

Campesino's DIY Auto Drip and Drain

I grow in Coco/Perlite and practice high frequency fertigation. The system that I describe is designed to be able to allow you to fertigate multiple times per day without supervision. You could also use this system with soil, but at much lower fertigation frequency.

If you are growing in Coco, it is best to practice high frequency fertigation. This is adding nutrients to all water and applying water at least daily. I currently Fertigate 4x per day, and my plants are paying me back with giant beautiful colas. To learn more about how to manage your Coco grow be sure to see [Campesino's Guide to Growing in Coco!](#)

The only way to effectively fertigate this frequently is to set up an auto-drip system. This post about my Drip and Drain has been a while in the making. On several occasions I have felt ready to post about it only to discover another problem or start worrying about another issue. Although, I feel confident again, there will always be more to learn.

My system is not perfect! I already know a few ways that I plan to improve it and I discuss some of those below. I am sure that many of you may come up with ways to improve it as well and when you do, I hope that you'll share 😊

That said, my system works. It is reasonably priced and easily set-up. I have had it running for over 6 weeks and the plants are happy! It has made high frequency fertigation possible and simultaneously dramatically eased my workload for the grow. I am able to leave them for up to 9 fertigation events. I have left 3 of the last 4 weekends and my plants are approaching harvest! Coming from twice daily hand-watering, this is like being let out of jail! Freedom!

Basic Set-up: I have a res tank that sits outside my tent. One main waterline goes into the tent and several smaller lines are attached to that. My pump sits in the res and runs on a timer. Each pot has 4 drippers distributing water. The pots sit on elevated self-draining saucers, which empty to my "Automatic Pumping Drain Bucket". In my system, I needed a pump to get rid of waste-water because I don't have additional gravity (height) to play with. The "Automatic Pumping Drain Bucket" moves water from the tent to a drain bucket that sits outside of the tent.

Be Aware: All of the plants that you put on the drip system will get the same nutrient solution. You can revert to hand-watering to do flushes when needed. However, as a general rule, you want to be able to give the same nutrient solution to all of your plants at every stage of the grow. This means choosing strains which enjoy similar EC and which will mature through the flowering cycle on similar timelines.

There are three basic systems: The Drip System, The Self Draining Saucers, and the Catchment. I will discuss each. After discussing the set-up, I share some tips and strategies for managing the system.

This is offered as a community resource.

Thank you to all who offered advice to me in setting this up – and to all of those who offered feedback on advanced drafts of this write-up! 😊

Special Thanks to: @Obi-wan @Chefbjy @Stainsgrow @Rosettastoned @Gurnsy @oldjarhead100 @Cronk

The Drip System

Components: Total Cost for Drip System \$136.65

Res Tank: 14 gallon \$28 <http://a.co/hwx4jWv>

I like the Res tank that I got! However, it is tall and therefore incapable of holding more than 8.5 gallons after a fertigation event because of the siphon problem. Still, 8.5 gallons is enough for most situations and the height offers the possibility of using a pump and fountain style aeration. I drilled a hole through the top edge of the bucket to run the water line. I cut a hole in the lid to run the power cord, air-pump line, and thermometer probe. I covered the small hole in the lid with fabric and held all in place with duct tape

Oxygenation: Air pump and stone \$8 <http://a.co/a9lZXzx>

This is one of the areas in which my system could improve, but to be honest the little pump seems to be doing a great job. Price was certainly right and it is all you need to start. Eventually I may get something like this: <http://a.co/id1OTI2>

Pump: 320 GPH \$22 <http://a.co/cLqsD6l>

This pump ran 24 drippers with no problem. Flow wasn't super high, but I didn't want that. Flow was more than adequate for 6 plants and 24 drippers. I think this pump is perfect for 3-6 plants getting 1 quart to half gallon per event.

Timer: Digital timer \$13 <http://a.co/4d7z97E>

This timer has battery back-up, is easy to program, can set many cycles per day, and is programmable in minutes. It would be great to be able to set fertigation events in smaller increments, but I have made minute granularity work.

