Disadvantages of Drip Systems, cont.

6. Require filtration of water sources to prevent clogging of the small outlets in the emitters.
7. Restrict water distribution in the soil.

When water distribution is restricted here in the desert Southwest, problems are often encountered with soils and water supplies that are high in salts. During drip irrigation, slow applications of water to immediate root zones may result in the development of a salt front at the edges of the wetted area. These salts are often visible as a white accumulation on the soil surface. As excessive salts will result in root damage or the death of many plants, it is necessary to flush root zones periodically during the irrigation season. Either leave the system on for an extended period of time, or use a garden hose to thoroughly saturate the areas. This leaches the salts from the surrounding plant root zones and the immediate area.

References:

Feucht, James R. and Butler, Jack D. Landscape Management. (1988) New York, New York. Van Nostrand Reinhold.

Marr, Charles W., Lamont, William J. Jr., and Rogers, Danny. Drip irrigation for vegetables. Cooperative Extension Service. Kansas State University. Manhattan, Kansas

Waterwise Gardening. (1989). Menlo Park, California: Lane Publishing Co.

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Drip Irrigation Systems

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As water becomes more expensive, drip (or trickle) irrigation has increased in popularity. This rise in popularity has coincided with the development of new irrigation technology, combined with a revised philosophy on the part of home gardeners and the Green Industry to conserve water.

Modern experimentation with drip irrigation systems began in England in the 1940s. However, not until the innovation of polyethylene plastics in the 1960s did drip irrigating begin to gain momentum. Traditionally, irrigation had relied upon a broad coverage of water to an area that may or may not contain plants. Promoted for water conservation, drip irrigation does just the opposite. It applies small amounts of water (usually every two or three days) to the immediate root zone of plants.

In drip irrigation, water is delivered to individual plants at a low pressure and delivery rate to specific areas or zones in the landscape or garden. The slow application promotes a thorough penetration of the water to individual plant root zones and reduces potential runoff. The depth of water penetration depends on the length of time the system is allowed to operate and the texture of the soil.

Drip emitters apply the water directly to plant root zones and are very efficient and water-conserving by design. When applying water directly to the soil, there is virtually no waste from drift, evaporation or runoff. There are many designs of emitters available on the market, and even the mini-sprinkler, misters and mini-sprayer types are efficient in operation.

Drip systems are relatively easy to design, assemble and install, which is why they are popular. Depending on landscape needs, design the system to connect to a main water line or connect it to a hose bib. These systems are easy to modify.

In designing and assembling a drip system, advanced planning is critical to successful results. Reading, studying, observing systems and developing an overall concept of the installed principles of a basic drip system are the places to start. From that point, draw a plan that includes the layout of lines, your choice of emitter, the flow in gpm (gallons per minute) of your water supply and the total number of emitters to install on each line or system. At this point, it is essential to develop your list of landscape plants so that the system you design is matched to your actual needs.

Understanding the soil characteristics and topography in your landscape or garden is another important factor. The size and spacing of emitters you choose are affected by the different ways sun, exposure (N, S, E, W) and water move through the various types of soils. Soil types include clay, silt, sand (fine, medium and large particles) and loam. The amount of organic matter available in the soil also affects the soil's capacity to hold water.

All drip irrigation systems have five major and two optional components, and understanding these is the next step in actually designing a system.

