

# Wise Watering

Water. All living things need it to live and thrive, making it one of our most valuable natural resources. Unfortunately, it's rapidly becoming one of the most endangered. Water shortages loom as growing cities and suburbs bring increased demands in concentrated areas, and droughts threaten various regions every year. Adopting efficient watering practices not only conserves water and boosts plant health, it's another way to empower kids to help protect precious resources through their work in the garden.

Mother Nature may water your garden for most of the year, but when plants are growing vigorously during summer months you may need to water frequently. Most gardens have a water source close by, but not everyone has a practical plan for getting water from spigot to soil. We hear often from garden coordinators looking for solutions to this challenge. During school breaks, most garden programs depend on volunteers who have to haul watering cans or hoses - the irrigation option with the least up-front expense - but scheduling and coordination can be difficult, with the bulk of the work falling on a few people. Automatic irrigation equipment provides the most flexibility, but can require a larger cash outlay and time to design and install. This article covers the pros and cons of different irrigation methods to help you make sensible choices, and provides tips about best water management practices and lesson ideas for exploring water issues. We hope this helps you work out the perfect solution to your watering woes!

## PLANTS AND WATERING

Why do plants need water? Like people, many plants consist mostly of water. To visualize just how much they hold in their cells, compare a leaf of a living basil plant to one that's been dried.

Plants use water for important life processes, including photosynthesis (by which plants produce their own energy) and transpiration (evaporation of water from the leaves which cools the plant and creates pressure that moves water from roots to stems and leaves). Water also aids in the absorption of some nutrients.

How much water do plants need? This depends on many factors: plant species, plant size, maturity level, and environment (e.g., weather, soil, other plants growing nearby). For instance, cacti are adapted to desert conditions and need very little water, while water lilies live fully submerged in water. Older and larger plants often need more water to sustain healthy growth, and young plants with shallow roots need frequent watering as the soil near the surface dries quickly. Plants in cool, humid and, shady environments will lose water to transpiration more slowly than those exposed to sunny, warm, arid, and windy conditions. Ultimately, you, your young gardeners, and your volunteers will learn how much water your plots need based on the variables specific to your site.

Anyone who has gardened with kids know that they like to water – sometimes too much! Help them understand that providing the right amount is crucial to the health of their prized garden plants. You can even encourage experiments in test plots or pots where students will find that too little water causes wilting, slow growth, and can lead to early fruit and leaf drop, and that too much can lead to root suffocation and promote disease. Students can also research the water requirements of their various plants to determine their needs and fine-tune the amount based on local variables. Challenge students to track rainfall and monitor soil moisture to help determine when supplemental watering is needed.

## SELECT A SAFE WATER SOURCE

Use a potable (drinking water safe) water source to irrigate your edible garden. Water provided by your municipality is a safe source. If the water you're using comes from a private well or untreated surface water source such as a pond or river, have it tested regularly for bacterial and other types of contamination. Your local health department can provide you with information on water testing.

Water collected in rain barrels is not potable and may contain harmful bacteria and other contaminants, especially if it's water collected from rooftops. The safest course is to use rain barrel water only for irrigating non-edible crops. If you decide to use water from rain barrels on edibles, have the water tested regularly and clean and sanitize the barrels frequently.

## MAKING THE MOST OF MOISTURE

The EPA estimates that an average of 1/3 of all water use is for irrigation - approximately 7 billion gallons a day! This rate often climbs as high as 75% during the summer, especially in the South and West. Here are some wise watering techniques to help your garden crew minimize demands and pressures on shrinking water resources.

- **When to Water** – Irrigate during early morning hours. Much water applied in the heat of the day is lost through evaporation. Evening watering can contribute to disease problems because plant leaves stay wet longer. Watering during windy periods increases water loss.
- **Where to Apply Water** – Since plants absorb moisture through their roots, it makes most sense to apply water to the soil. Watering leaves is inefficient and can lead to disease problems. (If your garden is in a dusty area, rinse leaves occasionally if dust builds up on leaves.)
- **Watch the Weather** – As best you can, adapt your watering schedule to weather and changing seasons. Although watering every Monday and Wednesday might be convenient for you, it may not be the right schedule for your plants.
- **How Much to Water** – It is better to water thoroughly a few times a week rather than a little bit every day. You want the soil to absorb water to a depth of 6 to 8 inches to encourage deep, strong root growth. For all but fast-growing, shallow-rooted plants, allow soil to dry to a depth of 1 inch before watering again.
- **Avoid Runoff** – Avoid letting your irrigation water run off on to paved areas or down storm drains. If you notice runoff, apply water more slowly in cycles, taking small breaks between applications to allow the soil time to soak up moisture.
- **Know Your Soil** – How fast your soil absorbs water will vary by soil type and amount of organic matter in the soil. Clay soils are slow to absorb water but tend to hold moisture longer, so they need less frequent watering. Sandy soils drain quickly and do not hold water well, so they dry out faster. Adding compost and other organic matter to your soil will improve water penetration in clay soil and water retention in sandy soil.
- **Keep Moisture in the Soil** – Mulch beds and around the base of trees (but don't pile mulch up against tree trunks) to decrease water loss from evaporation. Mulch also helps regulate soil temperature and decrease weed growth.
- **What to Plant** – Choose plants adapted to your weather, climate, and soils. Native plants adapted to the conditions in your garden are often a good choice because their moisture needs have evolved within regional weather patterns. Group plants with similar water needs. It's better for the plants and makes your job easier.