Thermometer: Aquarium thermometer \$7 <http://a.co/j5io7nf>

Supply Lines and Drippers: Purchased locally (Total \$58.65+tax)

- Main line: **5/8" Poly hose**. I paid \$7.78
- Connectors: I used "**clamp and pierce connectors**" which were incredibly simple. I paid \$17.94 for 15
- Drinker lines: **1/4" PE tubing**. I paid \$5.98 for 50'
- In-Line Drippers: "**1 GPH mini inline drippers**" I paid \$8.95 for a bag of 25
- Terminal Drippers: "**Adjustable 180 Stream Bubbler On Stake**". I paid \$15.92 for 12
- Plug: You need a **plug** for the end of the main supply line. I paid \$2.08

There are many options for distributing water to the plants. You can run inline drippers and bubblers on a stake (like me), or use halos or other devices designed to distribute the water. Based on my experience talking to and working with other growers with drip systems, they all have problems distributing the water thoroughly. I started with only the bubblers (two points of fertigation per pot) and distribution was inadequate and my tips were burning. It has been much better once I added the inline drippers and created four points of fertigation.

My system seems to be as good as the halos and I like the adjustability and relative cost. Regardless, of the drippers/distribution system that you use, I recommend hand-watering at

least once per week to prevent dry spots and salt build-up. I discuss this further in the management section below.

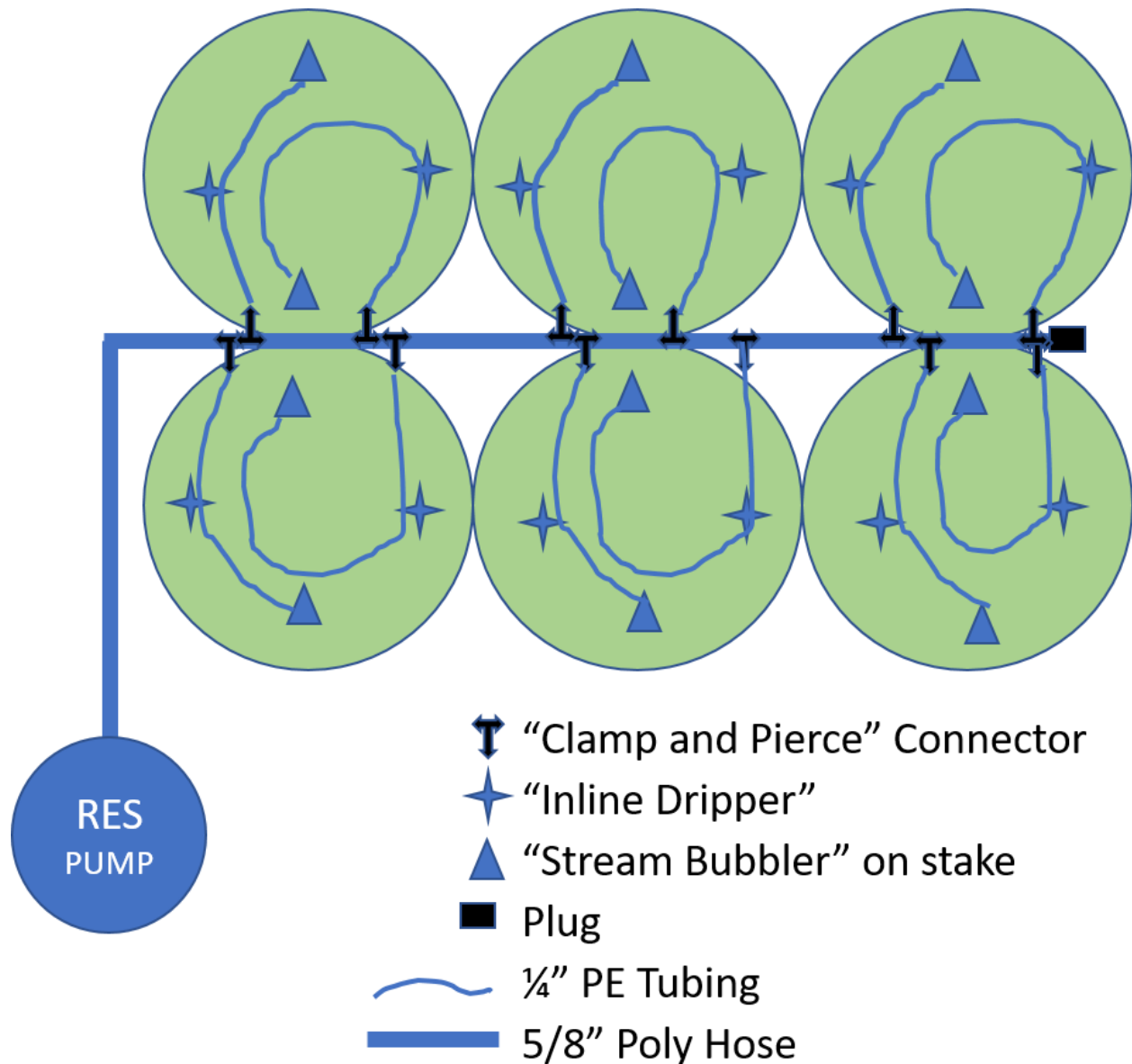
Be Aware: The water pressure in the system is not as high as normal water pressure. The drip bubblers are designed for outdoor use on normal (full) water pressure. On their labels, there are pictures where it will look like they spray water around – but in this system, they will just leak. If they are adjustable, you will be able to control how fast they leak, but they will not really distribute the water. You need to distribute the water using at least four points of fertigation!