Major Components

1. Valves: hand operated or electrical, and capable of operating at low pressures and low delivery rates.
   Drip systems are usually designed for automated operation using timers or specially engineered low-flow solenoid valves. Installation of a pressure vacuum breaker (PVB) or anti-siphon valve is also a necessity when using a well or a municipal water source. This valve prevents fertilizers or chemicals used in the drip system from siphoning back into the water supply when changes in system pressure occur.
2. Filters: disk, screen or sand.
   For smooth operation and prevention of clogging of the tiny outlets in the emitters, filters are considered an important component of the drip system. For wells or municipal water sources, use a screen filter (150-200 mesh screen) or disc filter. If you connect your system to any open or surface water sources, sand filters are an absolute requirement. Install these filters as a pair of sand-filled canisters, which are back-flushed to clean them.
3. Pressure regulators: spring or valve.
   Most drip systems operate on low pressures, with 20 to 30 psi offered as the standard operating pressure. These pressures are lower than those provided by municipal water supplies, which means a pressure reducing or flow control valve is a necessity for the system to operate properly. A call to your local water distributor will provide you with information on the available pressure of your water supply. Pressure regulators come in two types, spring (used on smaller systems) and diaphragm. These devices are inexpensive and reliable in holding pressure constant. Adjustable and pre-set types are available.
4. Water delivery system: polyvinyl chloride pipe (pvc); polyethylene tubing fitted with emitters, sprayer or line source drip tubing.
   The water delivery system is simply the network of tubing and water application devices that takes the water from the source and releases it at the destination.
5. Blowout valve or automatic drain:
   Installation of these valves is a good maintenance practice to clean lines and prevent damage from freezing.

Options

Automated controller: simple electric clock or computer.

By automating your system, it is very convenient to maintain an irrigation schedule. Watering can take place in the wee hours of the morning or when people are away from home. Electric solenoid valves are used to automate the system with the addition of a time clock or automatic controller box (computerized controller). Buy a controller that allows (90 to 120 minute) settings and multiple start times.

Fertigation system: electric and hydraulic pumps, cartridge systems, "hozon" venturi systems, etc.

Drip irrigation systems have an option to apply soluble fertilizers in the irrigation water. Fertigation with nitrogen, a highly soluble nutrient that moves easily through the soil profile to plant roots, is the most common method. Fertilizer cartridges (100% water soluble), which dissolve and are distributed through the watering process, are one option.

Another reliable method involves a simple "hozon" venturi injector, which siphons soluble fertilizer from a bucket or container into the irrigation tubing. The fertilizer is siphoned at a pre-set ratio (usually 1:16, or 1 gallon for every 16 gallons of water flowing through the line). Hozons are only suitable for plantings of ½ acre or les. In connecting a fertigation system, remember to place the fertilizer injections in front of the filter to screen any contaminants. A reduced-pressure vacuum breaker is sometimes required with the use of an injector system.

As you design your drip system, the components and options you choose will depend on your individual needs. They include the size of the system, the water source, the plants you want to irrigate and the degree of sophistication you desire.

As already discussed, drip systems have gained popularity as efficient, water-conserving irrigation systems. However, as you plan for your landscape and gardening needs, consider that there are both advantages and disadvantages of these systems. Consider these carefully as your final step in making your drip decisions.

Advantages of Drip Systems. They:

1. Conserve water by applying moisture only where it is needed, and by eliminating drift, potential runoff and most evaporation.
2. Are relatively simple to design and install.
3. Provide a more constant level of moisture to plant roots.
4. Are less expensive to install than some other systems.
5. Are flexible to expansion or design changes.
6. May be concealed to maintain the beauty of the landscape, and to reduce vandalism and liability when installed in public areas.
7. Require smaller water sources, for example, less than half of the water needed for a sprinkler system.
8. Are low-pressure systems, which require less energy costs if pumping is necessary.
9. Reduce the chance of plant disease by keeping foliage dry.
10. Help control weeds by not providing water to areas where it isn't needed.
11. Are capable of efficient automated fertilization when combined with the proper emitters.
11. Are capable of efficient automated fertilization when combined with the proper emitters.
12. Are capable of applying moisture on varied terrains in a variety of soil conditions.
13. Reduce soil erosion and nutrient leaching.
14. Permit other yard and garden work to continue when irrigation is taking place, as only the immediate plant areas are wet.

Disadvantages of Drip Systems. They:

1. Require frequent maintenance for efficient operation.
2. Are subject to vandalism when systems are not concealed.
3. Have limited life after installation due to the deterioration of the plastic components in a hot, arid climate when exposed to ultraviolet light.
4. Are temporary installations and must be expanded or adjusted to the drip line as plants grow.
5. Are subject to damage from rodents (particularly gophers and mice), insects and humans.