## CHOOSING AN IRRIGATION METHOD

### HAND WATERING

This method is usually the cheapest in terms of equipment costs. By using proper techniques, it can also be an efficient use of water. As you use a hose or watering can to irrigate you can be selective, watering each plant or plot as it needs. You can monitor how far moisture penetrates into the soil and adjust your watering time as necessary. It's important to apply water directly to the soil beneath the plants and to avoid excessive runoff onto sidewalks and other paved surfaces.

If you choose to use watering cans, select models that are the right size for your gardeners to avoid spills and injury. Remember that a gallon of water weighs 8 pounds, so cans get heavy quickly! Fortunately, watering cans are available in many different sizes. Or you can save money by using half-gallon or gallon milk and juice jugs with handles.

If you prefer using hoses choose adjustable spray nozzles that allow you to stop the flow without having to turn off the spigot, and that offer a range of volume and pressure options. This will ensure that you have the appropriate pressure for various kinds of plantings and reduce water waste.

The downside of hand watering is the time and energy needed. A strong and reliable team of kids and volunteers are necessary to monitor the weather and water when needed, especially during vacation breaks.

## SPRINKLERS

Sprinklers decrease the manpower needed for watering. You can purchase hose-end sprinklers or install a system of underground pipes with spray heads. Both types can be made even more efficient and flexible by attaching manual or automatic timers.

Hose-end sprinklers are the least expensive option and can be a good choice if you have lots of beds scattered around. Some produce a spray that moves in a circular motion, others cast a fan that can move back and forth, and still others that resemble mini-tractors “drive” through the garden guided by the hose! You can turn them off and on by hand or purchase a timer to do it for you. The first time you operate your sprinkler, observe the spray pattern to make sure it’s applying water where you need it and not to paved surfaces.

Built-in sprinklers use underground pipes and spray heads. They tend to be more sophisticated to use and expensive to install, but they can be useful for permanent beds and lawns. There are many different types of spray heads available including pop-ups, rotors, and bubblers that allow you to choose the direction and pressure of water delivery. Most built-in sprinklers are controlled by automatic timers you can program to water at the most appropriate time of day even if you’re away. A helpful feature available on some automatic timers is a moisture sensor that prevents sprinklers from activating during rain! It is important to check the system regularly to make sure broken sprinkler heads are not wasting water or delivering spray to paved areas, and that spray isn’t overlapping and overwatering some plants.

The main benefit of sprinklers is convenience, and this is what makes them the least efficient irrigation method. Once they’re on schedule, we often forget to monitor them and end up with dried up or drowned plants and wasted water. You also have very limited control over the spray, so some plants get water whether they need it or not. Much of water sprayed into the air is lost to evaporation and wind drift, and since you don’t have to be present to operate them, it might be weeks before you discover a broken sprinkler head that is wasting water or starving plants of moisture.

## DRIP IRRIGATION

Drip irrigation provides a happy medium between hand watering and sprinklers. Drip systems allow for more selective water application and can provide the convenience of automatic watering. Drip irrigation equipment is more costly on the front end than hand watering, but less expensive than installing underground sprinkler systems. Water savings and convenience can give you a rapid return on your initial investment.

There are two main types of drip irrigation. Soaker hose has small pores throughout its surface that leak water directly to the soil at a slow rate, allowing for increased absorption and less water waste. Soaker hose is a good option for rows and beds of vegetables and annual plants.

Emitter hoses feature components that are calibrated to deliver a precise amount of water, such as 1/2 or 1 gallon per hour. There are a variety of types. One kind features pipes with built-in emitters; others allow you to attach small-diameter flexible tubes capped with emitters to a main feeder hose, allowing you to locate emitters right under individual plants or in pots. Emitter irrigation is a great system for watering landscape beds with permanent plantings.

Both options deliver water more efficiently than sprinklers with less chance for water loss due to wind and runoff, and can be attached to timers and moisture monitors to allow for increased flexibility in scheduling. By delivering water directly to the soil, they are more selective than a sprinkler, but not quite as targeted as hand watering.

For optimal operation, you may need to add a pressure regulator to reduce and equalize water flow through the system and a filter to prevent small particles in the water from clogging pores and emitters. In some areas, insects such as ants may enter emitters in search of water and may cause clogs.

This table summarizes the major pros and cons of these three options:

Irrigation Method	Pros	Cons
<b>hand watering</b>	<ul style="list-style-type: none"><li>• inexpensive</li><li>• allows targeted water delivery</li><li>• allows you to monitor soil conditions as you water</li></ul>	<ul style="list-style-type: none"><li>• time consuming</li><li>• labor intensive</li></ul>
<b>sprinklers</b>	<ul style="list-style-type: none"><li>• can be inexpensive</li><li>• save time</li></ul>	<ul style="list-style-type: none"><li>• often waste water</li><li>• built-in systems can be costly and complex to design/install</li></ul>
<b>drip irrigation</b>	<ul style="list-style-type: none"><li>• efficient water delivery</li><li>• saves time</li></ul>	<ul style="list-style-type: none"><li>• may not be as targeted as hand watering</li><li>• more expensive initially than hand watering and many sprinklers</li></ul>