



Resource Conservation District of Santa Cruz County

What diameter mainline do I need? Estimate it from the dripline flowrate

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Sizing PVC mainlines for irrigation systems is challenging for designers, since they face the tradeoff between high costs of the pipes (if the diameter is too big) and high pumping costs (if the diameter is too small). A rule of thumb to estimate the correct size of your pipe is keeping the water velocity below 4.5 ft/s. The table below shows the highest flowrate that a PVC pipe of various diameters can carry based on this rule.

This is just an estimate, for a detailed design of an irrigation system, contact an irrigation engineer.

To calculate the flowrate of your irrigation system setup in gpm/acre use the following formula:

Flowrate = $5227.2 \times \# \text{ of lines per bed} \times \text{dripline flowrate} \div \text{bed width in inches}$.

Dripline flowrate is expressed in units of in gpm/100ft and can be found on the label of the tape roll.

For example, for 2 driptapes/bed, 0.67 gpm/100ft dripline flowrate and 52 inch beds, the formula gives:

Diameter	Maximum Flowrate
inch	gpm
1	11
1.5	25
2	44
3	99
4	176
5	275
6	397
8	705
10	1102
12	1586

Flowrate = $5227.2 \times 2 \times 0.67 \div 52 = 134 \text{ gpm/acre}$

Another example, for 48 inch beds with one driptape and a 0.5 gpm/100ft dripline flowrate, the flowrate per acre is:

Flowrate = $5227.2 \times 1 \times 0.5 \div 48 = 54 \text{ gpm/acre}$.

Usually your irrigation system flowrate will be between 50 and 150 gpm/acre.

To calculate the flowrate that a mainline needs to carry, multiply the gpm/acre calculated above by the area of the blocks served by the mainline. For example if the mainline serves 3 blocks of 1.5 acres each (total 4.5 acres), the mainline in the first example needs to carry $4.5 \times 134 = 607.5 \text{ gpm}$. According to the table, the mainline must be at least 8 inch in diameter. In the second example, if the mainline serves 4.5 acres, it needs to carry $4.5 \times 54 = 243 \text{ gpm}$ so a 5 inch mainline would be sufficient.

For more assistance, contact the RCD of Santa Cruz County at (831) 464-2950, info@rcdsantacruz.org