Water Availability

As water is applied to the soil surface, either by rain events or irrigation, it must either enter into the soil, runoff the surface, or evaporate into the atmosphere.

Water Entering the Rootzone
Infiltration is the downward entry of water moving into the soil. Infiltration depends on the water application rate. If water is being applied faster than it can infiltrate or the soil is saturated, water will stand on the surface or runoff.

Infiltration also depends on the makeup of the rootzone. Water infiltration rates increase as soil texture becomes coarser. Infiltration rates decrease in finer textured soils. Because of the higher amount of macropores, coarse textured soils generally lose more water to drainage and evapotranspiration in comparison with finer textured soils.

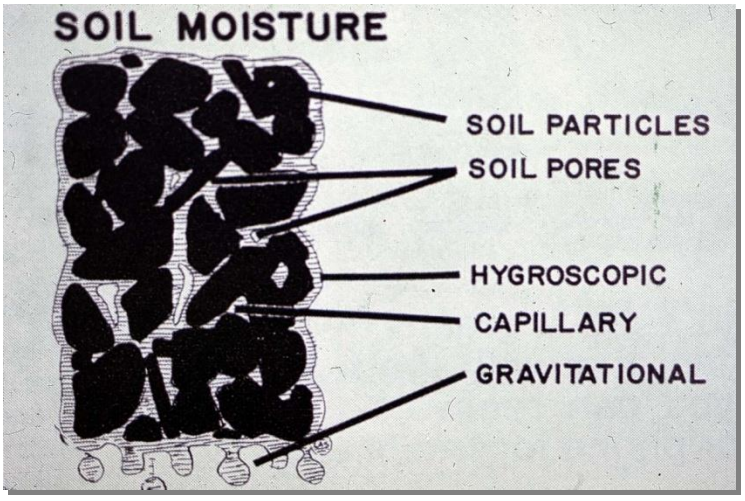
Infiltration is important because if water cannot enter the soil, plant roots will not have access to water. Water entry can be impeded by a dense thatch layer, surface crusts, or compaction. Infiltration rates can decrease over time due to organic matter additions from plants.

Water in the Rootzone
Percolation is the downward movement of water within the soil profile. Percolation is affected by porosity. Fine textured soils with high amounts of micropores have a low percolation rate. Coarse textured soils with high amounts of macropores have a high percolation rate.

When the amount of water entering the soil becomes greater than the water holding capacity, loss by percolation will occur. In a saturated soil, the infiltration rate and percolation rate are equal.

Water Availability
Water in the rootzone is classified as adhesive, cohesive or gravitational.

- Adhesive/Hygroscopic water is not available to plants because it is held tightly to soil particles.
- Cohesive/Capillary water is available to the plant because it is bound to other water molecules. Silt, fine sand and organic matter hold the most cohesive water.



- Gravitational water is not available to plants because it moves through the rootzone too quickly. Gravitational water aids in groundwater recharge.

Runoff

Runoff occurs aboveground when a rootzone is saturated or when precipitation rate exceeds infiltration rate. Runoff can also occur on soils that are overly compacted, have a dense thatch layer, or a surface crust.

Evapotranspiration

Evaporation is water lost to the atmosphere from the soil, plant leaves or water sources. Evaporation increases with temperature, wind, and solar radiation. Depending on weather conditions, irrigation should be adjusted accordingly. Daytime irrigation can require 30 percent more water than nighttime irrigation.

Transpiration is the movement of water vapor through the plant. As plant roots take up water and nutrients into the stems and leaves, some of the water is returned to the air by transpiration. Transpiration is a necessary process to help cool plants during hot weather conditions. Temperature, humidity, sunlight availability and intensity, precipitation, soil type and saturation, wind and land slope all affect transpiration rates. On hot, dry, sunny days, plants lose more water compared to a cloudy, cool, humid day.

Evapotranspiration is a combination of evaporation and transpiration. Evapotranspiration is the loss of water from the soil by evaporation and through the plant growing on the soil by transpiration.