Easy Drip Irrigation for Your Garden

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.

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

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

What is drip irrigation

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

Why drip irrigation

- 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. Source: EPA “Outdoor Water Use in the United States”

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.

That totals approximately 7 billion gallons of water per day. Source: EPA “Outdoor Water Use in the United States”

That is why drip irrigation is so widely used in farming.

Experts estimated that
- 50% of that water is wasted
- Some 3.5 billion gallons per day

Source: EPA “Outdoor Water Use in the United States”

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
- Plugged Tee for Blow-out Connection
- Water Meter
- Main Shut-off
- Tee connection to water service

Point of Connection
- Hose bibb

Point of Connection
- Well System

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

Hose shut-off “Y” Connector
- Allows connection of both drip irrigation and a hose or 2 drip connections.

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.

Filters
Prevent drip emitters from clogging
- Minimum of 100 micron or 150 mesh filter is recommended

Hose shut-off “Y” Connector

Pressure Regulator
- Insures pressure is reduced to an optimum range
- Needed when pressure exceeds 50 psi
Typical Hose Bibb Point of Connection

Backflow Preventer
Pressure Regulator
Filter
Tubing Adapter

Distribution Piping

Flush Valve
Water Source

Battery Timers - optional

Options for Distribution Piping
- Solid Drip Tubing
- Polyethylene (PE) Pipe

Optional Timer

The timer should be installed between the hose bibb and the backflow preventer.
The backflow preventer should not be under constant pressure. Only when the drip is operating.

Options for Distribution Piping
- Solid Drip Tubing

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Different Drip Zones for Plants with Different Water Requirements

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

How many drip emitters can I operate at one time?

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

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

$9.98 Lowes
Performing a Pressure Test
- Attached a pressure gauge to a hose bib 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 bib
- 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
- 5 ÷ 40 = .125 gallons per second
- .125 x 3600 = 450 gph
- 450 x 75% = 337.5 gph
- 337.5 is my total allowable flow in gallons per hour (gph)

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
Line Source Drip Emitters
Pre-spaced inline drip emitters

Emitters are molded into the tubing at consistent spaced intervals - 12”, 18”, 24”

Point Source Drip Emitters
Pressure compensating “button” emitters installed where they are needed

Line Source Drip Emitters
Pre-spaced inline drip emitters

Hole punch used to pierce the tubing to install the emitter

http://www.youtube.com/watch?v=d4BoEacEPuo

Line Source Drip Emitters
Pre-spaced inline drip emitter irrigating strawberries

Point Source Drip Emitters
Pressure compensating “button” emitters

Emitter drips slow rate of water
Point Source Drip Emitters
Pressure compensating “button” emitters

Point Source Drip Emitters
Emitters discharge can be extended with ¼" tubing

Point Source Drip Emitters
Self-piercing drip emitters

Point Source Drip Emitters
Spot watering

Point Source Drip Emitters
Classic Flag Emitters

Point Source Drip Emitters
Classic flag emitters
Point Source Drip Emitters
Spot watering

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

Point Source Drip Emitters
Multi-port pressure compensating emitters

Micro Sprays irrigating flowers
Accommodate seasonal change of color

Point Source Drip Emitters
Multi-port pressure compensating emitters allow multiple plants to be irrigated from a single emitter

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

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

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

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

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

Example:
Ground Cover in Sandy Soil

- .9 GPH Drip Emitters
- Emitters spaced 18 inches apart in tubing
- Tubing rows spaced 18 inches apart

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

Line Source Emitters
Pre-spaced tubing irrigating flowers

Drip Indicator
Flag stands up when drip tubing is pressurized

Line Source Emitters
Pre-spaced tubing irrigating small shrubs

Line Source Emitters
Pre-spaced tubing irrigating mid-size ornamental trees

Solid tubing
(no emitters)

0.9 gph 12” spaced emitters

Solid tubing
(no emitters)

0.9 gph 12” spaced emitters

Let's look at some applications
- Line source emitters
- Point source drip emitters
Line Source Emitters
Pre-spaced tubing irrigating larger tree

0.6 gph
12” spaced emitters

Line Source Emitters
Rows of pre-spaced drip tubing ready to irrigate vegetable garden

Slower application rate to saturate the tree root ball

Vegetable Garden Irrigated with Pre-spaced Line Source Emitters

Line Source Emitters
Pre-spaced tubing irrigating island to be planted with ground cover

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 where need to irrigate pots and hanging baskets (1/4" tubing with emitters)

Point Source Drip Emitters
Installed in raised planter box where needed to irrigate plant material

Point Source Drip Emitters
Installed where need to irrigate vines

Point Source Drip Emitters
Installed on stake to irrigate tomato plant

Micro Sprays
Placed where needed to irrigate ground cover
Combination
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

Maintenance
Observe and inspect the drip system regularly

Longwood Gardens
East Conservatory Plaza
Drip irrigation waters the plant material on all the walls

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
Soil Sample Probe
$50 - $60 online

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
  - Aquarius Supply
    ▷ 1120 Goffle Road
    Hawthorne, NJ
    ▷ 1000 Airport Road
    Lakewood, NJ
    ▷ 235 Delea Drive
    Sewell, NJ
- 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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