

Low Volume Irrigation

by Angela Chandler, Harris County Master Gardener
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Introduction

Low volume irrigation (LVI) has been called by many names since its introduction to the market: “trickle irrigation,” “drip irrigation,” “micro-irrigation,” “micro-misting” and “low-pressure irrigation.” “Low volume irrigation,” reinforcing the idea of responsible water usage, will be used in the discussion below.

Several brands of LVI systems have been available for a number of years and have come a long way from the early days when single emitters distributed water drop by drop over a long cycle. LVI technology is continually improving, and now offers more efficient performance and customization through the availability of a wide selection of specialized components.

Many products are available from which to choose, and a system can be customized for virtually every plant and landscape situation. This fact sheet has been developed to describe the basics and get the new user started. Most people discover that it’s fairly easy to quickly master the system.

LVI vs. the Other Guys

There are many ways to get water to plants, the most efficient and productive being regular rains. Plants seem to respond to rainwater better than anything else, and gardeners often refer to supplemental watering of any kind as “life support” for plants. But all Houston gardeners know that it is necessary to provide plenty of supplemental watering during certain seasons, especially summer.

Hand watering. Some people find hand-held hose watering a pleasant, relaxing garden “chore,” but it can waste a lot of water and is very time-consuming, especially if there is a large area to cover.

***The LVI advantage: Turn it on...go about your business...
turn it off.***

Soaker hoses. Soaker hoses work well, but are real water guzzlers. They must be placed fairly close together, or must be left on for long periods of time to soak a large area. Many times the area directly under the soaker hose becomes waterlogged while the outer zone of the area is barely damp. A soaker hose system is awkward and inconvenient to modify when the

garden needs remodeling. It takes two people to safely remove and reinstall soaker hoses in an established bed when the needs of the garden change, or if the hose is damaged.

The LVI advantage: The system distributes water directly to a specific area or plant. The system can be modified within minutes without moving heavy hoses.

In-ground sprinklers. In-ground sprinkler systems use a lot of water. Water is dispersed so rapidly that it often cannot soak in as fast as it is dispersed. In-ground systems have their place and are efficient systems for watering lawns and large estates, but they may not be the best answer for planting beds and certainly not for container plants. In-ground sprinklers require that the yard be trenched, and installation is expensive and not very “homeowner friendly.” As a garden matures and watering needs change, modifications to in-ground sprinkler systems can be costly and complicated. In gardens where an existing in-ground system already exists, it can be retrofitted for LVI in areas other than the lawn.

The LVI advantage: Where sprinkler systems are measured in GPM (gallons per minute), LVI is measured in GPH (gallons per hour). LVI does not require trenching, and it can be installed inexpensively and modified infinitely.

Leaky Pipe™ irrigation. Leaky Pipe is a low-volume irrigation method, but differs somewhat from drip and micro-irrigation. This subsurface system is a wonderful method for watering vegetable gardens and orchard rows. Pre-planning is imperative, and installation of the system should be done before the plants are set in place. A good place to start if you are interested in Leaky Pipe irrigation is to take the home irrigation class offered by Urban Harvest.

LVI is Environmentally Friendly

It is important to conserve all natural resources, especially water, one of our most precious assets. In order to protect the environment, it is also important that chemicals, fertilizers and nutrients—even “organic” products—stay in the residential landscape where they can be used by the garden. Properly used, LVI seldom produces a runoff problem, minimizing the burden on local bayous, streams, estuaries and bays.

How It Works

LVI distributes a measured amount of water over a specific period of time using a system of delivery and distribution pipes and application emitters. The systems are designed to maintain an evenly moist root zone.

Choosing the LVI System

One can assemble an LVI system from separately purchased components, or with a kit. Kits seldom offer any cost saving over individual components, and gardeners usually discover they quickly outgrow the kits. Most home centers carry one or more brands and a wide variety of

components. Many of these components are interchangeable between brands, but a few are not. Check for compatibility before you leave the store.

Each manufacturer provides a brief installation manual, which contains a lot of helpful information. However, the “design” pages in the manuals usually show a system for a whole yard being run from a single hose bib. This suggested configuration is intimidating to most beginners, giving the impression that one must design and install the entire yard in one system. In reality, not only is this impractical and unnecessary; it is impossible. Skip that page!

Getting Started

It’s actually easier to design a system after some experience is gained in installing one. Start with a small project, and then graduate to a whole yard zoning and watering plan.

Design

Begin by breaking the yard or garden into “zones.” For example, a “zone” can be one garden bed or border.

Observe the types of plants growing in this zone and decide which type emitter to use. For example, adjustable drippers that do not spray water on leaves would best serve a bed of roses. Or a bed of gingers might benefit from a summer drench from micro-sprinklers. A mixed border may use several different types of emitters.

Count the number of emitters required. Be sure to allow an “overlap zone” (25 percent) for micro-sprinklers. Make a list of their flow rates, which are printed on each package. If the total exceeds 200 GPH, it will be necessary to break the “zone” into circuits. (Tip: micro-sprinklers have a higher flow rate (7–25 GPH) than drip emitters (1–10 GPH), and may require more “circuits.”)

A single “circuit” should not exceed 200 GPH or 200 feet of ½" poly-pipe header.

Tools:

A pair of scissors

A punch tool (available with the other components)

A pair of wire cutters (if old shirt hangers are recycled as hold-downs)

Materials:

½" poly-pipe header

¼" feeder tubing

Hose-end fitting

Figure-eight end closure

Goof plugs

Double-barbed connectors

Spray stakes

Back-flow device

Pressure regulator (depending on type of emitter device)

Hold-downs (or hangers if you are a recycler)

Emitters:

- 1/4" porous pipe
- 1/4" laser-drilled pipe
- Punch-in emitters
- In-line emitters
- Micro-spray heads (available in various spray patterns)
- Drippers (available in fixed rate or adjustable rate)

Installation

Unroll the 1/2" poly-pipe and let it "relax" in the sun.

