

Drip Irrigation

Grow with USask



Drip systems are very water wise methods of irrigation. Drip irrigation allows you to avoid watering non-target plants and customize water volumes for optimizing irrigation. Whether it is a vegetable garden, fruit orchard or an ornamental garden, drip systems can be adapted for efficient irrigation.

Drip irrigation limits water loss by;

- Slowly applying water to only a small area of soil reducing run off
- Not wetting unplanted areas
- Dripping directly on soil in large droplets limiting evaporation before water enters soil
- Irrigates odd shapes or narrow areas without watering outside of the planted area
- Concentrating irrigation to specific plants reducing weed germination



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Drip tape is optimal for plants growing in line because the water emitters are evenly spaced.

Environmental Impact of Over Irrigation

Too much water can leach soil nutrients below the root zone of plants. Run off can move soil particles, pathogens and nutrients across the surface of the soil potentially contaminating bodies of water. Not to mention wasting water and reducing downstream river flows.

Choosing the Right Irrigation System

Drip isn't the perfect solution for all of your irrigation needs. A sprinkler irrigation system that broadcasts the water is often a better choice when you have a lot of tightly packed plants like a lawn, a bed of baby greens or when germinating direct seeded crops.

An emitter is an orifice that discharges and controls the amount of water put out from an irrigation system. Drip emitters are used to target specific plants for watering; shrubs in a landscape or widely spaced vegetables.

Drip tape is a polytube that comes with emitters built in that are evenly spaced. Drip tape is optimal for plants growing in line, like that in a vegetable garden. Drip tape can be on the soil surface, run under mulch or sometimes be buried under the soil.





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Water Quality

Irrigation water should be:

- Free of sediment
- Low in salts, conductivity <1 umhos/cm
- Free of pathogens, both plant and human
- Within safe levels of toxic metals i.e. Selenium
- Within safe levels of pesticide residues

Watering with Drip vs. Sprinkler Irrigation

- Sprinkler irrigation can lose more water from evaporation than drip. Drip systems tend to have larger droplets and spend little to no time in the air; and the slow wetting of soil keeps water from pooling or running off on the surface reducing the potential for evaporation and erosion.
- Watering with drip irrigation often requires more frequent watering than sprinkler irrigation. Sprinkler irrigation wets a large area of soil which creates a large reservoir of water for the plant to draw from, while drip

irrigation wets a smaller volume of soil and the plant has a smaller reservoir to draw from.

- Wetting a smaller area around your root zone and not wetting empty soil helps reduce weed germination. Localizing water to the root zone of your plants gives them a competitive advantage.

Types of Drip Irrigation

Drip tape

Drip tape is one of the simplest of the drip systems to set up. Drip tapes are premade lines that have evenly spaced emitters that are pressure compensating. There are many different brands, emitter spacing, tape diameters, and flow rates. Your supplier can tell you the maximum run length on a particular drip line.

For example, a 5/8 inch line with 6 inch spacing and emitters that are regulated to .15 GPH can run to 300' in length while maintaining even watering. There are many different brands, emitter spacing, tape diameters and flow rates.

- **Drip tape systems need to be pressure regulated.** Depending on the drip tape, inlet pressure to the drip tape is often regulated to at 9-15 psi. If drip tapes are connected to unregulated systems, pressure build up can cause the line to break and flood your garden.

