

Keep It Growing



Watering

Gardening requires lots of water, most of it in the form of perspiration.
~ Cecil Roberts

Water is the most basic plant growth requirement.

Plants use a lot of it! It comes in through the roots and exits through small openings in the leaves. A plant is like a big vacuum, continually sucking water from the ground and depositing it into the atmosphere. When water is limited, the plant responds by growing less and producing less. Without enough water, garden plants will ultimately die.

Know your soil type.

Soil type has a big impact on how water moves and how much is available for uptake by the plant roots. In a sandy soil, water moves quickly and vertically. In a loam soil, it moves at a moderate speed and flows both downwards and sideways. And in a clay soil, water moves very slowly and as far horizontally as vertically and may take a long time to penetrate deeply.

Water thoroughly and deeply.

When you irrigate, make sure water soaks the soil well below the surface into the zone where the roots are growing. Depending upon the plant type and growth stage, this may be either a few inches or several feet down. Deep, thorough irrigation encourages roots to grow even deeper, increasing their ability to mine water and nutrients and anchor themselves firmly. When seeds are first planted and when seedlings are young, watering must be frequent and does not need to go deep. Once plants are past the seedling stage, water more thoroughly and less often.

How do you know if your plants need more water?

Visually checking on them is the first step. If you see the leaves looking dull or less vibrant, that can be the first sign that plants need more water. Wilting indicates that water is seriously limited. These could also be symptoms of damage caused by a pest or disease, so you should also check the soil moisture. How soil appears on the surface is no indication of what is available to the roots, so use a trowel or soil core to get below the surface where the roots are.

The squeeze test can also help you determine whether the soil needs water. Dig down a few inches and grab a handful of soil. You need to water when

- Sandy soil won't retain its shape when squeezed into a ball
- Loamy soil looks dry and won't form a loose ball under pressure
- Clay soil won't form a ball unless squeezed.

Three general methods of irrigation

When you choose an irrigation method, remember to consider the growth stage of your plant, your soil type, and the resources (supplies, water source, funding, people) you have available.

Sprinkler or Overhead

This refers to any method that deposits a spray or mist to the plant and soil surface. You can achieve this with a watering can, a fan sprayer attached to a hose, an oscillator (lawn sprinkler) or various other sprinkler or mister systems. This method can be fun and satisfying for the young gardener. It's also great for seed beds or small transplants with shallow roots. However, in California's dry climate, this is generally not the best method for a thorough, regular, irrigation of mature plants. Also, when using any sprinkler system, be aware that water may be falling in paths or other non-crop areas and causing weeds. Additionally water that ends up in paths can lead to muddy paths and puddles.

Furrow or Flood

This is any method where water is applied in large quantities and slowly soaks into the soil. It is more suitable for in ground garden beds. Much of California's large-scale crop irrigation uses this method, and you can see water moving down long furrows across huge fields.

The furrow method can be used to good effect in a garden setting to provide deep thorough irrigation. It generally requires moving soil to build dirt berms (walls) to create a basin or contained area that holds the water until it soaks into the soil. Water typically comes from the end of a garden hose. This method requires very little in the way of material resources, but a good amount of people and kid power to set up and manage, and is more effective in silt or clay soils rather than sandy soils.

Flood or furrow irrigation can provide a great project for upper elementary and middle school kids to give them a chance to work with soil and water flow. It's also a great way to study ancient civilizations, as most early agriculturalists relied on some version of flood or furrow irrigation.

Drip Method

This refers to systems that slowly drip water onto the soil surface using a tube or weepy hose. This is the method with the potential to effectively provide the majority of water needs in garden settings. It is efficient and allows for thorough irrigations. Systems are easily designed to keep water out of non-crop areas to prevent future weed problems.

The challenge of drip is that it generally requires more knowledge, confidence and supplies to set up than the other two methods. The simplest drip system is a "leaky" or soaker hose run through a planted area, attached to a garden hose. A more complex system waters several beds and can include drip-line, filters, pressure regulators and system timers.

Tips for watering with kids

Watering is a garden activity that many students enjoy. Before sending them out with a watering can or hose, make sure they understand a few watering basics:

- It's best for the plants if students make many passes with a gentle spray of water, rather than flood an area.
- Teach them to check that they have watered to the level of the roots rather than just the surface.
- If you have a large garden, you generally cannot rely on watering cans as your primary means of irrigation.
- If you have kids watering with watering cans or bottles consider having a large wide filling bucket that kids can dip their containers in to fill. This is often much easier and manageable for kids than filling with a hose or spigot.