Decide where the hose hook-up will be. This should be a position close to the water source. Attach the hose-end fitting to this end of the poly-pipe.

Lay out the poly-pipe. It can be hidden under mulch or tucked behind your border material or planting. If the poly-pipe needs to be pinned down, use recycled shirt hangers or purchase plastic hold-downs. Slide the figure-eight closure over the end of the poly-pipe, but do not close it off at this time.

Begin installing the emitters. (It may be easier to place the emitter at the plant and work back to the poly-pipe.)

Slide one end of the 1/4" feeder tubing over the barbed connector at the emitter. Set the emitter in place at the plant (it can be adjusted later).

Run the tubing back to the poly-pipe (do not exceed 10 feet).

Cut the tubing to length (leave a little extra).

Insert one end of the double-barbed connector into the 1/4" tubing.

Using the punch tool, punch a hole in the poly-pipe (listen for the "snap").

Insert the other end of the double-barbed connector into the 1/2" poly-pipe (listen for the "snap").

Continue until all emitters are in place.

Connect the water source. Allow the water to run until water flows from the end with the figure-eight closure. This will flush any small pieces of plastic, dirt, or mulch from the lines. Fold over the 1/2" poly-pipe and slide the figure-eight closure over the open end.

Test the system. Adjustments can be made at this time. If there is a poor flow rate, make sure the circuit is not overloaded. Add another circuit if required.

Maintenance and Repair

Winterizing the System

Normal winter conditions in southeast Texas will not harm this system as long as it is drained. To drain, simply open the figure-eight closure. As soon as the water has drained from the system, re-close the figure-eight to keep dirt and bugs out of the system.

Repairing the System

The system is easy to repair. Shovel or weed-eater damage to the 1/2" poly-pipe or the 1/4" feeder tubing can be repaired by cutting out the damaged portion of the poly-pipe and installing a coupling (poly-pipe) or double-barbed connector (feeder tubing).

Damaged emitters can simply be replaced. Clogged emitters can be removed and flushed out, then replaced.

If an emitter must be removed, just carefully pull it out and install a goof plug.

Beyond the Basics and Helpful Hints

Timers

Once the basic system is in place, it's possible to find many ways to tweak and fine-tune it. One of the first things most gardeners like to add is a timer. Timers will allow the gardener to go on vacation and not worry about coming home to a very distressed garden, or to keep a busy schedule and know the garden won't suffer as a consequence. Timers that work on two 9-volt batteries and offer several watering cycles can be purchased for \$25–\$30.

Feeders

In-line feeders are available for tablets and feeding crystals. A venturi type system can also be used.

Special Use Emitters

Several kinds of special use emitters are available, including foggers, a special-use type that growers of orchids, bromeliads, ferns, or other rainforest natives may find beneficial.

Creative Irrigation

A temporary and mobile misting system for rooting cuttings can be made up of LVI components and an inexpensive timer. A small greenhouse can be watered automatically with a similar set-up.

Quicker Connections

Quick-connect fittings provide additional convenience. Install a male-end quick-connect fitting onto each end fitting of each circuit, and a female quick-connect onto the supply hose end. Quick-connect fittings allow the user to move from circuit to circuit with just a click instead of screwing and unscrewing the hose each time.

Flow Rate Adjustments

Many emitters are designed to be "pressure compensating." However, some emitters are designed to work best at pressures lower than most municipal water systems. If this is the case with your choice of emitters, simply add a pressure regulator either at the hose bib or at the beginning of the circuit.

Slope Matters!

If drip emitters are used in slope situations, use emitters with lower flow rates in order to avoid run-off and insure absorption.

Suggested Emitter Types, Rates and Placement

Large Trees and Shrubs. Allow one gallon per hour for each 2½ feet of canopy. Use 1- or 2-GPH drip emitters or porous pipe placed evenly around drip line. Porous pipe can be added in “rings” spaced about 12 inches apart as the specimen grows.

Small Trees and Shrubs. Allow one gallon per hour for each 2½ feet of canopy. Use 1- or 2-GPH drip emitters or porous pipe placed evenly 6–24 inches from trunk.

Roses, Azaleas and Camellias. Use adjustable drippers (1–10 GPH) at the base of the plant. Adjust flow rate by season and size.

Flower Beds, Borders and Ground Cover Areas. Use micro-sprinklers spaced with 25 percent overlap zones.

Louisiana Iris Beds. Use ¼" porous tubing placed 12 inches apart off ½" poly-pipe header.

Vegetables in rows. Use ¼" laser-drilled tubing placed along each row, or 12 inches apart in wide beds. Use ¼" in-line shut-off valves on each line.

Tomatoes & Peppers. Use ¼" laser-drilled tubing placed along each row or a 1-GPH dripper at the base of each plant. These can be in-line emitters, punch-in emitters, or drippers on ¼" tubing branches.

Container Gardens. Use one 1-GPH dripper for each inch of container size. Misters or foggers can be added on stakes for plants that enjoy high humidity.



Gardening fact sheets are distributed by Harris County Master Gardeners, community volunteers trained in basic horticulture by Texas Cooperative Extension. For information about Master Gardener volunteer training classes, call Harris County Cooperative Extension at 281.855.5600, or send an e-mail to harris@ag.tamu.edu.