



CMG GardenNotes #714

Irrigating the Vegetable Garden

Outline: Garden irrigation, page 1
Measuring soil moisture content, page 1
Automate the system with controllers, page 2
Furrow irrigation, page 3
Sprinkler irrigation, page 3
Drip irrigation, page 3
Soaker hose, page 5

Garden Irrigation

In vegetable production, an adequate supply of water during the growing season is directly related to produce quality and yields. Many vegetables become strong-flavored or stringy with water stress. For details on specific water needs of vegetables, refer to *CMG GardenNotes* #716, **Water Conservation in the Vegetable Garden**.

Several gardening techniques (including soil preparation, mulching, and efficient irrigation) help conserve water in the vegetable garden. For additional information, refer to *CMG GardenNotes* #711, **Vegetable Garden: Soil Management and Fertilization**; #715, **Mulches for the Vegetable Garden**; and #716, **Water Conservation in the Vegetable Garden**.

As a rule of thumb, vegetables use around ¼ inch of water per day during typical summer weather. If the garden is watered every four days, apply one inch of water per irrigation. Hot, windy weather will increase water demand significantly. Beans and corn will be significantly higher in water demand during blooming or tasseling/silking.

Checking Soil Moisture Content

Check soil moisture regularly. Irrigate when the top two to four inches of soil is dry to the touch. This is especially important if using mulch, where surface evaporation is reduced.

Evaluating when the soil needs irrigation is rather subjective. The “stick” method (judging moisture by the relative easy or difficulty of pushing a stick or screwdriver into the soil) is an old farmer’s standard. It will be easier when wet than when dry. However, this very subjective method is specific to soil types and

can be misleading to the novice. On compacted clayey soils, it may be somewhat difficult when moist and very difficult when dry. On sandy soils, it may be somewhat easy wet or dry.

To check moisture levels, a soil probe is a useful tool to pull up soil samples from the rooting zone at a six to eight inch depth. A small garden spade could be used.

Houseplant watering meters are helpful in evaluating the soil moisture content under mulch. Realize however, that these inexpensive meters are somewhat inaccurate. If the fertility level is high, the meter will read on the wet side. If the fertility is low, the meter will read on the dry side. Learn to interpret the meter reading for a specific soil by trial and error. [Figure 1]



Figure 1. Although somewhat inaccurate, a houseplant water meter is a tool to evaluate water needs in the garden.

Automate the System with Controllers

Sprinkler or drip systems can be easily automated with a multi-zone controller like the lawn. A small garden could be connected to the lawn's controller as a separate zone and run on a different program. However, do not have the lawn and vegetable garden on the same zone, as water needs are not the same.

Single zone controllers connect to the garden hose. Some simple models are manually turned on and automatically turn off after the set number of minutes or gallons. More elaborate battery operated models turn the water on and off at the day and time interval set by the gardener. [Figure 2]



Figure 2. Single zone controllers connect to the hose line. Left: This style is manually turned on and automatically turns off the water flow after the set number of minutes. Right: This battery powered controller turns water on and off at the day and time intervals set by the gardener.

Furrow Irrigation

For gardeners who have irrigation water from a ditch, furrow irrigation in the traditional row-style garden layout may be most practical. As a rule of thumb, adjust water flow for the furrow so that the water reaches the end of the row 1/3 of the time into the irrigation period. For example, if the irrigation period is 15 minutes, the water should reach the end of the row in five minutes. Soil erosion and runoff are major disadvantages of furrow irrigation.

Sprinkler Irrigation

Sprinkler irrigation is considered more efficient in water delivery than furrow irrigation. It is easy to measure the amount of water applied and easy to manage. Because it wets the entire soil surface, weed seed germination may be high.

Sprinkler irrigation is discouraged on vegetables prone to foliar diseases such as Early Blight (tomatoes, peppers, and potatoes). The splashing water spreads disease organisms and water on the leaves creates favorable conditions for disease development. For additional information on Early Blight management, refer to *CMG GardenNotes* #718, **Tomato Early Blight**. Tall crops, such as corn and pole beans may interfere with water delivery patterns.

As a rule of thumb, vegetables use around ¼ inch of water per day, depending on temperature, wind, and stage of crop development. For example, if the garden is watered every four days, apply one inch of water per irrigation. The gardener can quickly learn how long to run the sprinklers by measuring the amount of water in several straight-sided cans placed around the garden.

Delivery rates depend on the type of sprinkler heads used, pressure, and the spacing of heads in the garden. For example, pop-up spray heads deliver around 1½ inches per hour and would typically run 40 minutes to apply 1-inch of water. Rotor type heads deliver around 1/2 inch per hour and would typically run for 120 minutes to apply 1-inch of water.

Because the water needs of the vegetable garden are different from a lawn, it should be on a different irrigation zone than the lawn. Water use will be low in the spring when crops are small and temperature are cool and will increase as the temperatures rise and crops come into bloom.

Drip Irrigation

Drip irrigation is well suited for the block-style garden layout and raised beds. Several different types of drip systems are available including:

- **In-line drip tubing** – Emitters are found in the tubing every 6, 12, or 24 inches; 12 inches is most common in the home garden trade.
- **Soaker hose and soaker tubing** – Emits water along the entire length of the hose.
- **Bubblers and drippers** – Emitter or drippers are placed to water individual plants.