Weed Management

A weed is a plant whose virtues have not yet been discovered.
~ Ralph Waldo Emerson

What is a weed?

A weed is any plant growing where it is not wanted. Remember, "One gardener's weed is another gardener's wealth." The plants that we generally all agree are "weeds" are typically hardy, reproduce easily, and are very competitive with other plant species.

Why do we weed? What do we hope to accomplish?

We weed to reduce competition for sunlight, water, soil nutrients and space for the crop plants. We also weed to eradicate plants that we know are serving as habitat for garden pests. And finally, we weed to get rid of plants that we consider ugly or a nuisance.

In defense of weeds

Sometimes weed species are providing an important beneficial function in the garden. Weigh the potential benefits against problems they may be causing.

Weeds

- provide ground cover to otherwise bare soil
- improve the soil through root penetration and/or increased organic matter
- can provide habitat for birds, worms, insects (good and bad), and other critters
- can be powerful medicinal plants. Some are edible.
- can provide additional learning opportunities in an instructional garden

Weed prevention strategies

Prevention is the best strategy! Follow these guidelines to prevent weed problems:

- Water only where you want to see plants growing. As much as possible, keep irrigation water off non-crop areas.
- Mulch paths heavily with a material that keeps weed seeds from germinating and seedlings from emerging. A good choice is cardboard or landscape fabric covered with wood chips.
- Eliminate weeds when they are small, and relatively easy to pull out.
- As a last resort, remove bad weeds before they go to seed or otherwise propagate.
- Stay ahead of any perennial weeds in your garden such as Bermuda grass or nutsedge. Because perennials survive year-round, they can quickly become a persistent nuisance.

Weed elimination methods

You have to choose which of these works best with your weeds, your weedeaters, and the current conditions in your garden, such as soil moisture and weather:

- Hand pulling
- Digging
- Hoeing
- Mulching (with *some* species this works even once weeds are growing if you pile enough stuff on top of them)
- Mowing or using a Weedeater
- Solarizing (this works best if you use clear plastic during warm months)

Making your weeding efforts count

Particularly in school gardens, you may be working with a large group of helpers one week and with none the next, so consider the following to make your efforts worthwhile:

- **Soil moisture.** Is it appropriate for your chosen weed removal technique? For pulling you want a loose, wet soil. For scraping or cutting weeds off at the surface you generally want a dry surface.
- **Tool choice.** Which tool will most effectively do the job and is it sharp and ready to go? The people who weed for a living would never consider heading to the field with a dull hoe or without their sharpening tool in their back pocket.
- **Prioritize timely weed projects.** If you have a limited supply of labor at one time, choose which weeds should be given highest priority and tackle those first.

Recycling weeds

If the weeds you have removed do not have seeds or will not re-root easily, they can serve as great mulching or compost material. Pile them around beds, trees or other perennials where you want to cover bare soil, either to prevent new weeds from germinating or where to keep the soil shaded, cool, and wet during hot months. If you have a functioning aerobic compost system that stays hot (135°F and above) for several days, even seedy weeds can go into it because seeds will be killed by the heat. If you are not sure that your compost is maintained at a high temperature, it is best not to include weed seeds or other persistent weeds in your compost pile.

Getting to know your weeds

The weeds and best methods for their control are different in every area and every garden. Get to know your own by examining them, researching them and considering these questions:

- Where are its seeds, and what do they look like?
- Do you know, or can you guess, if it propagates from seeds?
- What types of spaces does it seem to “like” in the garden?
- Are there many individuals of this weed growing?

- Does it appear to be warm season or cool season?
- Do you know, or can you guess, if it is an annual or a perennial?
- From what you can tell about it right now, what methods and/or tools would you suggest or try in order to control it?

Some bad weeds to look out for in California school gardens

- Bermuda grass
- Nutsedge
- Morning glory (bindweed)
- Foxtail
- Mallow (cheeseweed)
- Johnson grass
- Star thistle

Tips for weeding with kids

- When planning to have kids weed in the garden, be sure to water the weedy areas well so that the weeds come up easily. Kids get frustrated easily if they can't pull the weeds out, but feel great satisfaction if they can!
- Give kids a weeding demo. Assign a "Weed Manager." Designate sections for different groups. Have buckets ready.
- Have kids count their weeds; make a weed chart.
- Teach kids the difference between noxious weeds that cannot be composted and those that are OK to compost.

