



DRIP IRRIGATION FUNDAMENTALS 💧💧💧

COMPONENTS OF A DRIP SYSTEM

When designing a drip irrigation system, and before purchasing any components, consult a drip irrigation specialist or your county extension agent. Most irrigation supply companies have specialists who can assist with system design and sizing. Under-sizing or leaving out a necessary component can lead to costly problems, including system inefficiencies and expensive repairs.

💧 ESSENTIAL COMPONENTS OF DRIP IRRIGATION

WATER SOURCE

Common water sources include:

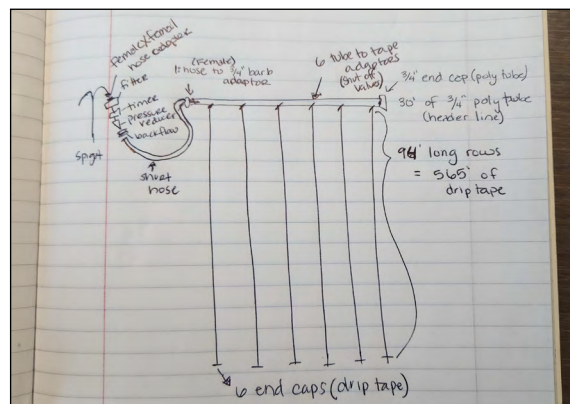
- Surface water: low cost, but often high in debris - filtration will be necessary.
- Groundwater: cleaner, but could be mineral-heavy (clog emitters); drilling a well can be costly.
- Municipal water: clean/reliable, but access can be limited and expensive.

Testing irrigation water, regardless of source, is essential, revealing pH, salt, mineral, and organic matter, which will help guide filtration, treatment, and nutrient management.



SYSTEM DESIGN PLAN

Before buying any drip system components, map out the system's layout. Using pen and paper is the simplest way to visualize a system's setup and figure out what parts will be needed. This step can save time, money, and at least one extra trip to the hardware store.



IRRIGATION PUMP

Choose an irrigation pump based on water source, number of emitters, flow rate, irrigation interval, crop type, slope, distance, and vertical lift.

Estimate minimum pump size:

$$\text{Minimum pump size (gph)} = \text{number of emitters} \times \text{flow rate (gph)}$$

It is often recommended to over-size an irrigation pump.



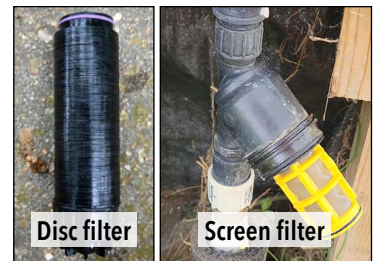
FILTERS

Filters prevent debris and sediment from clogging emitters. Filters should be located near the water source and be easily accessible for cleaning and maintenance. A 150-mesh filter is commonly recommended for drip systems.

Types of filters:

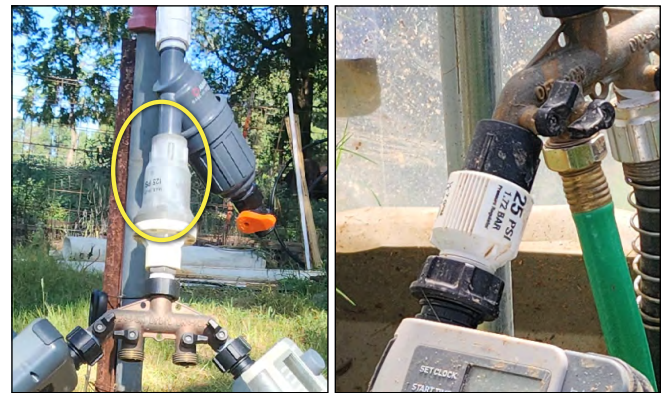
- Screen filters: Affordable, easy to use and clean; however, they require frequent cleaning and lower flow rates.
- Disk filters: Greater filtration capacity than screen filters of similar size.
- Media filters: Best for poor-quality water and high flow rates; ideal for ponds or surface water sources.

Choose a filter based on the water source and system needs.



