Maintenance Tips for Drip Irrigation

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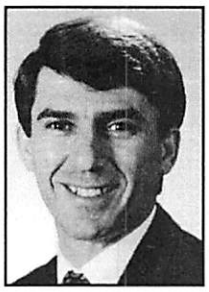

Chalk up another one for posterity, another spring season that is. While the 1997 bedding season isn't officially over yet, we should have a pretty good idea by now about whether it is going to be a good one or not. After all the spring rushes I have been through, it still excites me to experience yet another one and I hope you feel the same.

As the dust settles on the spring rush, summer brings time to perform maintenance chores on our irrigation systems. These systems get us through the busy season by automating the most important and most time-consuming chore in our greenhouses... watering. I may only rely on my drip system to do my watering for two months, April and May, but during this period it is worth its weight in gold!

Preseason Maintenance

There are two types of maintenance chores that I try to keep up with on the systems. The first type is performed when a system is being "fired up" for the first time after being idle for months. This involves fixing leaky solenoid valves, cracked pipe fittings, and broken drip tubes. Seasonal changes in the greenhouse environment are extreme and expose equipment to temperature fluctuations that can range from more than 100 F in the summer to below 0 F if the house is unheated during the winter. Moisture is ever present in the greenhouse and causes electrical connections to age prematurely.

Solenoid valves may need to be tightened after months of daily expansion and contraction. Occasionally the diaphragm may need to be replaced. It only takes a pinhole or tiny crack to cause it to fail. Most often, "fail" means the valve does not shut off properly, continuing to run and flooding its zone. The electromagnet that activates the valve may also fail after years of use. For most brands of solenoids, this involves nothing more than disconnecting the old one, unscrewing it from the valve body, and reinstalling a new one. I always keep a few spare solenoids around to use for parts. A version of Murphy's Law comes into play here. Solenoids never fail on quiet, peaceful days in March. Instead they wait until noon on a Saturday in May when the weather is sunny and hot, the plants are thirsty and dry, and the parking lot is full of cars belonging to very anxious gardeners. I doubt there is anyone who hasn't had this scenario to deal with once or twice.

Repairing broken fittings also comes with the automation territory. When working with PVC, remember that the glue needs time to cure. You cannot pressurize immediately after making the repair. If repairs are made in-season, a hand watering or two may be required while the system is down.

Drip tubes are easily broken from their headers during crop shipment if someone forgets to pull the stake out of the pot before removing the pot from the bench (figure 1). Because this happens at the end of the crop cycle, these missing tubes may not be noticed until the next crop is planted. Don't worry about hunting them down. They will identify themselves by a 20-foot stream of water that says "here I am, come fix me" the first time the system is turned back on.

These minor repairs are relatively easy and do not require much time to perform. In most cases, you either fix the problem or you don't have an operational system. Lastly, to keep this discussion in perspective, let me say that the time involved in routinely conducting these maintenance chores is nothing compared to the time these systems save us during operation.

Postseason Maintenance

The second kind of maintenance involves the water that moves through the drip system, and includes cleaning in-line filters and treating the system for sediment and microbial accumulations. Nothing says that these chores have to be addressed at the end of the season, but this is the time that I have been most likely to perform them.

When dealing with water filtration, remember that the filter is your friend. On a few occasions, I have been fooled into believing that my filter was actually my enemy when, in fact, it was the sand and grit the filter had trapped that was trying to do me in. I usually experience system failure once a season, because a filter was so clogged that not enough water could pass to fully pressurize the system. With 20 greenhouses to keep track of, it is easy for a filter to escape my cleaning routine.

There are two common types of filters, screen and disc. Screen filters have been around much longer and consist of a fine mesh screen mounted on some type of support, usually in the shape of a tube. As the water passes through the screen, particles larger than the mesh of the screen are caught and prevented from entering the system.

Cleaning a screen is easy if you have a cleaning brush that is small enough to fit into the tube and soft enough to not damage the screen. All it takes is a small hole in the screen to render it ineffective. If you damage a screen, discard it rather than taking a chance by reinstalling it or saving it as a backup. A broken screen is not much better than no screen at all.