Critters and Critter Control

*“Though snails are exceedingly slow,
There is one thing I'd like to know.
If I out-run 'em round the yard,
How come they beat me to the chard?”*
~ Allen Klein

Remember, healthy plants will have fewer pest problems. Keeping soils fertile and irrigating adequately will also prevent many pest problems from occurring.

Follow these steps to ecologically sound pest control:

Start by monitoring.

To keep pest problems to a minimum, start by regular monitoring. Insect and disease problems are easiest to fix if caught early. Check plants for pests like aphids, scale or the larval stages of several pest species. Look out for leaf spots that can be a sign of fungal or bacterial disease. When you have identified a pest problem try to find out what is causing the damage. This can be an exciting investigative activity for your students. Decide whether the damage is significant enough to warrant action.

In an instructional garden, choose to tolerate some plant damage. Observing species interactions or the unchecked impact of a pest can be as important as harvesting a crop and is part of the learning process for your students. Many plant pests have natural predators, and if you remove the pests, your students will never get to see the predators in action.

Discourage excess moisture on foliage.

Most fungal and bacterial diseases infect plant surfaces only if there is moisture present. In regions where the growing season is humid, give plants enough space so air can circulate freely. Water in the morning hours, so the water can evaporate during the daylight hours. Drip irrigation is also a good way to water without getting leaves wet. Plants such as tomatoes, potatoes, squash, and cucumbers should not be watered from above, although this is somewhat less of a concern in arid climates.

Healthy soil makes healthy plants.

Just like well-nourished humans, plants are able to avoid sickness when well nourished. Test your soil and maintain proper fertilization for healthier plants.

Look for disease and pest resistant varieties.

Many crop varieties are bred to be less susceptible to disease and pest problems. Information on resistance is generally available in the variety descriptions in catalogs and on seed packets.

Choose crops that are appropriate for your region and season.

Many plants will succumb to pest attacks if they are grown in the wrong climate zone or during the wrong time of year. You can avoid pest problems if you start by doing your research and making careful choices.

Clean up your garden.

Diseases and pests can remain on infected and dead plant material where they can survive until attacking another host crop. Remove infected plant leaves, keep weeds to a minimum, and clean up the garden regularly.

Encourage beneficial organisms.

Make the garden inviting to beneficial species such as ladybugs, wasps, lacewings, and birds that are known to feed upon pests. Plant appropriate habitat species. Plants in the mint family, the sunflower (composite) family, and the carrot (umbel) family will attract good insects to your garden. Choose perennials that have consecutive flowering periods so that something is in bloom for as much of the year as possible. Limit the use of insecticides that can kill beneficials as well as pests. Add a bird feeder or a water feature, such as a fountain or bath to attract birds.

Practice crop rotations.

Pests and diseases that affect certain crops build up in the soil if the same crop is grown in the same location repeatedly. By planting different crops in a location on a three-year cycle, you can avoid many problems.

Use non-chemical pest control methods and/or install barriers to pests.

There are many fun and effective non-chemical pest control methods that are particularly appropriate in school garden programs.

- Hand-picking pests is a method that is rarely viable in commercial operations but effective when you have 20 children with bright eyes and small fingers.
- Row covers can keep flying pests off an entire bed.
- Sticky barriers can provide a barrier to ants.
- A board laid on the soil is good for collecting snails and slugs. Turn it over daily and pick off the mollusks that have gathered there.
- A short section of old hose or rolled up newspaper will attract nighttime marauders like earwigs.
- Mix one tablespoon of liquid dishwashing soap with a quart of water and spray the soapy solution on plants. This is good for taking care of aphids and whiteflies.

And what about those vertebrate pests?

Often the most damaging pests to our gardens are rabbits, squirrels and gophers. These can be very difficult to deal with. When properly secured, row cover is an effective barrier to non-burrowing vertebrates. Gophers can be kept out of beds lined underground with gopher baskets or hardware cloth (screen). Most traps and poisons are potentially dangerous to children and other species and must be used with discretion. Check regulations at your school and district to find out what is allowed.

Tips for controlling critters with kids

- As mentioned above, hand picking can be a fun way to control pesky pests—just be sure that what kids hand-pick is safe. Snails are a favorite.
- Use some of the benign methods such as rolled up newspaper to capture critters.
- Kids will enjoy turning over a board to find creepy crawlies.
- Teach kids to distinguish between beneficial insects and pests (aka “good” bugs and “bad” bugs). The more they learn, the less likely they will be to indiscriminately squish small insects.