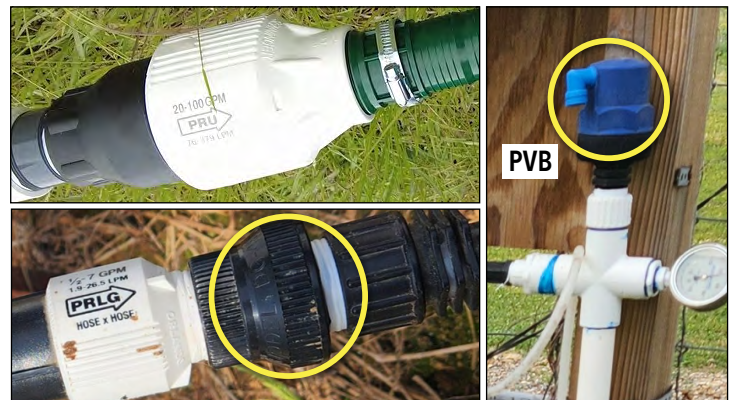
PRESSURE REDUCER

Most drip irrigation systems require a pressure reducer. Emitters are designed to deliver a specific amount of water at low pressures, typically between 10 and 25 PSI. Operating a system at higher pressures can reduce emitter efficiency, cause damage and even lead to blown lines. For best results, it is recommended to install a pressure reducer downstream from a filter or check valve.



BACKFLOW PREVENTER OR CHECK VALVE

A check valve ensures water flows in one direction, protecting equipment (such as pumps) from damage and preventing contamination of a water source by fertilizers, chemicals, or soilborne pathogens. It can also keep an irrigation pump primed by preventing water from flowing back to the source. While similar in function to a check valve, backflow preventors offer more layers of protection and are often legally required when using municipal water. A pressure vacuum breaker (PVB) is a type of backflow prevention device that protects the system against back-siphonage.



MAINLINES AND HEADER LINES

Main and header lines can be made from a variety of materials. Common options include:

- PVC: Often used for mainlines in perennial systems or when the main line is buried.
- Layflat hose: Common for header lines or temporary main lines that rest on the soil surface.
- Polyurethane tubing: Typically used for header lines resting on the soil surface.

When designing a drip system, be sure to choose the correct size for the main and header lines to ensure they can carry enough water to meet the system's needs.



DRIP TAPE OR TUBING

Emitter and line spacing, as well as emitter flow rate, should be based on crop type, plant spacing, and soil texture. In-line emitter tape with built-in turbulent flow emitters is the most common drip tape in vegetable and small fruit production, offering quick installation and good clog resistance. For long-term crops with wider plant spacing like orchards, more durable tubing with point-source emitters is preferred, since point-source emitters are separate from the tubing they can be spaced as needed, and more can be added as plants grow.



PRESSURE COMPENSATING EMITTERS

Elevation changes in a drip irrigated row will affect pressure, reducing emitter uniformity and compromising water and nutrient efficiency. A rise or drop of a single foot will shift pressure by ± 0.433 PSI. Pressure compensating emitters can help overcome these pressure changes and maintain uniform flow.



HEADER LINE TO TAPE ADAPTORS

A header line to tape adaptor connects the main water supply line to the drip tape. Choosing the right type of adaptor for a system's materials is essential, as it ensures a secure, leak-free connection between the header line and the tape. While not essential, adaptors with shut-off valves can be useful for repairing a leaking drip line or for shutting off water to one bed without affecting others.



END CAPS

Each drip line must be closed at the end to prevent water from escaping and to maintain the pressure needed for even drip distribution along the tape. There are several ways to do this, but end caps, though more expensive than other methods, offer the added advantage of making routine system flushing easy.



COUPLERS AND GOOF PLUGS

Leaks can happen, whether from rodents, tools, UV degradation or during installation. Keeping drip tape couplers (or couplers that match a system's materials) on hand allows for quick repairs. Fast fixes help keep irrigation on schedule, protecting plants. Goof plugs are useful for repairing accidental holes in header lines or for sealing spots where a drip line has been moved or removed.