The second and newer type of filter is a disc filter, which consists of many (perhaps 100) thin discs shaped like large washers stacked on a support to again form a tube. Each disc has tiny channels formed into its upper and lower surfaces, giving each surface a rough, patterned appearance. When the filter is pressurized, the discs compress against each other and only allow water to pass through these preformed channels. Particles that don't fit into the channels are filtered out of the stream.

Disc filters can also be cleaned. After removing the assembly, the discs will decompress and allow access to the channels in the individual discs. Some can be soaked in acid to remove precipitates. I always have a replacement on hand for an emergency or in case I can't clean the filter right away.

Both types of filters are usually equipped with backwash valves. Use this feature. Much of the accumulated debris can be backwashed if done on a regular basis. "Regular" depends on how much the system is used; the more it is used, the more debris will accumulate and the more often it should be backwashed.

How frequently you need to clean and backwash filters also depends on the quality of your water source. If you are pumping from a well, pond or river, make sure you provide adequate filtration. While municipal water sources are put through varying degrees of filtration, they still require additional filtration on-site. Every drip system needs some filtration, regardless of water source. A good rule to use is : if in doubt, install a filter.

Chemical Treatment

Some water sources contain sufficient amounts of minerals that can precipitate and accumulate in headers, drip tubes, and emitters over time. Calcium deposits can clog channels in drip emitters and either reduce water flow or prevent it completely (figure 2). Treating the entire drip system during the off-season with various acid solutions can dissolve and remove these precipitates before they cause system failure.

Microbial growth inside drip lines also causes clogging. Common types of algae that cause problems on greenhouse floors, benches, and soil surfaces are present in water supplies and , along with sunlight and nitrogen, flourish in the greenhouse environment. Materials used to construct drip lines and tubes are colored black to minimize light penetration of the line. White PVC piping is a common material used in greenhouse plumbing lines. During routine plumbing work, I regularly find a green layer of algae lining the inside edge of my pipes. This layer of algae is much more common in pipes carrying fertilizer because of the rich nutrient environment that is constantly present.

Common greenhouse disinfectants such as Green-Shield® can be used to flush drip systems and maintain microbial populations below problem-causing levels. Before it became illegal to do so, common household bleach was used for this purpose. A word of caution for those who do not keep up with this system treatment. If you have a drip system that has been operating for a number of years and you have never

treated it for microbial growth, you may create more problems by treating at this late date than if you leave well-enough alone and do not treat it at all. If you suddenly kill what has been growing in there for years, the dead material will flake off of the sides of the lines and move with the flow of water. You could end up clogging a whole lot of emitters by trying to do the right thing. The bottom line is to adopt this practice as preventive maintenance and keep microbial populations from establishing themselves in the first place.

To Err is Human

An important aspect of my articles and talks is the fact that I am a grower who makes my living practicing those things that I write and speak about. This reality lends a certain amount of credibility to the message. I believe the maintenance chores discussed in this article are important, but I must confess that if you were to visit my range today, you would probably find a few leaky solenoids and clogged emitters here and there. I try to maintain filters, but I do occasionally have one clog on me. I have been negligent in off-season treatment for mineral and microbial accumulations. My justification for not keeping up is that with more than 100 solenoid valves in use and more than 25, 000 emitters.... how could anyone be expected to be on top of every one? Isn't it funny how we all have our twisted ways of rationalizing our responsibilities away?!

