Easy Drip Irrigation for Your Garden or Landscape

A little about myself

- Irrigation contractor for over 40 years
- Certified Irrigation Designer
- Certified Landscape Irrigation Auditor
- Adjunct professor here at Cook College
- Worked in a retail garden center for ten years
- Installed my first drip irrigation in my flower and vegetable garden at my home in 1976

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What is drip irrigation

A low volume watering method that delivers water slowly and directly to the plant roots for maximum efficiency.

What is micro-irrigation

Micro-spray and other devices operating at low pressure that apply water just above, on, or below the surface of the soil at low flow rates.

Why drip irrigation

- Most efficient method of irrigation
- Reduces water runoff, deep percolation, evaporation
- Reduces water contact with leaves, stems, and fruit
- Reduces weed establishment
- Less favorable conditions for disease
- Often results in increased yields
- Exempt from NJ DEP drought restrictions

Most of all, we have a responsibility to be better stewards of the environment.
Nationwide, landscape and garden irrigation is estimated to account for almost 1/3 of all residential water use. That totals approximately 7 billion gallons of water per day.

Experts estimated that some 3.5 billion gallons per day of that water is wasted, some 50% of that water is wasted, which is why drip irrigation is so widely used in farming.

Drip irrigation saves water. Some experts say a garden or landscape irrigated with drip irrigation will use 50% less water than a garden or landscape watered with a conventional irrigation system or hose end watering. These savings can only be realized if the drip irrigation is installed properly and operated efficiently.

Components of a drip irrigation system:
- Point of connection, a water source
- Backflow preventer
- Timer (optional)
- Strainer
- Pressure reducing valve
- Distribution pipe
- Emitters or micro-sprays
- Miscellaneous other components
Point of connection
- Plumbing connection with shut-off valve
- Well system
- Hose bibb

Indoor Point of Connection
Plumbing connection with shut-off valve
- Shut-off Ball Valve
- Main Shut-off
- Water Meter
- Tee connection to water service
- Plugged Tee for Blow-out Connection

Point of connection
- Well System

Point of connection
- Hose bibb

Point of connection
Hose bibb components
- "Y" connector
- Tubing connector
- Pressure Regulator
- Filter

Backflow preventer
A backflow is a must!
What is Backflow?
The undesirable reversal of flow of water or other substances into the potable water distribution system.

It happens!
In 1969 the entire Holy Cross Football Team came down with infectious hepatitis as a result of drinking water contaminated from the football field irrigation system.

Backflow Example

Hose shut-off “Y” Connector

Filters
Prevent drip emitters from clogging

Minimum of a 100 micron or 150 mesh filter is recommended.
Pressure regulator
- Insures pressure is reduced to an optimum range
- Needed when pressure exceeds 50 psi

Point of connection
Hose Bibb

Typical Hose Bibb
Point of connection

Battery timers - optional

Optional timer
Timer should be installed between the hose bibb and the backflow preventer

Distribution piping
Options for Distribution Piping
- Solid Drip Tubing
- Polyethylene (PE) Pipe
- Polyvinyl Chloride (PVC) Pipe

Different Drip Zones for different plant materials

How many drip emitters can I operate at one time?

Determining the water supply from a hose bibb
- Tools needed
  - Pressure gauge
  - 5 gallon bucket
  - Stop watch

Performing a pressure test
- Attached a pressure gauge to a hose bibb and record the pressure
- Pressure is measured in pounds per square inch (psi)
- If the pressure is greater than 50 psi, a pressure regulator will be required
- If the pressure is below 30 psi, it may be inadequate for proper drip irrigation

Performing a bucket test
- Place a 5 gallon bucket under a running hose bibb
- With a stop watch, time how long it takes to fill the bucket
- Divide 5 gallons by the number of seconds it takes to fill the bucket (yields gallons per second)
- Multiply that number by 3600 (yields gallons per hour or GPH)
- Multiple this number by 75%
- This is my total allowable flow in gallons per hour (gph)
Example of a bucket test
- 5 gallon bucket filled in 40 seconds
- \( \frac{5}{40} = 0.125 \) gallons per second
- \( 0.125 \times 3600 = 450 \) gph
- 450 \times 75\% = 337.5 gph
- 337.5 is my total allowable flow in gallons per hour (gph)

Example of a bucket test
- If 337.5 is my total allowable flow in (gph)
- Using 0.6 gph drip emitters, you could operate 562 at a time \( (337.5 ÷ 0.6 = 562.5) \)
- Using 0.9 gph drip emitters, you could operate 375 at a time \( (337.5 ÷ 0.9 = 375) \)

Types of drip emitters
- Pressure compensating vs. non-pressure compensating emitters
- Use pressure compensating emitters if:
  - You have long runs of any single row drip tube
  - You have elevation changes in excess of 15 feet on any drip tube run
- Otherwise, for garden and residential landscape applications, it doesn't really matter whether the drip emitters are pressure compensating or not

Types of drip emitters
- Line source emitters are pre-installed internally in the tubing at equally spaced intervals
- Point source type emitters are attached external to the tubing. The installer can select the desired location to suit the planting configuration

Line source drip emitters
- Pre-spaced inline drip emitters
- Emitters are molded into the tubing at consistent spaced intervals - 12", 18", 24"
Line source drip emitters
Pre-spaced inline drip emitters