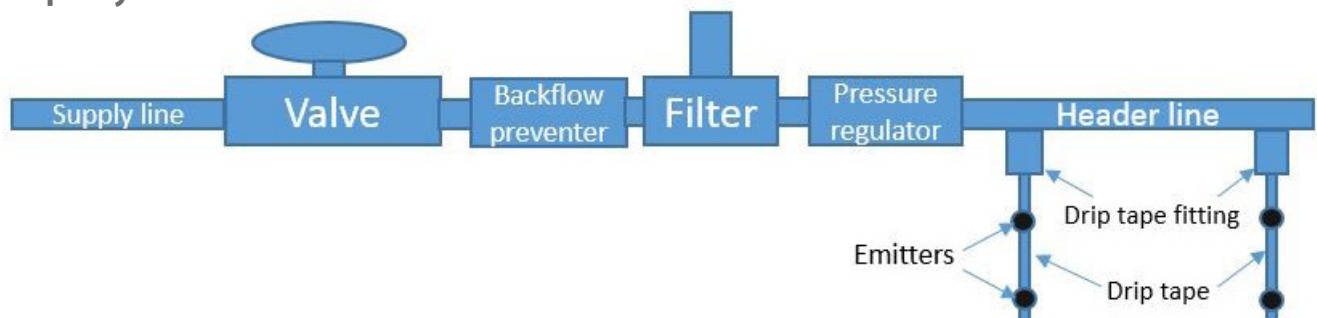
Emitter systems

Emitter systems have supply lines (can be pressure regulated or not) that run through the planted area and emitters are punched into the tubing which give regulated supplies of irrigation water. Emitters can drip directly from the supply line or be attached to smaller tubing for optimal drip placement near the plant.

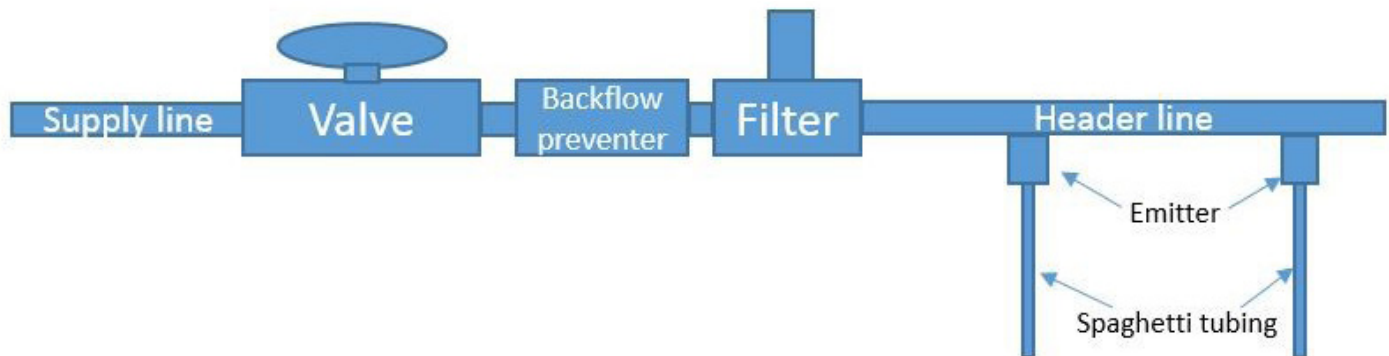


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Drip Tape System



Emitter System



Non-pressurized drip systems

Some drip systems can be attached to a rain barrel allowing you to utilize collection water. These work by gravity. The trick with this is that the rain barrel has to be high enough to push the water through the garden. Some of the gravity fed systems can be used with a very low height from your water reservoir. Emitters for gravity fed systems are different from that of pressurized systems and will have no pressure compensation; this means that some areas will get more water depending on the elevation and how close they are to the water source relative to other emitters. This may need monitoring when one first sets up a system to ensure everything is getting watered. There are two solutions to this problem; change the elevation of emitters in the system so they are more equal or separate them into “zones” separated by valves so they can be run independently of each other.



Drip tape can be run under mini tunnels.

Drip Set-up

Setting up a drip irrigation system for the first time may seem like a daunting task. Set up does take some time, but none of it is beyond the skill level of the average gardener. With a little understanding and time, drip systems are easily installed.

Drip irrigation parts:

- Check valve, back flow preventer
- Pressurized water source
- Supply line
- Header line
- Lateral lines
- Emitters
- Pressure regulator (sometimes necessary)

Drip System Assembly

Once you have a basic design figured out and you have collected the materials needed, start at the water inlet. The first part that needs to be installed is the check valve or backflow preventer. In the event of a loss of pressure the check valve will prevent water and contaminants from being drawn back into the water supply potentially contaminating it. The check valve is a very important piece of the system.

