The Merits of Drip Irrigation

Drip irrigation conserves water, reduces weeding, and is easier to install than most gardeners realize.

ARTICLE AND PHOTOGRAPHS BY LEE REICH

WHEN I once asked one of the country's best vegetable gardeners why he doesn't use drip irrigation, he smiled, flourished his watering wand, and said, "I like to play god." For those of us who are less omnipotent in the garden, drip irrigation (also called trickle irrigation) is a godsend. Thanks to drip irrigation, a method of watering where water is slowly dripped into the soil, the ground in my garden remains moist throughout each growing season come rain or shine and with little attention from me. The benefits of drip irrigation are most dramatic in arid climates—in Israel, for example, where drip irrigation was invented. But even where I garden, in the humid Northeast and other regions with usually abundant rainfall, plants grow better with regular watering. Rain, after all, rarely falls in just the right place at just the right time.

That said, a caveat is in order: Drip irrigation, or any method of watering, is not always necessary for growing plants. The

Water drips from the spaced holes of a quarter-inch drip tube, targeting moisture at the root zone of plants. Although drip tubes can be buried, the author prefers to keep them aboveground in his garden, where they are held in place with plastic stakes, as seen above.

A drip irrigation system simplifies supplemental watering in the author's large vegetable garden.

benefits of any kind of watering depend on the kinds of plants grown, how well the climate behaves, and the plant performance you desire. Drip irrigate a wildflower-type garden that includes drought-tolerant plants such as coneflower, liatris, and yarrow, and you're likely to end up with overly rank growth and more weeds. With few exceptions, though, if there's any part of your garden that you are going to water regularly, drip irrigation is the best way to go.

A real plus of drip irrigation is its effect on weed problems and water use: Both diminish. By pinpointing water applications, none is wasted on promoting weed growth in the ground between widely spaced garden plants or in paths. The water savings of drip over a sprinkler also comes about because a sprinkler floods all soil pores with each watering, but much is wasted until gravity drains water from larger pores, letting roots catch their breath to use what's left. With drip irrigation, water is offered at a rate more in sync with plant use, so roots have constant access to needed water and air. And finally, water from a drip system does not spray into the air, which offers two more benefits over sprinklers. First, not getting water on leaves reduces the likelihood of fungal diseases. Second, avoiding having airborne water reduces evaporation, making another contribution to the 60 percent water savings generally attributed to drip irrigation.

So why aren't more gardeners using drip irrigation, you may ask? In most cases, it's because drip irrigation is perceived as difficult or high-tech, or only designed for nursery applications. Nothing could be further from the truth. Almost anyone can put together a basic drip irrigation system. The control mechanisms, tubing, fittings, emitters, and hole punch are available through a number of suppliers; some provide online assistance to help you design a system tailored to your garden's needs. Some manufacturers offer kits that come complete with all you need to set up a drip irrigation system for a small garden.

SOAKER HOSE CAUTIONS

A soaker hose may seem like the ideal way to water plants. Just screw the porous rubber hose to the end of your hose or spigot, lay the soaker hose on top of the ground or bury it a few inches deep, turn on the faucet, and let water trickle out. One spring I did just this in my vegetable garden.

After noting the less-than-stellar response from my plants, I cut up two-foot sections of the hose for more quantitative testing. What I found was that the output was highly variable from different sections and that it changed during even one season.

A soaker hose provides water to a blueberry.

I expect ooze rate in the field to be even more variable. With no pressure-compensating feature, output from elevated portions will be less than lower portions and portions closer to the water source will ooze faster than those further along the line. The pores also are not self-cleaning, so they can be expected to ooze more slowly over time, especially when used without a filter. I consider soaker hoses to be poor stand-ins for drip irrigation. If you use them in a small, flat garden area, they may be more efficient than sprinklers, but to ensure continued effectiveness, you will probably need to replace them every season. —L.R.

RIGHT: JUDYWHITE, GARDENPHOTOS.COM

A plug-in emitter directs water from the mainline to this young blueberry bush.

Sure, there's an upfront commitment of time to set up the drip system, but you'll find it's well worth it for the time and water savings over the long haul.

WATER, WATER EVERYWHERE

Ideally, a drip system puts out water at a rate that matches plant use, which of course varies with the size and kind of plant, temperature, sunlight, and wind speed. Rather than trying to factor together all these variables, you could just soak the whole garden with the equivalent of a one-inch depth (which works out to about a half-gallon per square foot) of water per week. This amount is a good approximation of average plant water use. Compute how long it would take to provide this amount of water using emitter spacing, emitter output, and the lateral spread of water for your soil type—remember, water drains more quickly through a sandy or loamy soil than it does in a clay soil.

An alternative to this computation, most useful wherever periodic rainfalls allow some wiggle room, is to water for a total of about four hours per week. This may seem like a lot of water, but the water is just dripping during that time, and those four hours can be spread out over much of the day every day of the week, allowing wells and aquifers recharge time. For instance, my drip timer can turn the water on and off six times a day, so each watering, spread at intervals during daylight hours, is for four hours divided by seven days of the week divided by six times per day, or about six minutes per session.