VARIOUS CONNECTORS AND ADAPTORS

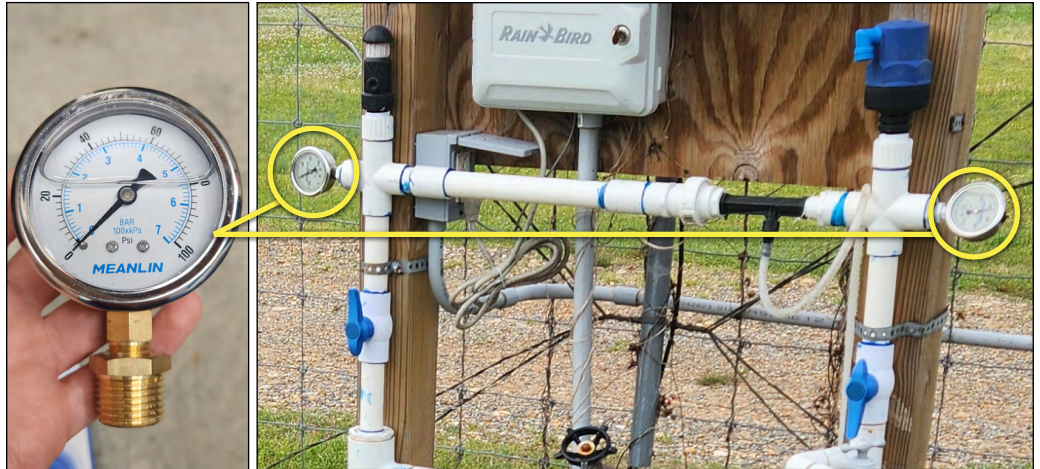
No matter what material is used for the header, mainline, or drip tape/tubing, various connectors and adaptors will be needed to join the pieces and sections together. The specific components needed will depend on the system's design and materials.



💧 SYSTEM ENHANCERS

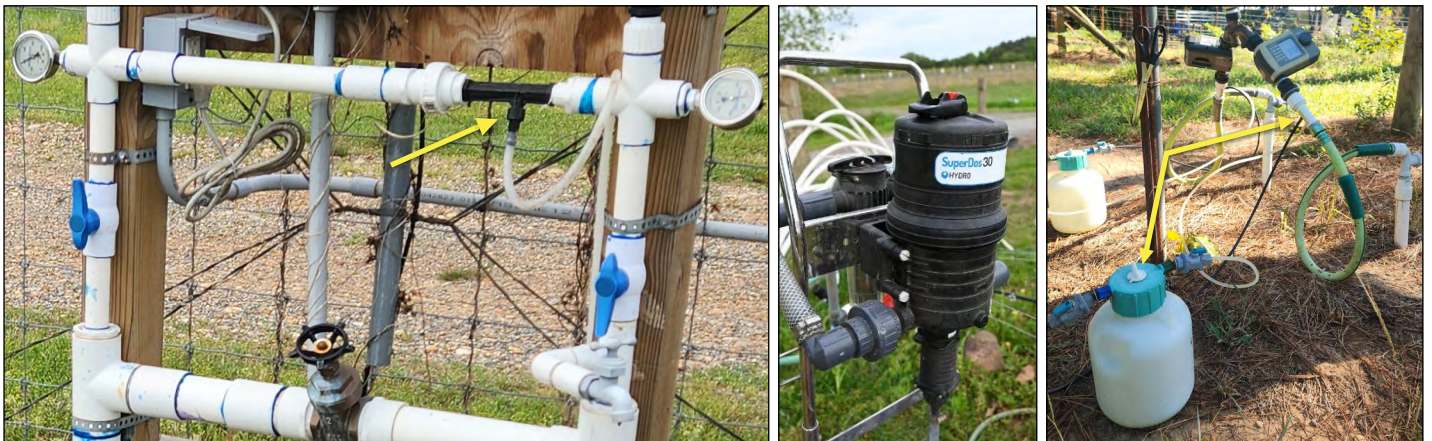
PRESSURE GAUGES

While not required for proper operation, installing pressure gauges at key points can help diagnose low- or high-pressure problems, verify that pressure reducers are working correctly, and protect other components from damage.



FERTILIZER INJECTORS

Adding a fertilizer injector to an existing drip system, or including one in the original design, is another advantage of drip irrigation. Fertilizer injectors vary widely in quality, complexity, and the size of the area they can serve. Choosing the wrong size injector is a common mistake that can reduce system efficiency and water pressure. It's important to select an injector that matches the size of the system, and seeking advice from an expert can help ensure the right fertilizer injector is selected.

