Introduction

Drip irrigation offers many advantages as a method of water application. Water is applied to the root zone of the plant at discrete locations through emitters either embedded into, embossed onto, or attached directly to plastic tubing. This water application method, compared to overhead application systems, reduces the potential for foliar diseases and increases water application efficiency. In addition, liquid fertilizer may be injected and applied as needed to provide prescription water and fertilizer applications in response to plant needs, even under plastic mulch. Drip irrigation is particularly beneficial on sandy soils, which have low water-holding capacities and low cation exchange capacities. However, without proper system management, drip irrigation can waste water and nutrients, or can reduce yields.

Proper use of drip irrigation requires that system designers and managers know the soil hydraulic characteristics, plant growth and water use characteristics, and evaporative demands. Irrigation schedules must be developed considering these factors and must conform to existing irrigation system and cultural constraints. Because excessive water applications leach plant nutrients out of the crop root zone, the water management program must be coordinated with the fertilizer management program. This bulletin discusses those aspects of drip irrigation scheduling specifically related to the soil and drip tube characteristics that affect water placement, distribution, and availablility to the plant.

Soil Properties

Soil properties play an important role in irrigation scheduling and plant water management. As much as 30% to 40% of the soil volume is pore space, which is filled with water at saturation. However, because a soil has a wide range of pore sizes, and water drains quickly from large pores, following saturation drainage occurs to the "field capacity" (FC) level of the soil. Plant extraction of water from the soil occurs until the remaining water is held so tightly that it is unavailable to the plant, and wilting point (WP) of the soil occurs.

The "available water-holding capacity" (AWHC) of the soil is defined as the difference between WP and FC (see Fig. 1). Soil water content for a typical Florida sandy soil may be 34%, 14%, and 8% by volume for the saturation, field capacity, and wilting point levels, respectively. The AWHC of this soil would be (14% - 8% = 6%) 6% by volume. Available water-holding capacity in typical Florida soils ranges from 3% to 8% in sands to

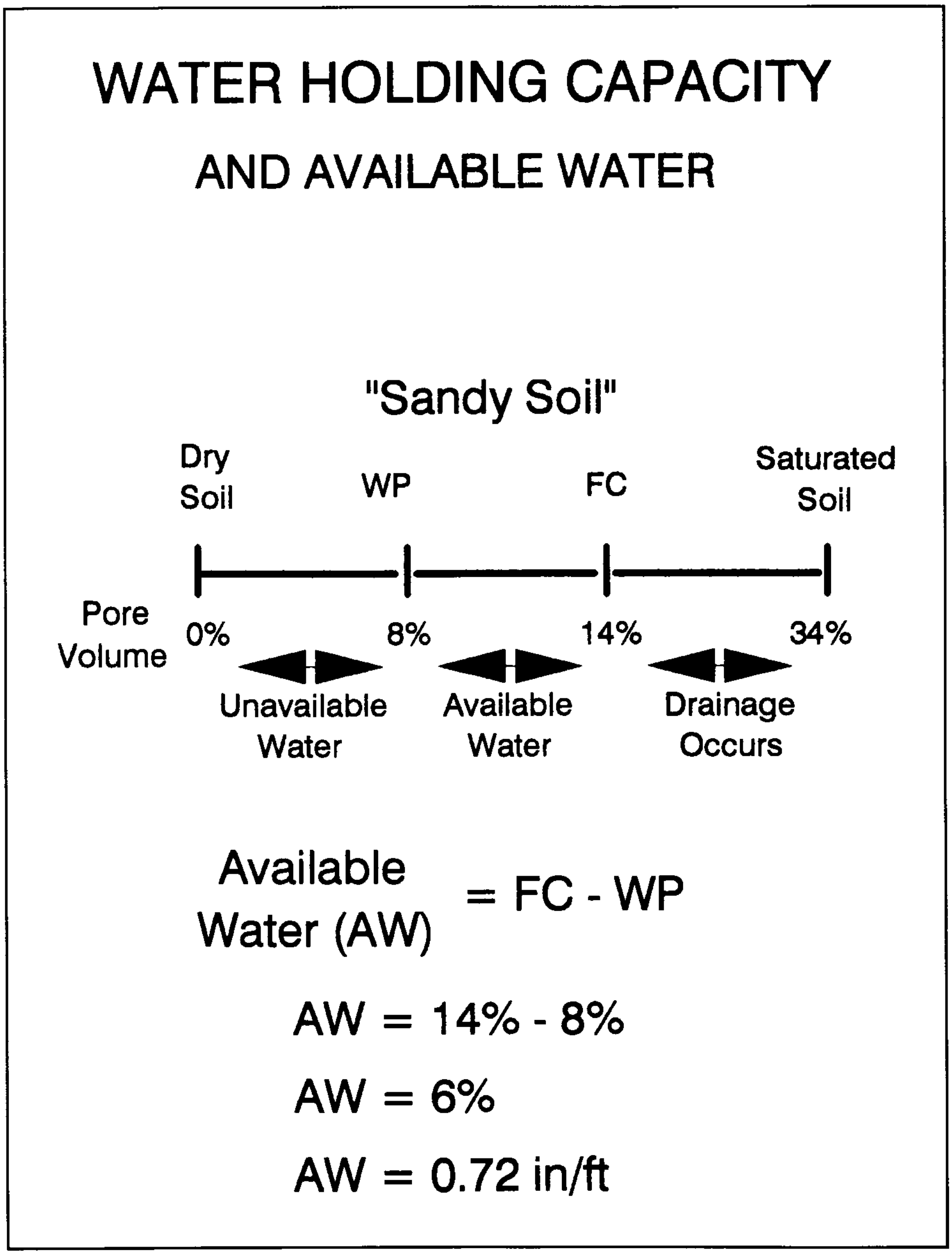

Figure 1. Water-holding capacity and available water example for a typical Florida sandy soil.