AE259

UNIVERSITY OF FLORIDA
IFAS EXTENSION

Scheduling Tips For Drip Irrigation of Vegetables[1]

Dorota Z. Haman and Allen G. Smajstrla[2]

Florida's sandy soils are well known for their inability to hold water. Very little water is stored in the root zone, and excessive water applications result in the loss of mobile nutrients such as nitrogen, due to deep percolation. These soil properties require precise irrigation scheduling to avoid unnecessary loss of water and nutrients while providing a sufficient amount of water for optimum plant growth and production.

The available water in typical Florida sandy soils is approximately 6%. For shallow-rooted vegetable plants (1-2 ft) and 24 inches wetted along the drip line, the 6% moisture content translates to the number of gallons presented in the second column of Table 1. A general rule for vegetable irrigation, is to provide irrigation before 50% of this water is used in order to avoid plant stress. Drip irrigation offers the possibility of frequent water application. Frequent, low-volume application allows the soil moisture content in the root zone to be maintained near the optimal levels. If possible, 33% depletion should be used for scheduling drip irrigation. This requires frequent (once or more per day), short water applications.

The amounts of water to be applied and the times to run the irrigation system at 33% and 50% depletion levels are shown in Table 1. These calculations were done for a drip tape discharging 0.5 gallons per minute (gpm) per 100 feet of row length (typical tape used in vegetable production). For example, to irrigate a 1-ft root depth at a 33% depletion level requires 30 gal/100 ft per application, and the irrigation duration is 1 hour.

If the tape discharge rate is not 0.5 gpm/100 ft, the irrigation duration can be calculated as follows:

- Multiply the tape discharge rate by 2.
- Divide the duration of irrigation time in Table 1 by this value.

For example, if a drip tape with a discharge rate of 0.3 gpm/100 ft is used, for previous example, then divide the 1 hour irrigation duration read from Table 1 by 0.6 (2 x 0.3). The result is 1.67 hours or 1 hour and 40 minutes.

Remember, frequent, short irrigations (once a day or more) are always better than infrequent and long irrigation cycles.

1. This document is AE259, one of a series of the Agricultural and Biological Engineering Department, Florida Cooperative Extension Service, Institute of Food and Agricultural Sciences, University of Florida. Original publication date February, 1997. Reviewed July, 2002. Visit the EDIS Web Site at http://edis.ifas.ufl.edu.

2. Dorota Z. Haman, associate professor and Allen G. Smajstrla, professor, Agricultural and Biological Engineering Department; Cooperative Extension Service, Institute of Food and Agricultural Sciences, University of Florida, Gainesville FL 32611.

SOIL MOISTURE MONITORING

Tensiometers should be used to monitor soil moisture and avoid water stress to the plants. They are relatively inexpensive and have been proven to be very reliable in Florida's sandy soils. However, they must be serviced regularly and placed in the active root zone of the plants to function properly. For most vegetables, it is recommended that irrigations be scheduled when the tensiometer reading reaches 10 cbars for a tensiometer placed at the 6-inch depth.

For typical Florida sandy soils, this corresponds to 50% water depletion. A reading of 7-8 cbars is approximately a 33% depletion.

A list of Florida Cooperative Extension publications which discuss various aspects of irrigation scheduling in more detail is in the References section.

REFERENCES

Clark, G.A., G.D. Stanley and A.G. Smajstrla. 1988. Micro-irrigation in mulched bed production systems: Irrigation depths. Cooperative Extension Service, Institute of Food and Agricultural Sciences, University of Florida, Gainesville, FL. Bulletin 245. 19 pp.

Smajstrla, A.G., B.J. Boman, G.A. Clark, D.Z. Haman, F.T. Izuno and F.S. Zazueta. 1988. Basic irrigation scheduling. Cooperative Extension Service, Institute of Food and Agricultural Sciences, University of Florida, Gainesville, FL. Bulletin 249. 11 pp.

Smajstrla A.G., D.S. Harrison and F.X. Duran. 1983. Tensiomerers for Soil Moisture Measurement and Irrigation Scheduling. Cooperative Extension Service, Institute of Food and Agricultural Sciences, University of Florida, Gainesville, FL. Circular 487. 15 pp.

Table 1.

Table 1. Guide to irrigation duration for Florida sandy soil (tape discharge of 0.5 gpm/100 ft assumed).

Depth of the root zone*	Available water per 100 ft of row length	**50%** of available water	Maximum duration of irrigation	**33%** of available water	Maximum duration of irrigation
1.0 ft	90 gal	45 gal	1 hr 30 min	30 gal	1 hr
1.5 ft	145 gal	73 gal	2 hr 45 min	45 gal	1hr 30 min
2.0 ft	180 gal	90 gal	3 hr	60 gal	2 hr

* Depth of the root zone is the zone near the soil surface where most of the plant roots are located, not the depth to the deepest roots found. It should be determined by digging. No more than the upper 2 ft of the root zone should be irrigated. It is assumed that deeper roots will be watered by rain.