



DRIP IRRIGATION FUNDAMENTALS

TROUBLESHOOTING A DRIP IRRIGATION SYSTEM

A well-functioning drip irrigation system can save time, conserve water, and deliver moisture exactly where plants need it. But like any system, a drip system can experience issues. Clogged emitters, uneven water distribution, leaks, or blown lines can reduce its efficiency and effectiveness. This troubleshooting guide offers some simple steps to quickly identify common problems, understand their causes, and get a system back in top shape.

NO OR LOW PRESSURE IN THE LINES?

A loss of pressure in a drip system can be the result of a few issues. The most common causes include contaminants clogging a part or parts of the lines, dirty filters, or leaks. If a fertilizer injector is incorporated into the drip system, an undersized or incorrectly installed injector can also reduce pressure in the lines (see our paper on Troubleshooting your Fertilizer Injector).

1. If you are using an irrigation pump:

- Check that the pump has power (electricity, gas, etc.) and is running properly.
- If a check valve is part of the pump intake line, make sure it is installed correctly (Image 1).

If the pump is working correctly, or the system does not include a pump:

2. Check that water is flowing:

Whether an irrigation pump, municipal water, or other water source is used, the system will likely have more than one valve throughout the design.

- Make sure all valves are in the correct position.
- If using an irrigation timer, check that it is on.

If valves are in the correct position, and the irrigation timer is on, but there is still no/low pressure in the lines:

3. Check the filter(s) and pressure regulator (Image 2)

- A dirty or damaged filter(s) can allow debris into a system, clogging lines and emitters.
- A malfunctioning pressure regulator may cause pressure to drop too low.

If filters are cleaned and back in place, but there is still low pressure:



Image 1. Check valve with arrow indicating the correct flow direction.

HELPFUL HINT: Review the pump's operating manual. Check the pump's capacity; an undersized pump will struggle to pressurize the whole system. Also check the pump's suction capacity and lift. A pump has a limit on the vertical distance it can lift water. If the pump is located too high above the water source, it can struggle to pressurize the system.



Image 2. Washing a screen filter.

4. With the system on, walk your field:

Look for wet spots such as flowing or puddling water (Image 3). Any of these can indicate holes, cracks, blown lines, or poorly fitted or disconnected couplers.

HELPFUL HINT: If you are using plasticulture, and your drip tape is buried, you may hear water hissing under the plastic if the tape has a hole.

If the pump is working, water is flowing, holes have been patched and the filter(s) are clean, but pressure remains low:

5. Flush the main line, header line(s), and drip lines.

Flushing lines can remove any debris (such as dirt, algae, or fertilizer particles) that may have found its way into the system.

Remember, if a system includes a fertilizer injector, this could also cause a loss of pressure.

💧 THE ENDS OF THE DRIP TAPE KEEP BLOWING OPEN

Blown or split drip lines are most often an indication of too much pressure in the drip lines. Whether drip tape or tubing is used, most drip systems are designed to operate within a pressure range of 10 - 25 PSI.

- For blown lines, check the pressure regulator. If the system does not have a pressure regulator, it's time to get one.
- A missing or malfunctioning pressure regulator may allow too much pressure in the drip tape, causing the ends to pop open or the tape to split (Image 4).

💧 THE SYSTEM IS WATERING UNEVENLY

Uneven watering in a drip system is often an indication of a pressure issue, clogged emitters, leaks, incorrect emitter spacing or flow rates, or a layout that doesn't match the system's capacity.

1. Check the filter(s) and pressure regulator

- A dirty or damaged filter(s) can allow debris into a system, clogging lines and emitters (Image 5).
- A malfunctioning pressure regulator may allow pressure to rise too high or drop too low (Image 5).

2. If the filters are clean and the pressure regulator is working correctly, check for clogged or partially clogged emitters.

Inspect the emitters in the area(s) that is not getting adequate water. Dry spots could indicate clogged emitters. Flushing the system will help remove debris and unclog emitters.

HELPFUL HINT: If emitters clog frequently, this may indicate that filters need to be cleaned more often, or installing an additional filter might be necessary.



Image 3. Water flowing between rows, indicating a hole in the drip tape.



Image 4. Drip tape starting to split due to high pressure.

HELPFUL HINT: A drip system doesn't require a pressure gauge to function, but adding one (or more) at key junctions can make it easier to catch and diagnose pressure issues.

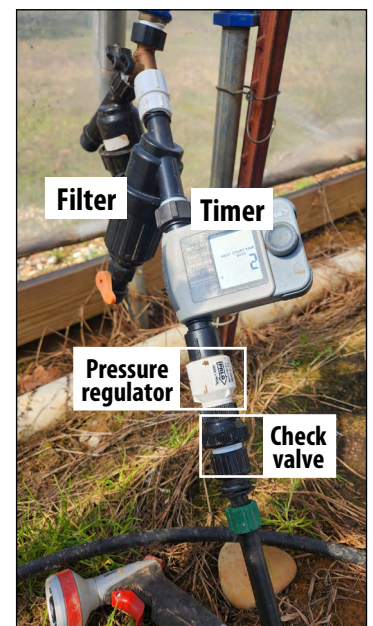


Image 5. Drip irrigation set-up inside a high tunnel.

