



## Resource Conservation District of Santa Cruz County

By Dr. Gerry Spinelli

### How to estimate the application rate of drip and sprinkler systems

Determining how long run your irrigation system can be challenging because typical irrigation recommendations are provided in inches (or feet) of water depth. Basic knowledge of the application rate of a specific irrigation system will allow you to convert these recommendations into daily or weekly hours of irrigation needed.

The application rate is the depth of water applied by an irrigation system over a certain period of time and is typically expressed in inches per hour (in/hr). Note that the application rate is a depth per time (not a volume), so it is independent of the area. In other words, a one acre block has the same application rate as a five acre block on the same ranch.

In drip systems, the variables determining the application rate are the bed width, the number of tapes per bed and the flowrate of the driptape (assuming the average pressure in the driptape is close to the design pressure, usually 8 or 10 psi). The driptape flowrate can be obtained from the label on the tape coil (see Figure 1), it has units of gpm/100ft.

To estimate the application rate in sprinkler systems (aluminum hand-move pipes) you need to know the spacing of laterals, the sprinkler nozzle size and the pressure at which the system is run; this can be measured with a pressure gage with pitot tube.

Estimates of application rates for drip systems are reported in Table 1, and application rates for sprinkler systems in Table 2. From Table 1, one can determine that a drip system for strawberries with 52-inch beds, two driplines per bed and a flowrate of 0.5 gpm/100ft, has an application rate of 0.22 in/hr. Similarly, a sprinkler system for lettuce with 7/64" nozzles and 30 by 33.3 feet spacing, run at 55 psi, has an application rate of 0.27 in/hr.

An application rate of 0.27 in/hr means that if the system is run for one hour, 0.27 inches of water are applied, if it is run for 45 minutes, 0.2 inches ( $0.27 \div 60 \times 45$ ) are applied and so on.

As a reference, on an average year in the Pajaro Valley, a strawberry crop needs one inch of water in one typical week in August and about 28 inches for an entire crop cycle. A grower with an application rate of 0.22 inch/hour will need to irrigate four and a half hours ( $1 \text{ inch} \div 0.22 \text{ in/hr} = 4.5 \text{ hr}$ ) in a week in August and 127 hours ( $28 \text{ in} \div 0.22 \text{ in/hr} = 127 \text{ hr}$ ) for the entire season.

This method only provides an estimate of application rates when direct measurements are not available. For a direct measurement of the application rate, schedule an on-site irrigation evaluation with the RCD of Santa Cruz County at: 831-464-2950, [info@rcdsantacruz.org](mailto:info@rcdsantacruz.org).

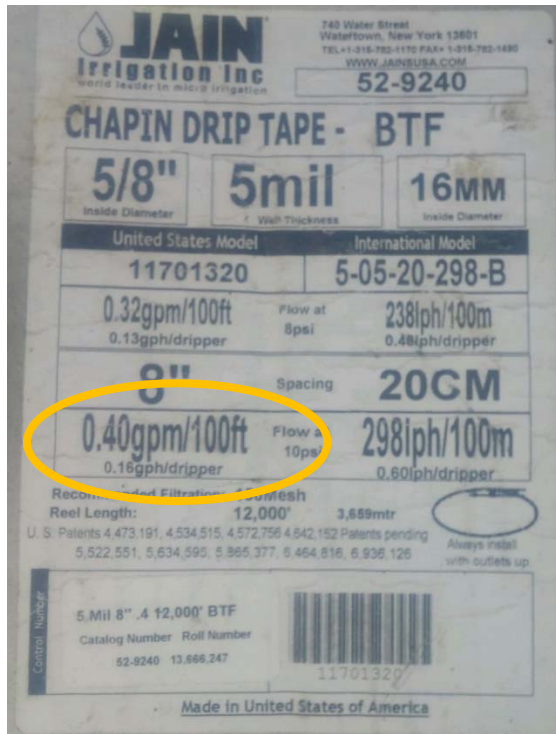


Figure 1: Examples of driptape flowrate from the labels on the rolls.

Table 1. Application rate in in/hr for drip systems for different flowrates and bed widths

Tape Flowrate [gpm/100 ft]	1 Dripline Per Bed	2 Driplines Per Bed	
	Bed Width 48 inch	Bed Width 48 inch	Bed Width 52 inch
0.25	0.06 inch/hour	0.12 inch/hour	0.11 inch/hour
0.3	0.07 inch/hour	0.14 inch/hour	0.13 inch/hour
0.4	0.1 inch/hour	0.19 inch/hour	0.18 inch/hour
0.5	0.12 inch/hour	0.24 inch/hour	0.22 inch/hour
0.63	0.15 inch/hour	0.3 inch/hour	0.28 inch/hour
0.67	0.16 inch/hour	0.32 inch/hour	0.3 inch/hour

Table 2. Application rate in in/hr for hand-move aluminum pipe sprinkler systems with Rainbird 20JH head for various nozzle sizes, spacings and pressures

Nozzle size inch	Pressure psi	Flowrate gpm	Spacing		Spacing		Spacing		Spacing	
			30	by 30	30	by 33.3	30	by 35	30	by 40
3/32	40	1.64	0.18 inch/hour		0.16 inch/hour		0.15 inch/hour		0.13 inch/hour	
	45	1.75	0.19 inch/hour		0.17 inch/hour		0.16 inch/hour		0.14 inch/hour	
	50	1.86	0.2 inch/hour		0.18 inch/hour		0.17 inch/hour		0.15 inch/hour	
	55	1.96	0.21 inch/hour		0.19 inch/hour		0.18 inch/hour		0.16 inch/hour	
	60	2.05	0.22 inch/hour		0.2 inch/hour		0.19 inch/hour		0.16 inch/hour	
7/64	40	2.45	0.26 inch/hour		0.24 inch/hour		0.22 inch/hour		0.2 inch/hour	
	45	2.58	0.28 inch/hour		0.25 inch/hour		0.24 inch/hour		0.21 inch/hour	
	50	2.70	0.29 inch/hour		0.26 inch/hour		0.25 inch/hour		0.22 inch/hour	
	55	2.82	0.3 inch/hour		0.27 inch/hour		0.26 inch/hour		0.23 inch/hour	
	60	2.93	0.31 inch/hour		0.28 inch/hour		0.27 inch/hour		0.23 inch/hour	
1/8	40	3.26	0.35 inch/hour		0.31 inch/hour		0.3 inch/hour		0.26 inch/hour	
	45	3.41	0.36 inch/hour		0.33 inch/hour		0.31 inch/hour		0.27 inch/hour	
	50	3.55	0.38 inch/hour		0.34 inch/hour		0.33 inch/hour		0.28 inch/hour	
	55	3.69	0.39 inch/hour		0.36 inch/hour		0.34 inch/hour		0.3 inch/hour	
	60	3.81	0.41 inch/hour		0.37 inch/hour		0.35 inch/hour		0.31 inch/hour	
9/64	40	4.08	0.44 inch/hour		0.39 inch/hour		0.37 inch/hour		0.33 inch/hour	
	45	4.25	0.45 inch/hour		0.41 inch/hour		0.39 inch/hour		0.34 inch/hour	
	50	4.41	0.47 inch/hour		0.42 inch/hour		0.4 inch/hour		0.35 inch/hour	
	55	4.55	0.49 inch/hour		0.44 inch/hour		0.42 inch/hour		0.37 inch/hour	
	60	4.69	0.5 inch/hour		0.45 inch/hour		0.43 inch/hour		0.38 inch/hour	