Evapotranspiration

The term evapotranspiration is simply the sum of evaporation and transpiration. It is the water lost to the atmosphere from the ground surface by evaporation and from the plant by transpiration.

Evaporation from the soil/growing media is the process of converting water into water vapour and moving it away from that surface. During the evaporation process, water vapour is lost from the soil/growing media and the surrounding air becomes saturated and the process potentially slows down unless the wet air is transferred to the atmosphere away from the evaporating surface by wind forces and the process can continue. This evaporation process is dependent on a number of climatic parameters (solar radiation, air temperature, air humidity and wind speed), the amount of shading (from the crop or a structure) and the available moisture levels in the soil/growing media.

Transpiration is essentially the evaporation of water from a plant, mainly from the leaves. Plant roots draw water up into the plant where this water is transpired into the atmosphere. Almost all water taken up by a plant is transpired with only a small amount being used within the plant. The rate of transpiration changes in relation to weather conditions (temperature, humidity, sunlight hours, sunlight intensity, wind and precipitation) and ground conditions (soil/growing media type and moisture levels). Transpiration rates also vary from plant to plant with those from arid regions transpiring far less than those from rainforest areas.

Transpiration increases

- as the temperature rises and the plant stomata open and release water vapour to the atmosphere.
- as the relative humidity around a plant decreases.
- with greater movement of air around the plant.
- with greater soil/growing media moisture levels.

The water loss balance between evaporation and transpiration changes over time. At the time of planting a small cutting or seedling the evapotranspiration will come almost completely from the evaporation of the soil/growing media and at maturity with a full canopy the evapotranspiration will derive mainly from transpiration of the plant eg. as a crop develops and the canopy increases, the amount of solar radiation reaching the soil/growing media surface reduces, the canopy buffers the wind, which in turn increases the relative humidity and therefore reduces evaporation. With the developing canopy the plant surface area becomes greater with a corresponding increase in plant transpiration.

Evapotranspiration (ET) is commonly computed from weather data using the 'Penman-Monteith' equation (the agreed standard method) using well watered and well maintained turf grass as the reference crop. This is sometimes known as the reference evapotranspiration (ETo). Particular crop or plant coefficients can be used in this calculation to provide more specific evapotranspiration (ET) information. Disappointingly the nursery industry does not have a range of crop/plant factors or coefficients at present that could be included in the calculation.

The evapotranspiration (ET) data is expressed in mm and can be a useful aid in determining the irrigation scheduling requirements for nursery crops or nursery blocks/zones of plants. The quantity of water that is needed to replace the evapotranspiration (ET) loss is defined as the crop water requirement. Traditional irrigation practices involve the scheduling of irrigation based on a seasonal time program but irrigation can be scheduled incorporating the evapotranspiration (ET) data from the previous 24 hours providing a more efficient application of irrigation. This information can be used to either schedule the irrigation directly or used to adjust the irrigation by a percentage of the standard application.

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