Line source drip emitters
Pre-spaced inline drip emitter irrigating strawberries

Point source type drip emitters
Pressure compensating “button” emitters
Installed where they are needed

Point source type drip emitters
Pressure compensating “button” emitters
- Hole punch used to pierce the tubing to install the emitter

Point source type drip emitters
Pressure compensating “button” emitters
- Emitter drips slow rate of water

http://www.youtube.com/watch?v=d4BoEacFPuo
Point source type drip emitters
Self-piercing drip emitters
Emitters discharge can be extended with $\frac{1}{4}$" tubing
Classic flag emitters
Spot watering
Point source type drip emitters
Multi-port pressure compensating emitters

Multi-port pressure compensating emitters allow multiple plants to be irrigated from a single emitter.

Micro Spray
Often preferred to irrigate flower beds to accommodate the seasonal color change.

Micro sprays irrigating flowers
Accommodate seasonal change of color

Micro sprays irrigating raised brick planter with annual color changes

Soaker hose
- Made from recycled rubber tires
- Soaker hose does not distribute water evenly. Heavier application occurs the closer you are to the source. If used, the length of run should not exceed 50 feet.
Soaker hose
Uneven application of water

Soaker hose
Vegetable garden irrigated with soaker hose. Owner confirmed uneven distribution of water with plants closer to the water source getting more water.

So which one do we choose?
Points to consider
- Type of landscape or plant material
- Soil type or texture
- Maintenance or gardening activity

Different landscapes and gardens have different soil types

Emitters perform differently depending on the soil type (texture)

Emitters perform differently depending on soil type (texture)
- Heavier clay type soils require emitters with a slower application rate
- Requires longer irrigation period or multiple shorter cycles
- Lighter sandy type soils benefit from emitters with a faster application rate
- Requires a shorter irrigation period due to faster application rate
Line source emitters

One example

- Pre-spaced drip tubing comes with:
  - different emitters with different discharge rates
  - Different spacing between emitters

Drip fittings – easy to join

- Insert fitting
- Compression fittings

Drip fittings – easy to join

- Be sure the fittings are appropriate for the size and type of tubing

End cap

Remove to flush tubing

Drip staples

Hold tubing in place, space as needed

Drip indicator

Flag stands up when drip tubing is pressurized
Let's look at some applications

- Line source emitters
- Point source drip emitters

**Line source emitters**

Pre-spaced tubing irrigating flowers

- Solid tubing (no emitters)
- 0.9 gph - 12" spaced emitters

**Line source emitters**

Pre-spaced tubing irrigating small shrubs

- 0.9 gph - 12" spaced emitters

**Line source emitters**

Pre-spaced tubing irrigating mid-size ornamental trees

- 0.9 gph - 12" spaced emitters
- Solid tubing (no emitters)

**Line source emitters**

Pre-spaced tubing irrigating larger tree

- 0.6 gph - 12" spaced emitters

**Slower application rate to saturate the tree root ball**
Line source emitters
Pre-spaced tubing irrigating island to be planted with ground cover

Line source emitters
Rows of pre-spaced drip tubing ready to irrigate vegetable garden

Vegetable Garden Irrigated with Pre-spaced Line Source Emitters

Line source emitters
Sub-surface turf drip irrigation

Line source emitters
Longwood Gardens
Pre-spaced tubing irrigating slopes on landform

Point source drip emitters
Installed in raised planter box where need to irrigate plant material
Point source drip emitters
Installed on stake to irrigate tomato plant

Point source drip emitters
Installed where need to irrigate pots and hanging baskets (1/4” tubing with emitters)

Point source drip emitters
Installed where need to irrigate vines

Micro sprays
Placed where needed to irrigate ground cover

Point source drip emitters
A combination of point source emitters and micro spray irrigation positioned where needed to water plant material.

Longwood Gardens
East Conservatory Plaza
Largest living wall in North America
Longwood Gardens
East Conservatory Plaza

Drip irrigation waters the plant material on all the walls.

Maintenance
Observe and inspect the drip system regularly.

Maintenance
Inspect and clean the filters to maintain optimum emitter performance.

Maintenance
If buried, winter freeze often pushes tubing to the surface requiring the tubing to be reburied and stapled.

Handy tool to check soil moisture.
Easy Drip for the Garden and Landscape

- Check your water supply
- Select equipment appropriate for your soil and plants
- Try it out before you bury anything
- Don’t be afraid of mistakes! That’s why they make “goof plugs”
- Have fun and grow a bumper crop

Sources for Drip Materials

- Irrigation Supply Houses
  - Swan Pump and Supply
    3490 US HWY 9 South
    Freehold NJ 07728
  - Atlantic Irrigation Specialties
    - 90 Newark Pompton Turnpike
      Wayne, NJ 07470
    - 5010 Industrial Road
      Farmingdale, NJ 07727
    - 309 Pinedge Drive
      West Berlin, NJ 08091

- Online Sources
  - Rain Bird
    http://store.rainbird.com
  - Drip Depot
    https://www.dripdepot.com
  - Drip Works
    http://www.dripworks.com

- Big Box Stores
  - Lowes
  - Home Depot

Thank You – Happy Gardening

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