Drip System Assembly and Installation

Drip System Schematic

Overhead View



Assembly: Assembly was incredibly easy. Attach the plug to one end of the main line and clamp the connectors at their approximate positions. I use two connectors per plant for two dripper lines. Each dripper line has one inline dripper and then the "stream bubbler on stake". Everything just goes together with a little force. If you are struggling you can dip lines in thermos of HOT water and it will be easier.

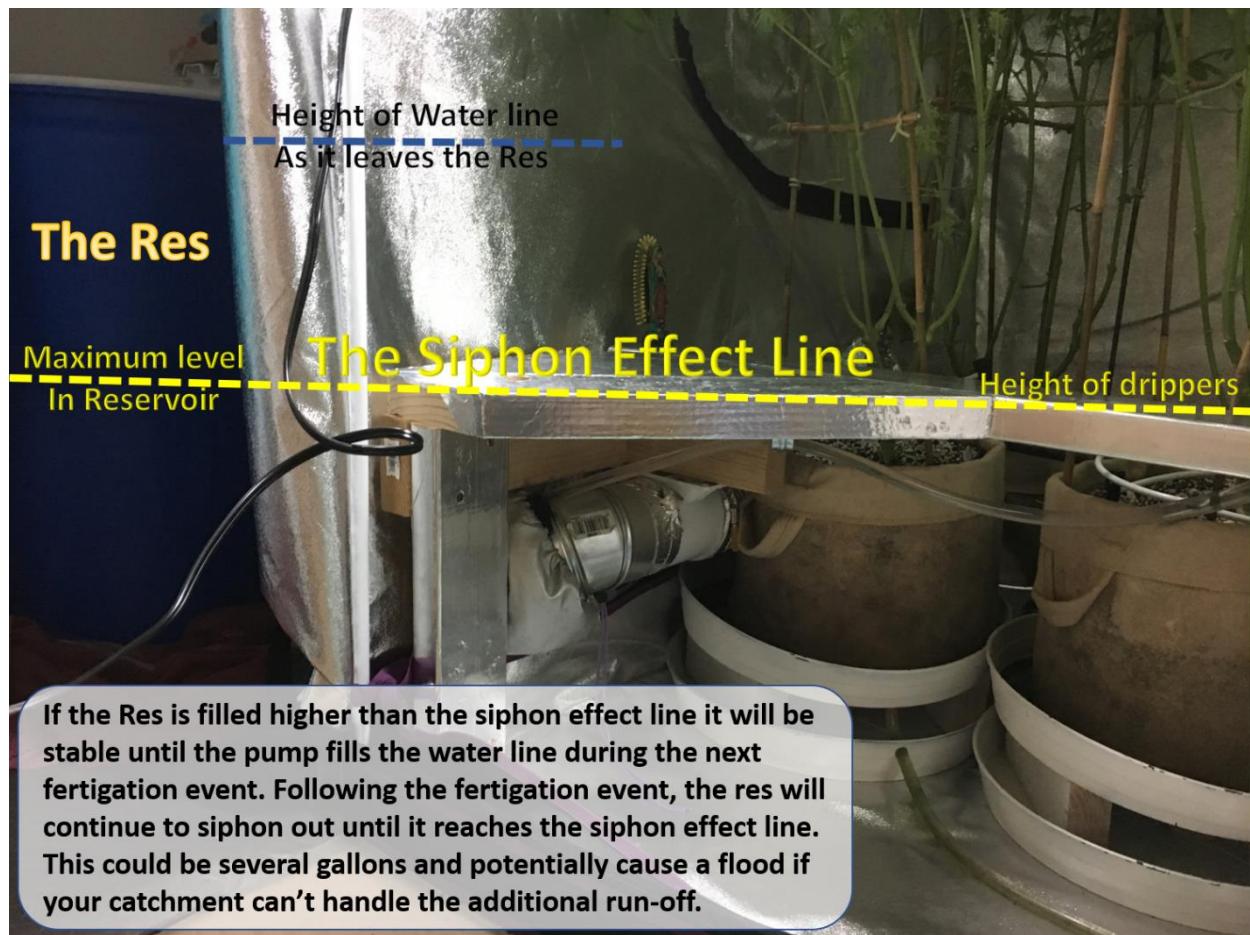
