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Irrigating Your Home Vegetable Garden

How much water do I need?

Vegetables require 1 inch of water per week. This should equal about 62 gallons for a 100 square foot bed. This water requirement includes rain, but when not enough rain falls in a week, additional water may need to be supplied through irrigation. There are also times when vegetables may need more water. During the summer when it is hot, sunny, windy, and relative humidity is low, vegetables may require up to 2 inches of water per week. There are also periods of time during crop development when plants may be particularly susceptible to drought stress. Care should be taken to make sure enough water is supplied during these times (Table 1).

Some crops may be particularly susceptible to overwatering or need periods of drought at critical times as well. For example, at the end of the growing season, onions, potatoes, pumpkins, and winter squash need time to cure so dry conditions are best. On the other hand, when tomatoes do not receive enough water, or the amount of water is inconsistent, it can result in blossom-end rot and fruit cracking.

Table 1. Critical periods of water need for different vegetable crops

Critical Period	Crops
Brush growth	Asparagus
Pod enlargement	Snap beans
Head development	Broccoli, cabbage, cauliflower, lettuce
Root development	Carrots, radishes, turnip, rutabaga
Bulb development	Onion
Tuber set and enlargement	Potatoes
Flowering and fruit development	Cucumbers, squash, melons, eggplants, peppers
Early flowering, fruit set and enlargement	Tomatoes

In the coming decades, Connecticut's climate is expected to change. Temperatures in Connecticut are also expected to increase by as much as 6°F, which could mean more water is needed for a longer period of time during the growing season to keep crops productive. Precipitation patterns are also expected to change. Although Connecticut is predicted to receive higher annual precipitation, that precipitation is expected during the winter and spring months, not during the summer months when crops are growing. This, combined with an increase in

drought conditions, and a projected increase in consecutive dry days of about 10%, will likely result in a greater need for irrigation. Keeping track of the amount of irrigation and rain supplied to your crops can ensure that they are receiving that needed water but will also ensure that excess water use is kept to a minimum.

The first step in figuring out how much/how long to water your garden is to calculate the volume of water that equals 1 inch for your garden. To start you will need to measure your garden and determine its area.

Length of bed x Width of bed = Area of
your garden (square feet)

Length of your bed: _____
Width of your bed: _____
Area of your bed: _____

Now that you have the area of the garden, you can calculate how much water it needs each week. You can do this one of two ways:

1) $\frac{\text{Area of your garden}}{100 \text{ square feet}} \times 62 \text{ gallons} =$

Gallons of water needed: _____

2) Area of your garden x 0.083 ft (1 in) =

Cubic feet of water needed : _____

Cubic feet of water x $\frac{7.48 \text{ gallons}}{1 \text{ cubic foot}} =$

Gallons of water needed: _____

For periods of time when more water is needed, you can multiply by this amount. For example, if 2 inches are needed, multiply the gallons of water needed for 1 inch by 2.

How long to run the irrigation?

Now that you know how much water is needed, you need to figure out how long to run your irrigation to get that much water. This will depend on how you apply irrigation. Form most homeowners, this will be using a hose, sprinkler, or watering can. Some with larger gardens might use a soaker hose or drip irrigation.

Watering Can

This is probably easiest. Determine how much water your watering can holds. You then divide the gallons of water needed by the volume of your watering can to find out how many watering cans you need to put on your garden. Keep in mind that the volume marked on your watering can may not be in gallons.

Volume conversions:

1 Gallon = 16 cups

1 Gallon = 4 quarts (1 quart = 4 cups)

1 Gallon = 128 fluid ounces

If your watering can does not say how much water it holds, or you are not sure, you can find out by filling it with using a measuring cup and counting how much water it holds.

Volume of the watering can: _____

$\frac{\text{Gallons of water needed}}{\text{Volume of the watering can}} =$

Number of watering cans to put on the garden: _____

Hose

To find out how long to run your hose to get the amount of water you need, you will first need a bucket of known volume. Some buckets have a standard size or have volume marks on the inside. If not and you are not

sure how much water your bucket holds, first fill it with a measuring cup and count how much water it holds.

Volume of the bucket: _____

Next time how long it takes to fill the bucket with your hose (Figure 1).

Time to fill the bucket: _____

Now you can calculate how long to run your hose to get the amount of water you need. Divide the amount of water you need by the volume of the bucket, then multiply by how long it takes to fill the bucket.

$\frac{\text{Gallons of water need} \times \text{Time to fill bucket}}{\text{Volume of the bucket}}$

Amount of time to run the hose: _____



Figure 1. This bucket holds 3.5 gallons of water. You can fill the bucket with a hose, or from whatever nozzle you have attached to your hose, as shown here.

Sprinkler

If you use a sprinkler to irrigate your garden, you will need a few small containers that you can place out in the garden where the sprinkler supplies water. They should be about 1 inch deep, so tuna or cat food cans

work well. If you use a different container, measure how deep the container is or mark the 1-inch depth on the side of the container (Figure 2).