The timer for an irrigation system regulates intervals for watering. Except in warm regions, this unit needs to be brought indoors in winter.

THROUGH THE YEAR

Except for some minor maintenance, drip irrigation lets you pretty much forget about watering for the season. The timer, filter, and pressure regulator need to be brought indoors for winter; everything else can remain outdoors. Some users suggest blowing water out of the lines with air at the end of each growing season. I also plug the header line—after disconnecting the timer, pressure regulator, and filter—to keep out curious creatures.

During the growing season, I turn off the spigot during wet spells and manually water newly planted seeds or transplants until their roots reach down to the wetting zone. Some years, if I think of it, I decrease watering durations early and late in the season, when plants use less water.

The performance of even the most automated watering system needs periodic monitoring. Look over your timer's shoulder to make sure the water is going on and off as planned. Then scurry over to your plants to spot check that water is dripping from the emitters. Occasionally check the soil, digging a hole to feel for moisture or probing for moisture with an electronic moisture meter. And, of course, look at your plants. If they look healthy and are growing well, you know the system is doing its job.

Sources

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THE NUTS AND BOLTS OF A DRIP IRRIGATION SYSTEM

The key to convenience for any drip irrigation system is a **timer**, which can be anything from an electronic "command center" that activates solenoid valves to water various zones at various times, to a relatively inexpensive, battery-powered unit that threads right onto any spigot.

From the timer, the water goes through a 200-micron **filte**r and then through a **pressure regulator**. It's important to note that some municipalities require you to install a **backflow preventer**, or **check valve**, at the beginning of the line to prevent water from siphoning back into the household water system if pressure drops, so be sure to check local ordinances. The pressure regulator brings water pressure down, typically to only about 15 pounds per square inch, enabling the use of inexpensive, low-pressure fittings.

The half-inch mainline carries water to the garden. To target where water is supplied, punch holes in the line, top. Insert a connector into the holes for the emitter line, above.

T connectors like this one are available for plugging into mainlines to allow for setting drip lines that need to branch or accommodate bends.

Next along the water line is thin-wall, half-inch, black polyethylene tubing, which is the so-called **"header line"** (or **mainline**) that carries water out to the garden. Where it runs across the lawn or paths, I bury this line shallowly or cover it with mulch just deeply enough to keep anyone from tripping on it or chewing it up with the lawnmower. Sharp bends and branches in this line are handled with special **L and T connectors** threaded or pushed onto the header line.

Once out in the garden, we come to the heart of drip irrigation: the **emitters** through which water exits. Emitters are not merely leaky pieces of pipe or holes punched in header lines. Output of water through such emitters would vary with water pressure, distance along the line, and changes in elevation, and would be prone to clogging should any particles get into the line.

The best emitters have ingeniously designed openings that are self-cleaning and maintain a fairly constant drip rate regardless of changes in water pressure. Water drips out at a specified rate, usually from one-third to one gallon per hour. Emitters can be buried in planted areas, but I prefer to leave them on the surface so they'll be less likely to be gouged by my trowel, and they can be moved out of the way when digging or spreading compost or mulch. In areas that experience especially intense sunlight, covering emitters with a thin layer of mulch slows degradation of the plastic by sunlight.

I tailor the emitters I use according to how my plants are arranged. Thus, in my vegetable garden I run a single quarter-inch "soakerline"—it should more correctly be called a **dripperline**—down the center of each three-foot-wide bed. This dripperline, also easy to snake among plants in a mixed border or flower bed, has relatively closely-spaced outlets, each six inches apart and emitting water at a rate of a half gallon per hour. Quarter-inch dripperline is not very pressure-compensating, but that's not a problem with my short 10- to 20-foot-long beds all on level ground. Were pressure compensation needed, I would instead use half-inch pressure-compensating line, "T-Tape," or some other products having pressure-compensating emitters six to 12 inches apart.

Emitters with openings every six to 12 inches are useful for beds because they wet wide swaths of ground as capillary attraction between soil particles pulls water horizontally even as gravity tugs it vertically. Soil texture determines the horizontal spread. The many capillary-size channels in clay soils pull water laterally about three feet from each emitter while, at the other end of the spectrum, the larger pores of sandy soils exert less pull, creating a wetting front that moves laterally only about a foot from each emitter. A wide bed, depending on the kind of soil, might require more than a single dripperline.

When setting up trees, shrubs, or other widely spaced plants on drip irrigation, you don't want to water the many feet of ground between them. In this case, run a header line from plant to plant, and then at each plant punch a hole in the line and plug in an emitter. Many types of **plug-in emitters** are available; for a row of newly planted fruit trees, I chose the pressure-compensating "PC Plus" emitter, which emits one-half gallon of water per hour. Older trees would need more than a single emitter—both for even root distribution and for adequate moisture—or could be encircled by a ring of emitter tubing, such as a half-inch pressure-compensating line, plugged into the header line. —L.R.