The next piece to attach is the filter. Having a suitable filter is going to help prevent plugging of the drip system. Then a header line or manifold will come off of the filter which is where you will install valves that will shut water off to the lateral lines. The lateral lines will run to the planted area and emitters or drip tape will be installed into them.

Calculating Flow

When trying to determine how many emitters you can have in a zone or the size of header line, you must add up all of the emitters in the zone and determine the flow rate. It is a lot less time consuming and costly to spend some time figuring this out than to retrofit or rebuild a system. Drip tape systems come with a flow rate/100 ft

Example: a zone with 20, 1 gph (gallons per hour) emitters will require 20 gph of flow or .33 gpm (gallons per min) flow

Example: 100 ft of drip tape with .34 gpm 100 ft

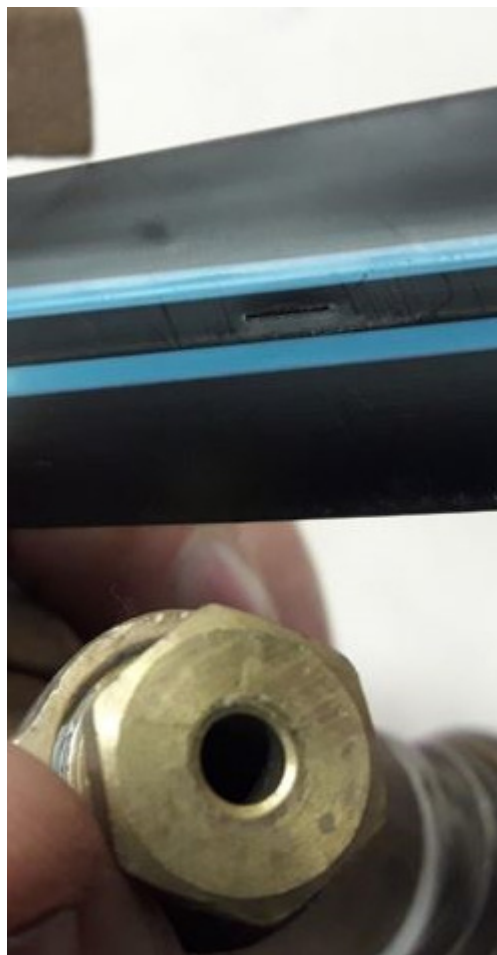
Assuming a pressure of 20- 70 psi the max flow rate is listed in the table below. There will be pressure losses if really long runs of line are used. It is good practice not to completely max out your flow rate when designing a system. Giving the potential for extra flow allows room for error in the event the system's pressure is inadequate or you need to add emitters for new plants and adjustments for plants that have higher irrigation needs than their neighbors. The irrigation needs of plants will change over time; a new nursery plant will require more frequent watering until its root system becomes established but will need less frequent watering after establishment. However as the plant grows, the total water the plant needs will increase.

	Max Flow (gallons per minute)
1/2"	14 gpm
3/4"	23 gpm
1"	37 gpm



Drip Cautions

- Drip systems conserve water. Drip systems water slowly, sometimes for several hours, and can easily be forgotten about; it is a good idea to use an irrigation timer (timer valve) to help eliminate human error, avoiding flooded soil.
- Drip systems have small orifices for water to push out and can become plugged from sediment or water scale. A filter is a necessity for a drip system. Municipal water supplies are typically much easier to use than that of the rural gardener but sediment still finds its way into the irrigation system. A good rule of thumb is to have a filter to screen out particles at least 1/10th the size of the smallest opening of the system.
- Drip lines can be damaged by people and animals. Rodents and pets can chew tubing and drip tapes and carelessness with a hoe can cause leaks.
- Really hard water may not be suitable for irrigation and should be tested; fortunately for the urban gardener, municipal water supplies are frequently tested and the information is often available to the public.



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