Yard and Garden Extension

Water Recommendations for Vegetables

Irrigation in the Vegetable Garden

In Utah, water is continuously in short supply due to population growth, a warming regional climate, and continued drought. With this, demand for water has increased while becoming less available. As far as water conservation, an area often overlooked is the vegetable garden. Traditionally, we irrigate using overhead sprinklers and/or flood irrigation. However, these methods can be wasteful, and so a way to conserve and still have a healthy garden is to use drip irrigation. It can reduce water use by up to about 50%.

There are two general drip emitter types: point source and inline. Point source emitters are individually placed at the base of a plant to maximize water efficiency by only irrigating individual plants. Inline emitters are spaced evenly along a pipe or hose so there is an emitter every 6 or 12 inches, for example, and are often laid in a grid pattern. Both drip tape (temporary) and drip line (more durable and permanent) are examples of inline emitters.

When using drip, it is hard to know how many inches of water are delivered every hour with emitter flow rates listed in gallons per hour. Vegetable garden irrigation recommendations are usually listed in inches of water per week and needs will vary based on growth stage, soil type, and temperature. Tables 1 and 2 include lists of the time needed to apply a ½ inch of water of both drip tape and drip line capacities, respectively. These tables include rates and spacings of common products that should be easy to find for the home gardener.

Table 1. *Drip Tape Application Rate and Time Needed to Apply 1/2-Inch Water to 100-Foot Row, Assuming 2-Foot Row Spacing*

Tape diameter	Emitter spacing (in.)	Gal./hour/100 ft	Gal./min./100 ft	In./hour	Hours to apply ½ in.
5/8	8	20.0	0.34	0.16	3.15
5/8	12	27.0	0.45	0.22	2.30

Note. Calculations are based on tape diameter and emitter spacing. Rates assume irrigation is run at the manufacturer's recommended PSI.

Table 2. *Drip Line Application Rate and Time Needed to Apply 1/2-Inch Water to 100-Foot Row, Assuming 2-Foot Row Spacing*

Flow emitter rate	Emitter spacing (in.)	Gal./ hour/100 ft	Gal./min./ 100 ft	In./ hour	Minutes to apply ½ in.
0.5	6	100	1.6	0.8	37
0.5	12	50	0.8	0.4	74
0.9	6	180	1.4	1.4	21
0.9	12	90	0.7	0.7	42
1.0	6	200	1.6	1.6	19
1.0	12	100	0.8	0.8	38

Note. Calculations are based on tape diameter and emitter spacing. Rates assume irrigation is run at the manufacturer's recommended PSI.

Point Source Emitter Formula

Application rate = (#of emitters × flow rate of emitter × 1.604) ÷ (area covered by emitters in square feet)

For example, if you have two point source emitters that deliver 1 gallon per hour (gph) to irrigate 1 square foot each, to figure the inches per hour, you would apply the numbers in the formula like this:

(2 emitters × 1 gph × 1.604) ÷ (2 square-feet) = 1.604 inches per hour

Inline Drip Formula

Drip rate = (flow per emitter × 231) ÷ (emitter spacing in inches × lateral spacing in inches)

For example, if your inline emitters are spaced every 12 inches and deliver 0.9 gallons per hour, and the rows are 18 inches apart, you would apply the formula like this:

(0.9 gph × 231) ÷ (12-inch emitter spacing × 18-inch lateral spacing) = 0.96 inches per hour

There are two conversion constants used in the equations above. The constant 1.604 is:

(12 in. / 1 ft) (1 ft^3 / 7.48 gal) = 1.604 (in. ft^2 / gal)

The first equation requires flow in gallons per hour, area (which is plant area) in square feet, and produces a result in inches per hour.

The constant 231 used in the second equation is effectively the same number as 1.604, but since the emitter spacing is in inches, rather than feet, we multiply 1.604 by 144, which equals 231.

(12 in. / 1 ft)^3 (1 ft^3 / 7.48 gal) = 231 (in.^{3} / gal)