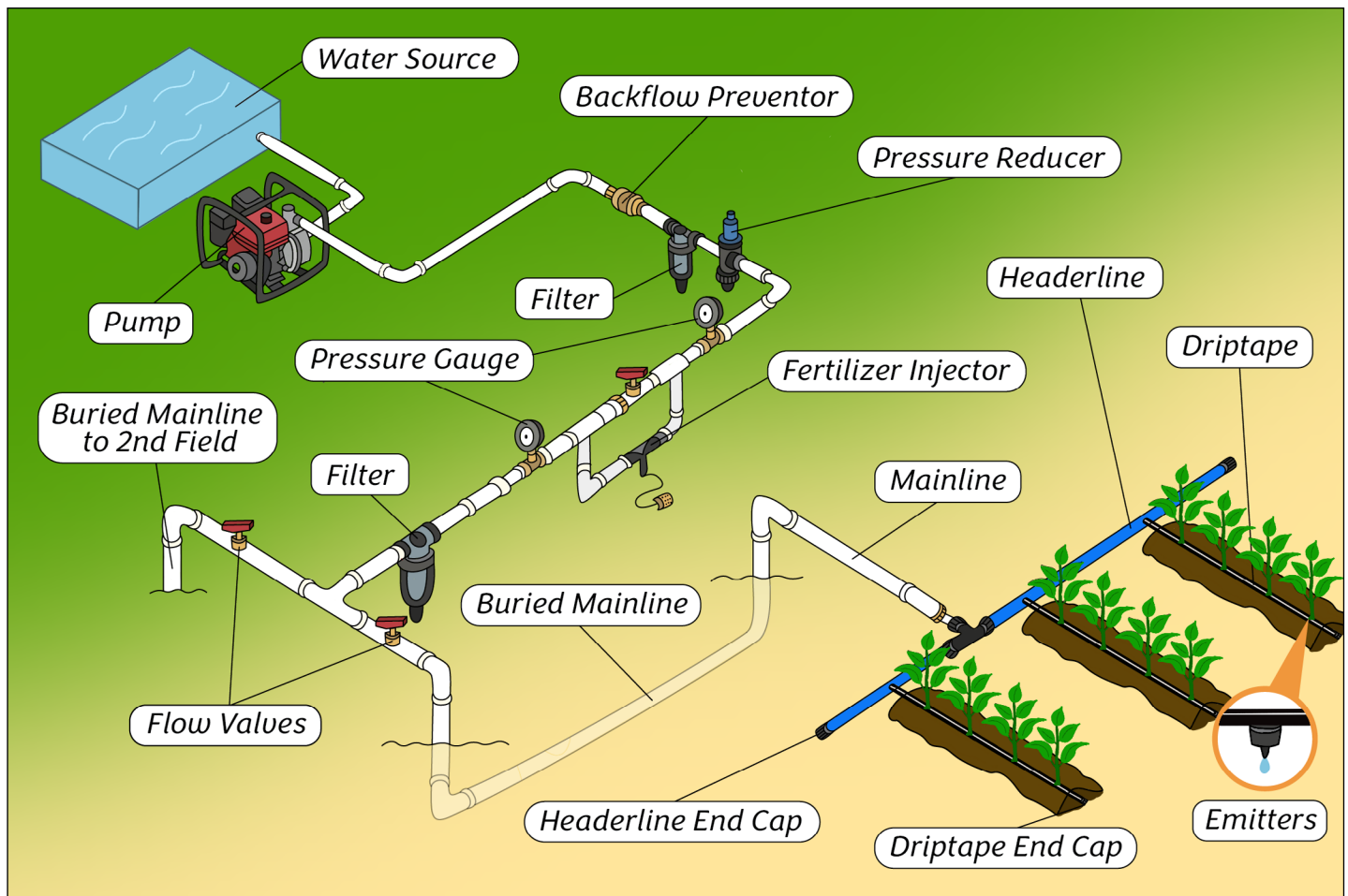


IRRIGATION TIMERS AND ZONE CONTROL VALVES

Automating a drip system is relatively easy and inexpensive, and it can save both time and labor. A simple battery-powered irrigation timer works well for smaller or single-zone systems, while larger systems or those with multiple zones may benefit from a zone control valve. Installing a zone control valve typically requires additional components.



CONNECTING ALL THE PARTS AND PIECES



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