Installation: The bubblers should be placed such that the two adjustable bubblers are across from each other at (12 and 6 positions of a clock) and the inline drippers are filling in the gaps (3 and 9 positions). See Overhead View Schematic above.

The bubblers are adjustable and it has been pretty easy to adjust the flow to each plant in place. My fertigation events are 2 minutes and that gets each plant about 1 quart.

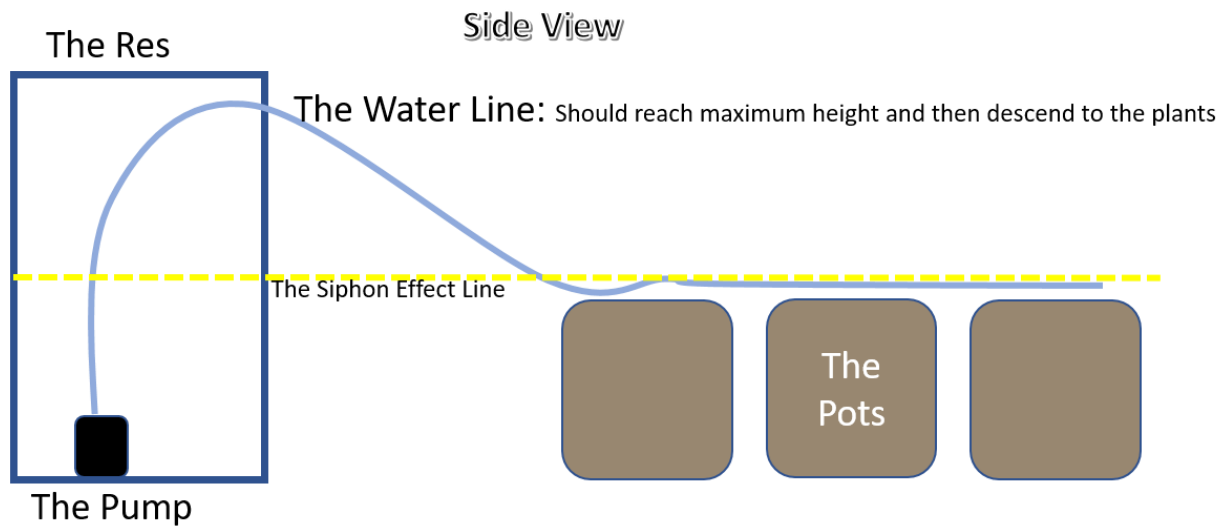
The line from the res should reach a high point between the res and the plants. This ensures that the line drains after each event. See Side View Schematic Below.