A disadvantage of a drip system is that they require relatively clean water. Systems readily plug with dirt, algae, or salts in the water. This is generally not a problem when using drinking quality municipal water supplies. Depending on water quality, drip irrigation may not be practical for many non-potable water sources. The filtering system required may be expensive and high maintenance.

Ideally, an in-line drip hose or soaker hose is placed on the soil surface under the mulch. The soaker hose may also be buried a couple of inches into the soil to protect the hose from breakdown by sunlight.

On a raised-bed box, space the drip line/soaker hose at 12-inch spacing. A four-foot wide box would have four runs of the drip line/soaker hose up and down the box (as illustrated in Figure 1). For larger vegetables like corn, squash, and cole crops (three plants across a four-foot wide bed) make three runs up and down a four-foot wide box. On a two-foot wide raised bed box for tomatoes or beans, the drip line/soaker hose runs down and back. [Figure 3]

Figure 3. On this four-foot wide box, the drip line or soaker hose makes four runs up and down the box at 12-inch spacing. Carrot rows are running across the box.



Drip systems are designed to run on low pressure. High pressure may split the hose and pop connections. The desired low pressure is easy to achieve with pressure regulators that have hose-end fitting (found with the drip system supplies). If the garden has changing elevations, a pressure regulator will be needed for every couple of feet change in elevation. [Figure 4]

Figure 4. With irrigation pipe, it is easy to plumb a tap at each raised bed box. Here a pressure regulator with hose-end fittings reduces pressure to 25 psi. It is connected to a ½-inch soaker hose.



Determine the run time by examining the soil moisture content. Run time will vary with the brand of hose, water pressure, and spacing.

Soaker Hose and Soaker Tube

The soaker hose and soaker tube type of drip system allows water to seep out the entire length of the hose. It is easy to use in traditional row style or raised-bed gardens. [Figure 5]

Figure 5. Soaker hose seeps water out along the length of the hose.



It can be connected by manually connecting the garden hose to each line at each irrigation session or by connecting a series of dedicated garden hoses to a series of lines. On raised-bed gardening, it is easy to run a water line with a tap to each box. Several small boxes may run together on the same zone. [Figure 4]

For uniform water delivery, keep runs short, generally 25 feet or less. With long lengths, water delivery will be higher at the top of the hose line and less at the bottom. The ground must be reasonably level. On slopes, run several short lengths.

Several brands and styles are available in the home garden trade.

- **Half-Inch Soaker Hose** – Some brands (like *Swans Soaker Hose*) are a ½-inch hose that connects with standard hose fitting. These are found the garden hose section. It can be cut to any length and connected with garden hose fittings.

A small plastic disc fits inside the female hose connection as a pressure regulator (actually a flow regulator). With the reduced water flow, it may need to run for around an hour to adequately water the garden. It works better to use the pressure regulators with hose-end fittings found with the drip irrigation supplies (figure 4). With this type of regulator, the drip line runs 10-20 minutes to adequately water the garden. Without a pressure regulator of some type, the soaker hose tends to rupture sending out streams of water at spots rather than dripping along the line.

This half-inch hose style is more tolerant of small amounts of dirt, algae, or salts in the water than other types of drip systems, and may be successful on some nonpotable water sources. Periodically, open up the end of the hose and flush out soil deposits.

- **Quarter-inch Soaker Tubing** – A ¼ inch soaker tubing is available in the drip irrigation section at garden stores. Cut the soaker tubing to desired length and connect with drip system components. An in-line pressure regulator (figure 4) is required; otherwise, the fitting may pop or leak.

Because the soaker tubing has a higher delivery rate, it can not be on the same zone as other in-line drip hoses, button emitters, or bubblers.

Additional Information – *CMG GardenNotes* on vegetable gardening:

#711	Vegetable Garden: Soil Management and Fertilization	#718	Early Blight of Tomatoes
#712	Sample Vegetable Garden Seed Catalogs	#719	Vegetable Garden Hints
#713	Block Style Layout in Raised Bed Vegetable Gardens	#720	Vegetable Planting Guide
#714	Irrigating the Vegetable Garden	#721	Sample Planting for Raised-Bed Garden
#715	Mulches for the Vegetable Garden	#722	Frost Protection and Extending the Growing Season
#716	Water Conservation in the Vegetable Garden	#723	Growing Vegetables in a Hobby Greenhouse
#717	Growing Tomatoes	#724	Vegetable Gardening in Containers

Authors: David Whiting (CSU Extension, retired), with Carol O'Meara (CSU Extension, Boulder County), and Carl Wilson (CSU Extension, retired). Artwork by David Whiting; used by permission.

- *CMG GardenNotes* are available online at www.cmg.colostate.edu.
- Colorado State University, U.S. Department of Agriculture and Colorado counties cooperating.
- Extension programs are available to all without discrimination.
- No endorsement of products mentioned is intended nor is criticism implied of products not mentioned.
- Copyright 2003-2018. Colorado State University Extension. All Rights Reserved. *CMG GardenNotes* may be reproduced, without change or additions, for nonprofit educational use.

Revised October 2014