The Science of Irrigation: What is ET?
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This summer, MWDOC is featuring a new series of articles in *eCurrents* on "The Science of Irrigation." Each article will strive to better educate and inform our readers about the principles and technologies behind watering their lawn and landscapes. There is more to establishing and maintain a lush, healthy landscape than simply turning-on the sprinklers and letting them run.

A little history: the common lawn sprinkler dates back to the 1870s. By the 1930s, residential irrigation was frequently advertised in magazines. Homeowners were promised savings in time, money, and an increased appearance in their lawn during times of drought with the installation of a permanent in-ground irrigation system. Now almost all newly constructed homes include an in-ground irrigation system with an automatic sprinkler timer.

How much water is used for irrigation? According to the Environmental Protection Agency, the national volume of water used to supplement lawns and landscapes is more than 7 billion gallons per day – enough to fill 280,000 residential swimming pools.

So, why do we irrigate? Plants need water. Irrigation is used to supply plants with water when there is either not enough rainfall, or the rainfall doesn't occur at the right time. The goal of efficient irrigation is to apply only that water lost through evapotranspiration that is not already replaced by rainfall.

Think back to your elementary school science class. Your teacher stood before you and drew the water cycle on the board. It was explained that water evaporates and condenses into clouds; it bursts out in rainfall; it is used by plants or creates runoff into a pond next to the little house on a hill; then it evaporates again and we have a simple cycle. If only everything needed no more than a third grade explanation.

This brings us to the first "grown up" concept in the science of irrigation, E*VAPOTRANSPIRATION*, also referred to as ET. Evapotranspiration is the amount of water lost by plants through evaporation or transpiration. Since it is very difficult to actually separate evaporation and transpiration mathematically, these two terms are combined.

Evapotranspiration rates are based on a number of weather factors including wind, humidity, temperature, and solar radiation. All of these characteristics of weather vary throughout the year and from season to season, as do the water requirements of plants. Of course, every plant uses water differently, so each plant has a specific value, called a "crop coefficient," that represents the amount of water the plant might need relative to its seasonal growing stage. A plant's specific evapo-transpiration rate will either be increased or decreased based on it crop coefficient.

With plant-specific evapotranspiration rates changing from week to week, month to month, and season to season, it becomes clear why your irrigation schedule needs to change as well. The amount of water that needs to be replaced in a plant is not static.

Is all this discussion of weather and adjusting your irrigation system leaving your head in the clouds? Well, have no fear, because the invention of the "Smart Timer" has made watering our plants and grass much easier and less confusing. The most common type of "Smart Timer" is the weather-based irrigation controller. These devices use an estimation of ET to schedule irrigation and are typically programmed with site- and landscape-specific conditions to make them more efficient than time-based systems alone (i.e. the standard irrigation, automatic, "set-it-and-forget-it" time clock).

Each Smart Timer works differently depending on the manufacturer and technology used, but typically can be programmed with site-specific conditions such as soil type, plant type, sprinkler type, sun and shade, etc. The controllers are designed to either replace the typical timer or act as an add-on device to the timer.

There are two basic types of Smart Timers, those with on-site weather sensors or those that receive weather information from a remote weather source. Depending on how the controller obtains its weather information, signal fees could be involved, but there are many controllers for which there are none. Additionally, Smart Timers can have accessories to make them more accurate (such as a rain shutoff sensor), while others come as a complete package and need no additions. The EPA is even in the process of developing a certification for Smart Timers as part of their WaterSense program.

And it gets better. Many local and regional water agencies offer customer rebates for the purchase and installation of Smart Timers and other related landscape irrigation products. Check out www.mwdoc.com or www.SoCalWaterSmart.com to find out about customer rebate options in Orange County and greater southern California.

So, lesson one in the Science of Irrigation series is complete. In the next installment, we will discuss water efficiency versus uniformity – two irrigation terms that are often confused. Your homework assignment is to hold on to your empty food cans for the field exercise in August.