Depth of the container: _____

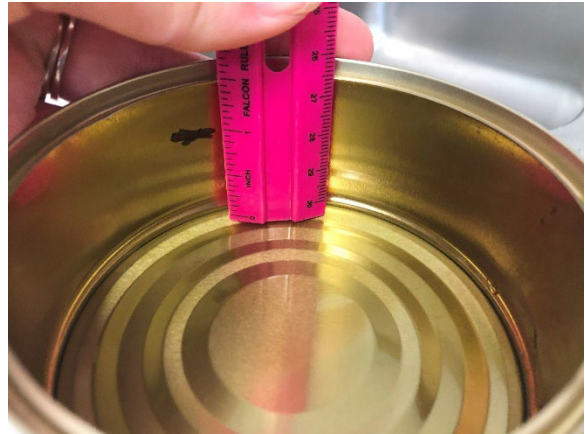


Figure 2. A deep can marked with the 1-inch depth.

Set the containers out in the garden when you plan to run the sprinkler. Then time how long it takes to fill the containers with 1 inch of water when the sprinkler is on (Figure 3). Different parts of your garden may take different amounts of time. Time until all of the containers are full to the 1-inch mark.

Time to fill containers to 1 inch: _____



Figure 3. The marked can set under the sprinkler spray.

If you are using tuna cans, or another container that is 1-inch deep, this is how long you should run your sprinkler. If you are using containers with a different depth, divide the amount of time it took to fill the containers by the depth of the containers.

$$\frac{\text{Time to fill container}}{\text{Depth of container}} =$$

Amount of time to run the sprinkler: _____

Soaker Hose

Determining how long to run a soaker hose to supply adequate irrigation can be a little more complicated than for the previous irrigation methods. Flow through soaker hoses will depend on the pressure or flow rate of your outdoor faucet, the operating pressure of the soaker hose, and the diameter and length of the hose. A larger diameter hose will deliver more water per minute and pressure decreases with longer hoses. Some hoses can operate at 40 PSI (pounds per square inch), the approximate pressure of an outdoor faucet. Others may require a lower pressure, 10-25 PSI for example. If that is the case, a pressure regulator can be installed between the faucet and your soaker hose.

Although water supply from a soaker hose can be calculated based on factory specifications for flow rate and area irrigated, these calculations may vary based on actual water pressure. Additionally, it may not be easy to determine what those values are for your soaker hose. In order to confirm how much water your soaker hose supplies to your garden, it may be best to run the soaker hose and see how long it takes to fill tuna or cat food cans as you would with a sprinkler. These can be placed at varying distances from the hose in the irrigated area and at

different points along the hose (distance from the water source).

Accounting for rain

Some of the water your vegetables will need each week will probably be provided by rain. This will change how much water you should supplement through irrigation each week. You can use a simple check book method to keep track of rain and determine how much additional water you need to irrigate. An example of such a log can be found in Table 2. You can keep track on paper or using a spreadsheet program on your computer. The first few steps for keeping a log are easy.

1. Record the date each day.
2. Record the amount of rain from either a rain gauge in your garden, or another accurate weather source. Setting up a rain gauge in your garden will give you the most accurate information for your location.
3. Determine if there is rain in the forecast. If there is a lot of rain in the forecast for the next couple of days, it may be wise to reduce the amount of irrigation supplied, or to wait to irrigate until after the rain. If this is the case, skip to step 5.

In the example in Table 2, rain has fallen all three days. In this case, no additional irrigation is needed that week.

The next few steps of the log may be a little more complicated. If there has been no rain, or not enough rain, and no rain is forecast you will run your irrigation. To determine how long to run your irrigation if some water has already been supplied, you can use the following equations:

Table 2. Example irrigation log using the check book method.

Date	Rain Depth (in)	Rain In Forecast?	Irrigation Supplied (in)	Needed Water Remaining (in)
6/29	0.01	Yes	0	0.99
6/30	0.34	Yes	0	0.65
6/31	1.07	Yes	0	0

Watering Can:

Needed water remaining (in) x Number of watering cans for 1 in = Number of watering cans for needed water

Hose, Sprinkler, and Soaker Hose:

Needed water remaining (in) x Amount of time to run the hose/sprinkler for 1 in = Amount of time to run the hose for needed water

4. Record the amount of irrigation supplied to the garden. This should be done in inches of depth. Select which of the following you did and follow those instructions:
 - a. If the full amount needed is supplied, then this will be 1 inch.
 - b. If you supplied all of the needed water remaining, then record the needed water remaining from the previous day in the irrigation column for today.
 - c. If you did neither a, nor b, you can use the following calculation to determine how many inches you have supplied

Watering Can:

Number of watering cans used

Number of watering cans for 1 inch

Hose, Sprinkler, and Soaker Hose:

Amount of time you ran the hose/sprinkler

Amount of time to run for 1 in

5. Subtract the rain depth and irrigation supplied from the water needed. At the beginning of the week, this will be the 1-inch water recommendation. After the first day of the week use the value from the previous day in the final column. Enter the amount in the final column for that day.

Some recommend that the water should be applied all at once to encourage deeper root growth.

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