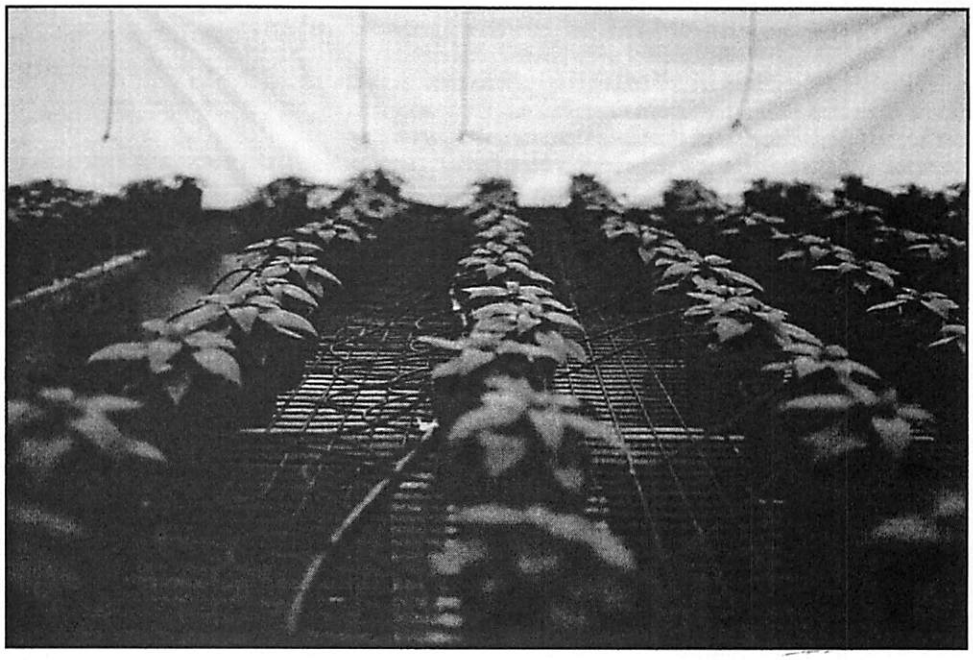

Figure 1. With drip tubes seemingly everywhere on a bench, it is inevitable that one or several will be pulled from the header as crops are moved or removed from the bench.

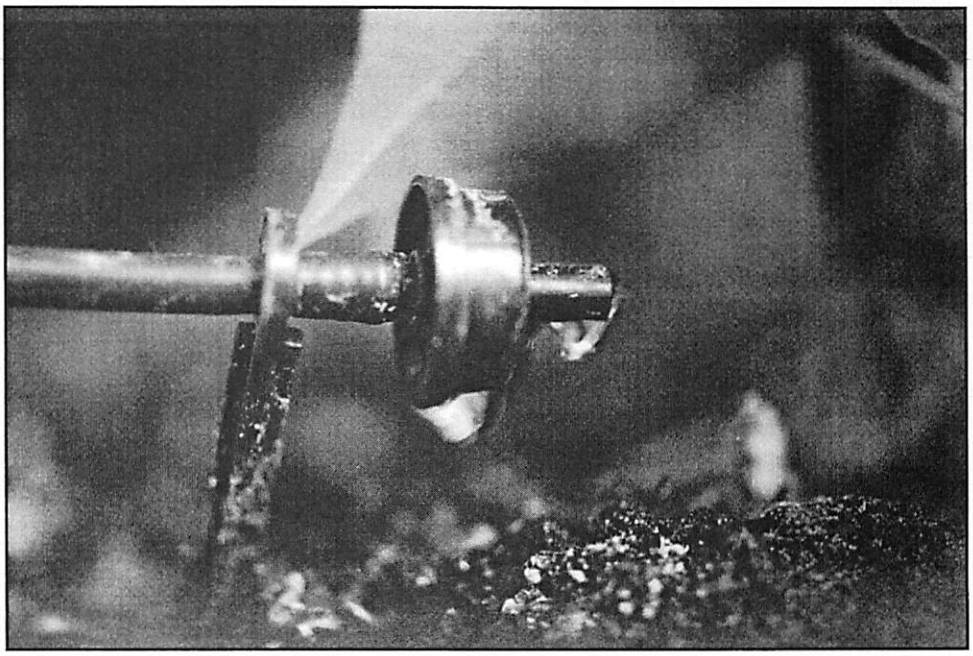

Figure 2. Allowing calcium deposits to build up will result in clogging of emitters. Ignoring filter screens and allowing microbial build up (or even cleaning heavy deposits) can also plug emitters.