to fill it. If a 5-gallon bucket fills up in 60 seconds, you have a flow of 5 gallons per minute.

Next, divide the total number of gallons your garden needs by the gallon-per-minute rate, and you'll know how many minutes you need to leave the water running. In our example, with a 5-gallon-per-minute flow, you'd need to run the hose about 69 minutes.

Common-sense watering tips

If terms like evapotranspiration put you off, and calculating gallon-per-minute and efficiency rates isn't your idea of the way to relax on a weekend, be patient. With experience, watering becomes instinctive. Your plants and soil will tell you it's time to water, and you'll water them.

In the meantime, keep these pointers in mind:

Water when it's needed, not according to the calendar. Use a shovel or trowel to check the top 3–6 inches of the soil. If the soil is dry and falls apart easily in your hand, water. Your plants will also show signs that they need water. Wilting or curling leaves—or brown leaves on the lower third of the plant—are signs that your plants may lack adequate water. Keep in mind, though, that too much water creates a lack of oxygen for plants, causing them to show many of the same symptoms.

Water slowly. Never water more than about 1/2 inch of water per hour, or too much water will be lost to runoff. This is why handheld watering cans or handheld hoses generally work only for watering small areas: to water a larger area properly, you'd be standing there a long, long time.

Here are infiltration rates for selected soils:

Light, sandy soils: 1/2–3/4 inch per hour.
Medium-textured clay or loam: 1/4–1/2 inch per hour.
Heavy-textured clay: 1/10–1/4 inch per hour.

Water deeply. With established vegetables and flowers, 6 inches is a minimum. With established trees and shrubs, water 12 to 24 inches or more. As a rule, 1 inch of water will penetrate to a depth of 12 inches in sand and 6 inches in clay. Shallow watering does more harm than good; it discourages plants from developing the deep roots they need to find their own water. Except when you are watering seedlings, soil should never be wet only in the top layer.

Water in the morning, if possible, and never during the hottest part of the day when too much water will be lost to evaporation. Watering in the evening sometimes causes problems in humid climates, particularly with overhead watering, which wets all the foliage. Foliage that remains wet all night sometimes results in disease and fungal growth. If you must water in the evening, do it as early as possible so the leaves have time to dry.

Don't allow runoff. On heavy clay soil, 1 inch of water will probably cause runoff. At the first sign that the water is not penetrating the soil, turn it off. Irrigate again in an hour or so, after the initial water has penetrated the soil.

Watering Methods

You can apply water to plants in different ways. When planning your watering regime, take into consideration your time, budget, terrain, and the type of plants you're growing.

Surface irrigation and subirrigation

Surface and subirrigation are perhaps the oldest forms of irrigation, and are simply methods of applying water at or below the soil surface. Plant tops are not wetted, which can be an important consideration in humid areas where fungal diseases are common problems. You can apply the water from a hose or watering can.

Furrow irrigation. Furrow irrigation is surface irrigation that involves digging furrows along the plant rows. Water released into the furrows then flows to plants laterally. For this system to work, you need to have a relatively flat garden, or all the water will end up at one end of the furrow. This method does not work well in very sandy soil, because the water drains out of the furrow before plants have a chance to take advantage of it.

Basin irrigation. Basin irrigation is surface irrigation that involves building saucers of soil around individual plants. Water can then be applied by hand.

Subirrigation. With subirrigation, water is delivered to the soil below the surface and travels to the plant root zone via capillary action. There are several ways to set up simple subirrigation devices.

For thousands of years, farmers in China and India have used the pitcher method, in which they sink earthen pitchers into the soil, then fill them with water continuously. The water wicks through the soil and becomes available to roots through capillary action.

Here are four ways to adapt this ancient watering technique to modern materials:

Use terra-cotta pots, with the holes plugged, or gallon jugs with three or four holes punched in the sides near the bottom. For watering tomatoes, you would probably want one jug or pot for every two plants. For woody plants in extremely well drained soils, sink an empty pot into the soil about 6 inches away from the base of the vine or shrub. This acts as a reservoir; you can fill the pot with water and walk away, rather than repeatedly giving plants a little moisture and waiting for it to soak in. Add manure to the soil outside the clay pot so that as water flows there, nutrients are made available to plant roots.
Puncture the bottoms of coffee cans with several holes (about 1/8 inch in diameter) and sink the cans into the soil close to where vegetable or flower plants are seeded or transplanted. The tops of the cans should be barely visible above the soil surface.

