

## HOW MUCH WATER IS NEEDED FOR TRICKLE IRRIGATION?

By John Nye

**Rule of thumb: Be able to deliver at least one acre inch of water per week to the root system of the plants.**

**One Acre Inch of Water is approx 27,000 Gallons.**

For orchards with one or two emitters per tree that have been grower installed into polyethylene trickle tubing, the formula for calculating the number of hours of irrigation per week that is necessary to apply an acre inch of water is as follows:

$$\text{Irrigation Hours Needed to Apply One Acre Inch of Water per Week} = \frac{27,000}{\text{Number of trees/ Acre} \times \text{Number of emitter/ tree} \times \text{GPH rate of emitters}}$$

*Example: If an orchard is planted with trees on a 20 x 16 spacing, there would be 43,560 / (20 x 16) = 136 trees/ acre. Let's assume that 2 emitters per tree were used with each emitter delivering 2gph of water.*

*Now solving the formula would be:*

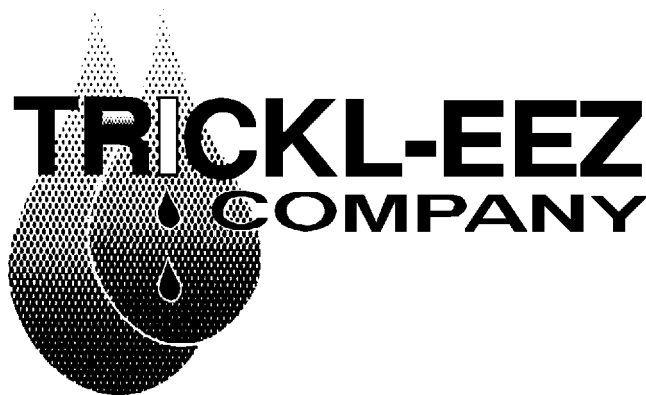
$$\text{Irrigation Hours Needed to Apply One Acre Inch of Water per Week} = \frac{27,000}{136 \times 2 \times 2} = 49.63 \text{ or } 50 \text{ hours per week}$$

For orchards where tubing with "built-in" emitters is used the formula for calculating the number of hours per week needed to deliver one acre inch of water is as follows:

$$\text{Irrigation Hours Needed to Apply One Acre Inch of Water per Week} = \frac{\text{Distance (ft) between rows} \times \text{distance (ft) between emitters} \times 27,000}{43,560 \times \text{GPH Rate of Emitters}}$$

*Example: If tubing used in an orchard planted with 15 feet between rows with emitters spaced every 3 feet with a .61 GPH emission rate, solving the formula would be:*

$$\text{Irrigation Hours Needed to Apply One Acre Inch of Water per Week} = \frac{15 \times 3 \times 27,000}{43,560 \times .61} = 45.73 \text{ or } 46 \text{ hours per week.}$$



## HOW MUCH WATER IS NEEDED FOR TRICKLE IRRIGATION? (Continued)

**Rule of thumb: Be able to deliver at least one acre inch of water per week to the root system of the plants.**

**One Acre Inch of Water is approx 27,000 Gallons.**

For vegetable fields or smaller fruits where a tape product is used, the formula for calculating the number of hours of irrigation per week that is necessary to apply an acre inch of water is as follows:

$$\text{Irrigation Hours Needed to Apply One Acre Inch of Water per Week} = \frac{27,000}{43,560} \times \frac{\text{feet between rows}}{\text{flow rate of tape in gpm per 100 feet}} \times \frac{100}{60}$$

Or use this simplified alternate formula:

$$\text{Irrigation Hours Needed to Apply One Acre Inch of Water per Week} = \frac{1.03 \times \text{feet between rows}}{\text{flow rate of tape in gpm per 100 feet}}$$

*Example: If a field of vegetables was planted with a 5 foot row width and the flow rate of the tape was .38 gpm per 100 feet, solving the formula would be:*

$$\text{Irrigation Hours Needed to Apply One Acre Inch of Water per Week} = \frac{27,000}{43,560} \times \frac{5}{.38} \times \frac{100}{60} = 13.59 \text{ or } 14 \text{ hours per week}$$

Or use the simplified alternate formula:

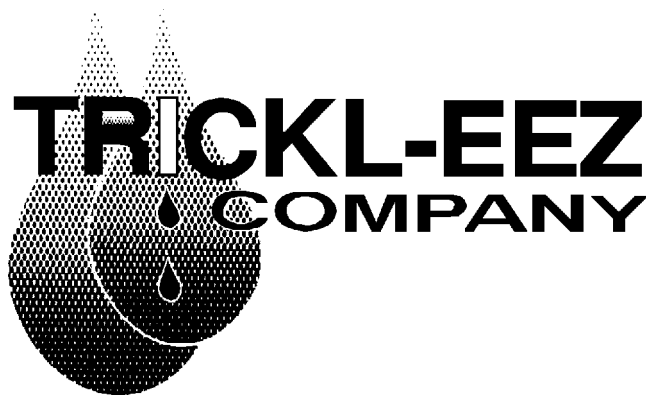
$$\text{Irrigation Hours Needed to Apply One Acre Inch of Water per Week} = \frac{1.03 \times 5}{.38} = 13.55 \text{ or } 14 \text{ hours per week}$$

If the flow rate of each emitter is known and the spacing in inches between emitters, another simple formula can be used:

$$\text{Irrigation Hours Needed to Apply One Acre Inch of Water per Week} = \frac{.052 \times \text{feet between rows} \times \text{emitter spacing in inches}}{\text{flow rate of each emitter in gallons per hour}}$$

*Example: If a field of vegetables was planted with a 5 foot row spacing and a tape was used that has an emitter every 16 inches with a flow rate per emitter of .23 GPH, solving the formula would be:*

$$\text{Irrigation Hours Needed to Apply One Acre Inch of Water per Week} = \frac{.052 \times 5 \times 16}{.23} = 18.09 \text{ or } 18 \text{ hours per week}$$



## Notes

Where vegetables are planted in lands of several rows divided by drive lanes, the water needed to irrigate an acre of ground would be less because less linear feet of tape would be operating. However, the time needed to apply an acre inch of irrigation water would be the same as though the rows were not interrupted by drive lanes.

Many vegetables require 1½ to 2 inches of water per week. If rainfall does not occur and more water is needed than one inch per week, increasing the hours of irrigation by 1½ times would apply 1½ inches per week. Doubling the irrigation time calculated would apply 2 inches per acre per week.