with the rapid population increases and the new industrial expansions, the potential user conflict has increased, especially during periods of low rainfall. Thus, detailed information on measurement or estimation of evapotranspiration (*ET*) is required for water resource managers and growers to make realistic decisions concerning their water management systems.

The main objectives of this bulletin are: (1) to present principles of the climate dependence of potential evapotranspiration, (2) to discuss the similarities of potential *ET* for various climatic regions in Florida, (3) to evaluate several methods of estimating actual *ET*, (4) to discuss the modifying influences of plant canopy and physiological stage of growth on *ET* of agricultural crops, (5) to illustrate the value of irrigation to prevent crop yield reduction, and (6) to discuss the interrelationships of *ET*, soil water storage, effective rainfall, and irrigation requirements within the framework of irrigation management systems.

2.0 EVAPOTRANSPIRATION CONCEPTS

2.1 CLIMATE DEPENDENCE

2.1.1 Evapotranspiration and the Energy Budget

Evapotranspiration is the combination of two processes: evaporation and transpiration. Evaporation is the direct vaporization of water from a free water surface, such as a lake or any wet or moist surface. Transpiration is the flow of water vapor from the interior of the plant to the atmosphere.

Transpiration involves transport of water in the liquid state from the soil, through the plant, to the leaves. It is a specialized case of evaporation, because liquid water is evaporated inside the leaves, and the resulting water vapor diffuses mostly through small pores, called stomata, into the atmosphere. When fully open, these stomata result in a leaf surface that is about 1% pore space. Stomata of most higher green terrestrial plants open during the day and close at night. If the soil is too dry, plants will be stressed and stomata will partially close during the day to keep the plant from losing water faster than it can be taken up by the root system.

Evaporation includes the change in state of water from liquid to vapor and a flow of water vapor from the evaporating surface to the bulk atmosphere. Early attempts to calculate evaporation rates were based on vapor pressure deficits of air (the difference between saturation vapor pressure and actual vapor pressure, or dryness of the air) and windspeed. However, it is difficult to calculate evaporation or *ET* using only these factors because of the importance of the energy source (solar radiation), temperature, and surface conditions. One way to eliminate the complications has been to treat evaporation as one component of the energy balance at the earth's surface.