If the filters are clean and the emitters don't appear clogged, there may be a bigger issue with the system. However, there are still a few simple steps that may help get things running smoothly again.

3. Look for wet spots such as flowing or puddling water

Wet areas, or flowing water, could indicate holes or cracks in the tape or tubing, blown lines, or loose couplers. Any of these issues can keep water from reaching other areas of a field.

4. Flush the main line, header line(s), and drip lines (Image 6).

Flushing lines can remove any debris (such as dirt, algae, or fertilizer particles) that may have found its way into your system. If drip lines have been flushed, filters and emitters cleaned, and damaged or leaking lines repaired, but watering is still uneven, the issue may be related to the overall design or setup of the drip system. Sizing and design problems can be more challenging to correct and may require more costly solutions. To help avoid any mid-season headaches, it's a good idea to consult an irrigation specialist before installation to make sure the system is properly sized and designed. Below are some common design mistakes that can result in uneven watering.

5. Are different crops being watered on the same irrigation zone?

Different crops have different water needs. When selecting drip tape, crop type should guide emitter and tape spacing, flow rates, and run times. When multiple types of crops share the same line, some may be overwatered while others may not receive enough water.

HELPFUL HINT: When designing a drip irrigation system, group crops with similar water needs together or create multiple irrigation zones (Image 7).

6. Consider the slope of the area being irrigated

Uneven terrain can result in pressure differences along the dripline, causing water to pool in low-lying areas while under-irrigating at higher points.

7. What is the diameter of the main and header lines?

- The size of the main and header lines will determine how much water can move through a system at once. If the lines are too small to feed all the emitters, the system may not fully pressurize, which can result in poor or uneven irrigation.
- If this is the case, there are two ways to address the issue. The undersized lines can be replaced with larger tubing that can supply enough water to fully pressurize the system, or the irrigated area can be divided into smaller zones so that a smaller section is pressurized at one time.



Image 6. Flushing a drip tube line.

HELPFUL HINT: Just like with emitters that clog frequently, a lot of debris in a system may indicate that filters need to be cleaned more often, or installing an additional filter might be necessary.

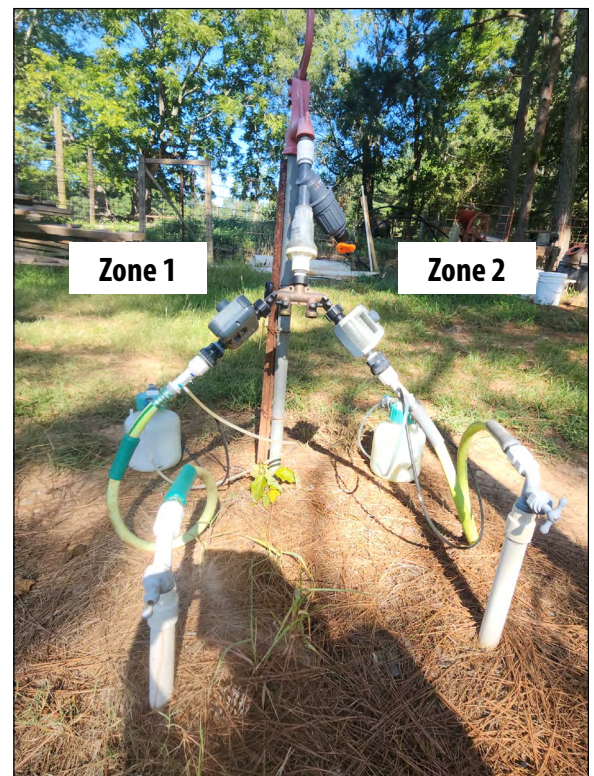


Image 7. A field with mixed crops is split into two irrigation zones.

HELPFUL HINT: If the field is sloped, consider using pressure-compensating emitters or pressure regulators to ensure uniform irrigation (Image 8).



Image 8. A bag of pressure compensating point source emitters.

8. How long are the drip rows?

- The length of each drip row also affects the system's ability to fully pressurize. How long a single drip row can be varies quite a bit and depends on factors like the number of emitters, their flow rate, the slope of the field, and the size of the pump. When rows are too long for the system's capacity, pressure can drop off before water reaches the end of the line, leading to uneven watering.
- If this is an issue, replacing the drip tape, or dividing the irrigated area into smaller zones are the best possible solutions.

HELPFUL HINT: When selecting drip tape, and determining irrigation layout, factors such as soil type, crop, system capacity, slope, flow rate, and more should all be considered. Manufacturer specifications and pressure-loss charts can help determine maximum run lines.

A good drip system should make life easier, not give headaches. A little routine maintenance goes a long way in keeping a system running smoothly and delivering water right where plants need it (see the Pre-, Mid-, and Post-season maintenance checklists). By keeping an eye out for pressure changes, leaks, clogs, and worn-out parts, many issues can be caught early and larger problems avoided down the road.

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