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Drip Irrigation- Low Flow is the Way to Go
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Providing water for large landscapes, or windbreak plantings can be labor intensive and time consuming, and the cost of water used adds up quickly. In these situations, drip irrigation is the most efficient watering method to use- 90% efficient compared to 50-70% efficient for sprinkler irrigation- proving that low flow is the way to go. Hardly any water is wasted through wind, evaporation, run-off or overspray.

Additional benefits of drip irrigation include the following.

- Drip irrigation makes supplying water to narrow, or odd-shaped areas easier. And it's great for all types of garden areas.
- Water is applied slowly, reducing the risk of soil erosion or compaction.
- Drip irrigation can be operated during windy periods, without significant water lost to evaporation.
- Low volume water application preserves a good water/oxygen ratio in the soil, which is necessary for healthy plant root growth.
- Plant disease resulting from overhead irrigation, and wetting of plant leaves, is eliminated.
- Drip, or micro-irrigation, is the best way to apply water to berms and slopes. The slow rate of water application created with these systems allows the water to soak into the soil more easily, instead of running off down the slope or side of the berm.
- Systems can be run by connecting them to an AC or battery powered controller unit, which automates the system runtime for busy homeowners.
- Drip irrigation supplies are readily available, and can be installed by do-it-youselfers.

Soaker hoses or “leaky pipes” are the least expensive form of drip irrigation available for home landscape plantings. They weep or drip water through the sides of the hose wall. Soaker hoses can be coiled through a landscape planting and buried under mulch. They also can be automated through the addition of a battery-operated timer/valve at the hose connection.

Also known as micro-irrigation, a drip system is constructed using a network of 1/2 to 3/4 inch diameter black polyethylene pipe that delivers water under low pressure to plants. The main pipeline may have several lateral lines. Pipes can be laid along tree rows, through vegetable gardens, or landscape beds.

Drip Irrigation Emitters
A critical feature of every drip irrigation system is the emitter. They are designed to release water so slowly that water drips or trickles from emitter’s opening, which gives this watering

system its name. There are two main types of emitters- pressure compensating and pressure sensitive. Pressure compensating emitters provide the same amount of water to all emitters along the length of a pipe. Pressure sensitive emitters provide a higher amount of water when higher water pressure is available. Emitters can be attached directly to the plastic piping, or connected to 0.25 inch microtubes allowing placement near plants further away.

The amount of water applied by emitters is measured in gallons per hour, and various flow rates can be selected based on your system, or plant needs. Common emitter flow rates include 0.5, 1, 2, or 4 gallons of water per hour (gph), allowing you to choose emitters that apply water at the proper rate for your soil type and plant needs. Emitters are often color-coded by their flow rate, making them easier to identify as you install or modify your system. However, not all irrigation system manufacturers use the same color code system. So consider purchasing all your equipment from one manufacturer to keep things simple.

Bubblers are another type of emitter, applying larger amounts of water in a circular pattern. They can be used to water larger plants, or fill a basin created around the base of a new tree or shrub. Bubblers have adjustable flow rates from 0 to 35 gph.
Do not include microspray heads in the design of your drip irrigation system. Microspray heads put out fine streams of water a few inches above ground level, in full, half, or quarter circular spray patterns. Because of their higher water output microspray heads should be used on their own dedicated irrigation lines.

Soil Type Effects on Water Infiltration

Effects of soil type, including water infiltration rates and lateral water spread, are important when designing your irrigation system.

- Clay soils have high water holding capacity but slow water infiltration rates, usually .10 to .25 inch per hour. For this reason your drip irrigation system should be designed to apply water slowly enough to avoid runoff.
- Loam soils have moderate water holding capacity and an infiltration rate of .25 to .50 inch per hour.
- Sandy soils have the fastest water infiltration rates at .50 to .75 inch per hour, but low water-holding capacity. Water can be applied to sandy soils more quickly with less chance of runoff; however, any water applied beyond the water-holding capacity of the soil is lost as it moves below the plant's root zone. More frequent applications may be necessary to provide plants growing in sandy soils the continuous amounts of water needed for good growth.

To measure the water infiltration rate for the soil in your landscape, cut the top and bottom out of a coffee can. Mark the inside of the can in 1 inch increments. Insert one end of the can into the soil. Be sure it goes through both turf and thatch. Check that water does not seep laterally from the can. Fill the can with water and allow time for all of it to drain into the soil. Then add water to the 2 inch mark on the can. Now measure the time for this water to sink into the soil. Divide this elapsed time by two. The number you get will be the infiltration rate for your lawn, i.e., the

rate for 1 inch of water to enter your soil. Adjust your irrigation system to apply water at this rate.

If water is applied too heavily at a single application it is forced below the depth of the plant's root system and is wasted. This happens most commonly on sandy soils. When irrigating annuals and vegetables the upper 5 to 6 inches of soil should be moistened. Herbaceous perennials should be watered to a depth of 8 to 10 inches, and woody trees and shrubs to a depth of 12-18 inches.

Most landscape plants, including ornamental annuals and perennials, trees and shrubs, and vegetables, require 1-1.5 inches of water per week, although applications must be adjusted according to the type of plants being irrigated, the soil texture and microclimate they are growing in, and the season of the year. Woody plants and most ornamentals require 1 inch of water applied in a single, weekly application. Vegetable plants require at least 1 inch of water per week. Determine when to water by scratching the soil. If the top 1-2 inches of soil is dry, then the vegetable garden should be watered.

System Design Notes

Drip irrigation systems are a great do-it-yourself project because the main pine line does not need to be trenched into the soil, although if the lines are not buried, they should be held in place with wire landscape pins placed every 2-3 feet. This helps eliminate the pipe as a tripping hazard in the garden. Burying the irrigation system pipes with mulch is also beneficial; it protects the pipes, holds moisture in the soil, and prevents weed problems.

The most common water source is an outdoor home faucet. At the faucet, install a 1) backflow preventer, 2) 150-200 mesh filter, and 3) pressure regulator.

Backflow prevention is important when using a municipal or other potable water source. It prevents back siphoning of contaminants into the water source if a sudden drop in water pressure occurs from the water source.

A filter is installed on the main line to catch physical contaminants and prevent clogging of the emitters. The filter should be cleaned regularly so the system operates effectively.

Drip irrigations usually operate best with 10-30 pounds per square inch (psi) of water pressure, however, many municipal water systems deliver water at pressures above 30 psi. High water pressure can blow out emitters.

To estimate the water pressure of your faucet, use an old bucket and turn the water on full force. Note the number of seconds is takes to fill the bucket. Plug your numbers into the equation below.

(Bucket size in gallons/ Seconds to fill bucket) x 3600 seconds per hour = flow rate in gph

If you are not sure of your home water pressure, the addition of a pressure reducer or regulator can be beneficial.

A drip system can also draw water from a well or pond, or utilize one valve of a high-pressure sprinkler system. For more information on setting up these systems, refer to

- Small Acreage Low Flow (Micro or Drip) Irrigation System Design and Installation, Utah State University
- Low Pressure Drip Irrigation for Small Plots and Urban Landscapes, New Mexico State University
- Drip Irrigation for Home Gardens, Colorado State University