Easy Drip Irrigation for Your Garden or Landscape
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
- Creates less favorable conditions for disease
- Often results in increased yields
- Exempt from NJ DEP drought restrictions
Why drip irrigation

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”
That totals approximately 7 billion gallons of water per day.

Source: EPA
“Outdoor Water Use in the United States”
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”
Drip irrigation saves water

- Some experts say a garden or landscape irrigated with drip irrigation will use 50% less water than 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 is why drip irrigation is so widely used in farming.
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
- Shut-off Ball Valve
- Tee connection to water service
- Water Meter
- Main Shut-off
Point of connection

- Well System
Point of connection

- Hose bibb
Point of connection

Hose bibb components

- Backflow preventer
- "Y" connector
- Tubing connector
- Filter
- Pressure Regulator
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
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
Hose shut-off “Y” Connector

- Allows connection of both drip irrigation and a hose or 2 drip connections.
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.
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)
- Multiply 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
- $5 \div 40 = 0.125$ 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 \((337.5 \div 0.6 = 562.5)\)
  - Using 0.9 gph drip emitters, you could operate 375 at a time \((337.5 \div 0.9 = 375)\)
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

Water flows through the tubing and enters the dripper through the inlet filter. The filter blocks dirt and debris from entering, ensuring only clean water enters the dripperline.
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

http://www.youtube.com/watch?v=d4BoEacEPuo
Point source type drip emitters
Self-piercing drip emitters
Point source type drip emitters

Classic Flag Emitters
Point source type drip emitters
Emitters discharge can be extended with \( \frac{1}{4}'' \) tubing
Point source type drip emitters
Spot watering
Point source type drip emitters

Classic flag emitters
Point source type drip emitters

Spot watering
Point source type drip emitters
Multi-port pressure compensating emitters
Point source type drip 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

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

All soils are comprised of:
- sand
- silt
- clay
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

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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
Line source emitters
Pre-spaced tubing irrigating small shrubs

0.9 gph - 12” spaced emitters

Solid tubing (no emitters)
**Line source emitters**

Pre-spaced tubing irrigating mid-size ornamental trees

- **Solid tubing** (no emitters)
- **0.9 gph - 12” spaced 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
Pre-spaced tubing irrigating rows in a vegetable garden
Line source emitters

Rows of pre-spaced drip tubing ready to irrigate vegetable garden
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
Thank You – Happy Gardening

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