Landscape Irrigation Management
Part 1: Water in the Landscape

Many in the Southeast view irrigation as a “quick fix” for problems encountered during a hot, dry summer. It is a simple way to get some water to plants that are wilting and keep them alive until rainfall returns. Others see irrigation as a method to provide all of the water a plant may need on a daily basis. Neither of these views will provide a good habitat for our landscape plants.

*Irrigation is quite simply a balancing act. We are attempting to maintain a given soil moisture content for optimum plant growth.*

When too much water is applied to the landscape, the excess water saturates the root zone and replaces oxygen in the rooting area. Plant roots require oxygen to grow properly, so the anaerobic (without oxygen) conditions in a saturated or flooded landscape do not provide the ideal growing medium for a plant. Plants that are found in a flooded or saturated area are often referred to as “drowned,” which is an apt expression.

When too little water is applied to the landscape, plants begin to dry and wither. Every plant transpires (or emits) an amount of water through the stomata (small openings that vary in size with the climate conditions) in the leaves as a part of the plant’s water use and transport / production processes. When a plant finds itself in a drought condition, it usually begins to hoard its water supply by partially closing the stomata. This restricts water flow through the plant and results in slower transport processes as well as wilting. If we allow the plant to be “drought-stressed” in this manner for too long, the plant will be weakened and may even die.

Irrigation is one method to replace water in the soil used by the plants. As previously mentioned, this is a balancing act. We must apply enough water to maintain a plant’s growth, but not so much that we saturate the soil and drown the plant. We must also consider other water additions to and subtractions from the landscape.

*Figure 1. The irrigation balancing act.*

**Water Additions to the Landscape**

**Rainfall:** Rainfall is an obvious contributor of water to the landscape. Nice, gentle showers provide a great deal of water over a period of time, most of which may stay in the landscape. Intense thunderstorms, however, often provide water more quickly than the soil can absorb it. In this case, excess water will actually “run off” (explained later in the text) and leave the landscape, so we may not receive the full benefit of all the water that fell in our rain gauge.
Snow, Sleet & Hail: Each of these forms of precipitation also contributes water to the landscape, albeit during times of the year when our plants may not require very much. “Wet” snow that falls when the temperature is near freezing may contribute up to 1 inch of water for every 6 inches of snowfall, while “dry” snow that falls during much colder weather may contribute up to 1 inch of water for every 12 inches of snowfall. Sleet and hail will also contribute water (although hail will hopefully not fall in a large enough quantity to provide an appreciable amount of water).

Irrigation: This is the man-made method of applying water to the landscape. Some concerns that apply to rainfall also apply to irrigation – if water is applied too quickly, some of it may “run off” and provide no benefit to the landscape.

“Run-On”: Assume that your neighbor’s yard is a few feet higher in elevation than your yard. If a hard rainfall event occurs, some of the water may “run off” from that yard and subsequently “run on” to your yard. If the water stays in your yard it will contribute to the soil moisture in your landscape. This “run-on” may be beneficial in a dry year, but it may also be a continual problem in a wet year if it saturates your landscape soil regularly or creates a wet spot. If this is the case some form of drainage (drain tile, etc.) or runoff water diversion (terrace, etc.) may be necessary.

Water Subtractions from the Landscape
Evaporation: Everyone is familiar with the evaporation of water from puddles, water glasses, ponds and swimming pools. Soil moisture may also be lost from a bare soil surface due to evaporation. Only the top inch or so of soil may be subject to this evaporation, but in a drought situation, every drop counts. Mulches help reduce this soil evaporation loss.

Transpiration: This is a large word for “plant water use.” The water taken up by a plant is largely “transpired” as water vapor through the stomata in the leaves, then “evaporated” into the atmosphere. (The term “evapotranspiration,” also called “ET” in irrigation publications, refers to plant transpiration plus soil evaporation.)

Runoff: Soil can accept water at a certain speed or rate, called the infiltration rate. This rate of water movement into the soil varies with soil type (and other factors). When water is applied to the landscape faster than the soil can accept it, the excess water “runs off” across the landscape, giving us the term “runoff.”

Water that “runs off” has quite obviously left your landscape and will not be there when plants need it. If runoff occurs during a thunderstorm, we assume some portion of the rainfall received will benefit our landscape but not the full amount found in our rain gauge. Quickly-moving runoff water can also cause soil erosion, creating rills (small eroded channels) and small gullies in the landscape.

The same principle applies to irrigation – any water that runs off is leaving your landscape and not providing moisture for plants. If you see water running off during irrigation, stop the irrigation system, allow the water to soak in for an hour or so, and then resume irrigating. If the runoff is due to a steep slope or heavy soils (clays, etc.) you may need to change your irrigation schedule to water for a shorter amount of time twice that day rather than a single long irrigation set. This will help conserve water and make sure your landscape will receive all of the water purchased or pumped.

Driveways and sidewalks can also contribute to runoff losses if sprinklers are not adjusted correctly. Any water applied to a concrete or asphalt surface will immediately run off to the nearest ditch or culvert. Water applied to these areas can also create liability problems for the homeowner, especially if an irrigation system turns on unexpectedly while pedestrians are using the sidewalk. Make sure all sprinklers and spray heads are adjusted correctly so that the water is applied to the landscape, not the pavement.

Leaching: Assume that your yard is completely level, the soil is somewhat coarse or sandy, and no runoff occurs during irrigation. If you apply more water than the soil can hold see HGIC 1805, Landscape Irrigation Management Part 6: Soil Type & Irrigation Frequency, the extra water has to go somewhere. In this case it moves downward through the soil profile. When the extra water moves past the root zone of the landscape plants, it has in effect “leached” out of the root zone. The
water is still in the soil, but it is too deep for the plants to retrieve it. This water has left your landscape just as effectively as if it had run off over the top of the ground.

Excess water leaching past the root zone has another detrimental aspect. The leaching water may move water-soluble compounds in the soil (such as fertilizers and pesticides) down with it. This removes these compounds from the root zone area where they are needed and may eventually transport them to the groundwater. A homeowner will lose fertilizer, pesticide or herbicide, and water if leaching occurs and may also impact the groundwater in that area.

**Summary**

In order to provide the best growing environment for our landscape plants, we need to first understand where the water comes from - and how the water may leave our landscape. This simple knowledge provides a basis to help us understand the reasons for various irrigation practices used today.

Adapted from the 2007 *South Carolina Master Gardener Training Manual.*

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