

TRICKLE TUBE FLOW REGULATION FOR CUT FLOWERS

Joe J. Hanan¹

Information on figuring leader tube length and diameters for trickle irrigation systems is given. This helps to avoid water delivery problems where main line pressure is likely to vary.

Trickle irrigation systems, although expensive, have a number of advantages: such as keeping water off of foliage, avoiding soil disturbance and crusting, and reducing water loss from evaporation. However, the water supply must be clean with few magnesium or calcium carbonate salts — otherwise trickle systems will soon plug. At CSU, we have additional problems of short bench runs and widely varying main line pressures so that it is often difficult to adjust hand valves to provide reliable flow rates. We have seen, with newer systems, fairly cheap pressure regulators, which in combination with the proper sized leader tube and length, allows the grower insurance that the far end of the bench will get water without blowing the system apart.

Examples of pressure regulators are provided in Fig. 1, and we have recently begun installation of these on most of our cut flower benches at the research range. Thus, we do not have to worry about untrained personnel running a bench system wide open or not enough. The size and length of the leader tube determines water delivery for a specific pressure drop. Detailed tables are usually available from manufacturers, and the curves in Fig. 3 were generated from such tables. An example is provided for a 150-foot bench, using a 0.210-inch, inside diameter leader tube. For a system using the same gallonage (1.5 per 100 ft), a 0.128-inch ID tube might be selected for a 50-foot bench since only 0.75 gpm would be required per tube.

¹Professor. Thanks to R. J. Schwartz and Dick Chapin.

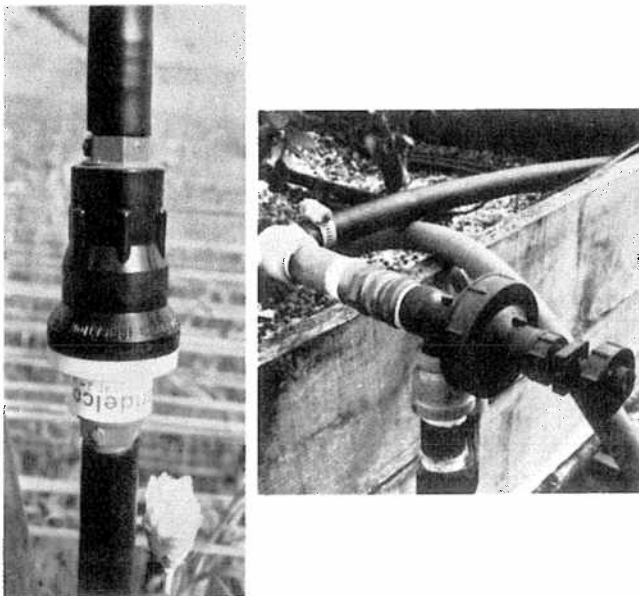


Fig. 1: Two types of pressure regulators for trickle systems. The left, in-line regulator is fixed at 20 psi. The right is variable between 0 and 20 psi. Downstream pressure in the latter can be measured with a tire gauge, and water turned off with the knob at right.

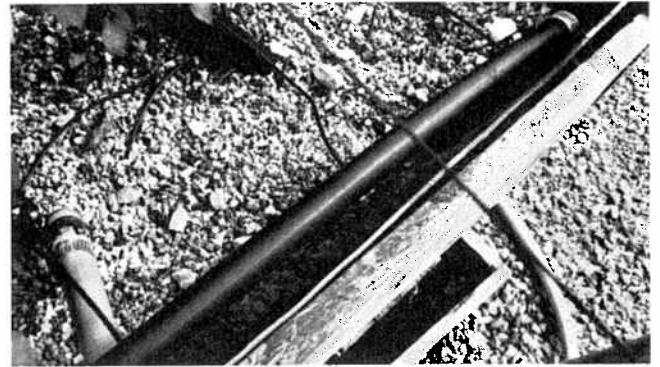


Fig. 2: Header with leader tubes to double-wall trickle tube. The amount of water delivered to each trickle tube is determined by: 1) the pressure regulator shown in Fig. 1, 2) the inside diameter of the leader tube, and 3) its length. By referring to Fig. 3, the grower can determine the size and length of leader tube to deliver a known amount of water to a trickle tube for a given pressure.

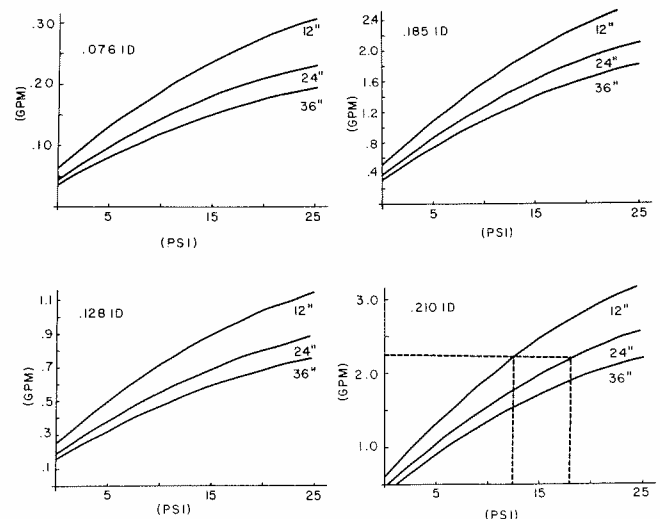


Fig. 3: Effect of water pressure (psi) on water delivery (gpm) by various sizes and lengths of leader tube. For example, assume a 150-foot bench, using 1.5 gallons per 100 feet of trickle tube such as the Chapin 4-inch or 1.5-inch twin wall. A tube 150 feet long would require 2.25 gpm. Enter on the vertical axis at 2.25 gpm and proceed right, horizontally as shown with the .210-inch size leader tube. Where it intersects with the 12-inch long line, the pressure should be about 12.5 psi. If the tube is 24 inches long, the pressure should be nearly 18 psi. If pressure on the regulator is fixed at 20 psi, some inter-portion of tube to be required to arrive at the proper length of tube to achieve a 2.25 gpm rate. These curves were generated from more detailed tables available from Chapin Watermatics, Watertown, NY.