Take a 2-liter plastic soda bottle and pull off the black bottom, if there is one. Cut off the bottle bottom and remove it. With a hot nail, punch a hole in the bottle cap; then screw on the cap. Turn the bottle upside down and push it into the soil, so that the top (really the bottom) of the bottle is just above the soil surface.
Sink two or more vertical drainage tiles or pipes just inside the drip line of the tree or shrub. Fill the cylinders with drain gravel, then water to irrigate. This is an efficient method to accomplish deep root irrigation of established trees and shrubs.

Sprinkler irrigation

The increased availability of piped municipal water in the past 50 years, and the invention of low-cost sprinklers, have made sprinkler irrigation the most commonly used watering method, particularly for lawns and large areas. Sprinkler irrigation works best with well-draining soils and shallow-rooted plants, or where a cooling effect is desired.

Sprinklers have several disadvantages. They waste water, since much of it is sprayed on areas other than the root zone around the plant. Because much of the water is thrown high in the air, loss due to evaporation can be significant. Sprinklers can also foster fungal diseases and other problems with some plants, such as roses, that don't like having wet foliage. Sprinklers require good water pressure and are best used on plants that are not in bloom. Several types of sprinklers are available.

Overhead, hose-end sprinklers. An oscillating sprinkler provides overhead watering from a perforated tube that rocks back and forth, distributing water over a square or rectangular area. A rotating sprinkler ejects water from one or more nozzles that are forced around by water pressure, watering a circular area. A fixed spray mister simply sprays water upward in a limited area.

Permanent sprinklers. Fixed pop-up sprinklers can be installed as part of a permanent underground irrigation system. These nozzles sit just below the soil surface when out of action and pop up when in use. Permanent systems are convenient but costly to install.

Drip or trickle irrigation

Drip or trickle irrigation (using low-flow hoses or emitters) can save more than half the water that overhead sprinklers lose due to evaporation or runoff (or both). It also reduces disease, because the foliage is never wetted. This type of irrigation never saturates the soil, so there is little negative effect on overall soil structure. Since the area that's watered is reduced, weed growth is reduced as well.

Drip systems don't require trenching. You can design a simple drip system to direct low flows of water to individual plants, either by laying polyethylene tubing on the ground or burying it shallowly. Or you can buy a more sophisticated, custom-designed system.

Drip systems have their limitations, of course. They don't work for lawns or broad areas, and they can be damaged if children or pets dig them up. The cost for the required number of emitters, misters, and sprayers can add up. A drip system also often requires a water-pressure reducer, to keep low-volume fittings functioning properly.

Soaker hoses are similar to drip systems in some ways, but are even simpler. Soaker hoses "leak" water along the length of the hose. You can buy flat plastic hoses or soakers made from recycled rubber tires, known as sweaty hoses or leaky pipe soakers.

Watering Tools

Garden stores are filled with gadgets and tools to help you water your garden. Here are a few tools that, although not required, can make watering easier.

Rain gauges

Keeping track of rainfall helps you avoid overwatering or underwatering your garden. A rain gauge is a plastic calibrated tube that measures rainfall. Check the gauge after every rain, and then empty it. If you let the water stay in the gauge, add a few drops of oil to reduce evaporation. Remember, if your goal is to make sure that your plants get an inch of water a week, rainfall will reduce the amount of supplemental water required.

Timers

There are two kinds of water timers: electronic and mechanical.

Electronic timers combine a clock, an electric water valve, and a computer that opens and closes the valve, starting and stopping the flow of water. You can program electronic timers to water your garden while you're at work or out of town. Most of them also allow you to turn off the water manually, without erasing the program.

Mechanical timers resemble kitchen timers. The water drives a turbine, which turns gears that rotate the dial back to zero. Instead of sounding a bell, the timer turns off the water. Mechanical timers work like water meters, measuring the water that passes through them and delivering a set amount. The delivery time varies depending on water pressure and the number and type of sprinklers you're using. Mechanical timers are inexpensive and handy if you want to run water for an hour, for example, but can't stay home to turn if off.

Watering cans

For small areas, container plantings, and seedlings, watering cans work well. Make sure your watering can has a "rose" attachment so that the water can be delivered like a fine rain. When picking a watering can, keep in mind that they are quite heavy when filled. A 2-gallon can full of water is about as much as most people can carry conveniently. Make sure that the handle and the rest of the can are designed for ease of carrying.