Tools required: Scissors/snips to cut water lines, and Drill with 7/8" bit for hole in Res tank to pass water line.

Caution: The Siphon Effect! The water level in the Res must be lower than the height of the drippers. Otherwise a siphon will be created and water will flow out of the Res until the water level is at the same level as the drippers. In my set-up, my plants are high enough that I can keep 8.5 gallons in the tank without siphoning. (When I leave town, I over-fill my tank by one gallon, knowing that after the next fertigation event the tank will have 8.5 gallons remaining. This gets me one extra "event").



Drip System Schematic



Assembly Photos



Installation Photos



The Drainage System

For Drainage there are two systems. Self-Draining Saucers and a Catchment.

The Self-Draining Saucers

I have had these since I started this indoor grow last year. They are very useful whether you are using and automatic drip system or hand-watering. I already made a post about my self-draining saucers, so rather than repeat that here, I will simply link to it: [Campesino's Self-Draining Saucers](#)

The Catchment

This is where I had to get creative. My self-draining saucers raise the plant 3.5" and I needed to work with only that amount of space. It was not enough to just get a shallow pan or saucer, so I had to create an "Automatic Pumping Drain Bucket". If you can raise your plants higher, perhaps raise the whole tent,

then you can simply use gravity to drain into a bucket. If you cannot raise the plants, then you may want to consider a system like mine. It works great with the plants only 3.5" off the ground.

All of my self-draining saucers have 1/2" drain lines. I cut holes 2" from the bottom of a bucket and attached grommets. I then fed each drain line into the bucket. Inside the bucket is a "Shallow Pan Condensate Pump". This is a pump that is designed to sit in a tray (or bucket) and turn on automatically when the water reaches a certain height. I had to get the "shallow pan" model, which turns on in only 1.75" of water and shuts off again when water is about 1". The saucers drain into the bucket and the pump evacuates the waste water automatically. I pump it to a separate 5-gallon bucket that sits next to my Res tank. The pump was expensive, but be careful about cutting corners here. I did a lot of research and if this is your problem, this pump is an excellent solution.

Shallow Pan Condensate Pump, \$115: <http://a.co/hlAzpbX>

The Automatic Pumping Drain Bucket



Managing the System

My system has really been very easy to manage and maintain, but it didn't start out that way. I suffered a bacterial infestation in the res during the first two weeks and had to change my practices. Since then, I have a firm handle on the tank and the numbers are stable. I also dealt with some tip burn as a result of poor water distribution in the media. I have rectified that situation as well, and hope that you can learn from my experience!

Finally, I provide the information that I looked everywhere for before figuring it out. How to time multiple fertigation events.

Managing the Res:

To prevent bacterial infection, it is important to use a couple of products that you may not have been using with hand watering. It is also important to keep your water oxygenated and this usually requires also keeping it cool.

1. In the tank: In addition to my normal nutrients I add H2O2 and SM-90.

- The Hydrogen Peroxide (H2O2) that you need is not the stuff that you use for first aid. The first aid stuff is 3% the horticulture stuff is 29%. You need to use the 29% stuff. 2.5ml/gal. Add it last, just prior to adding to the res.
- SM-90 is going to play several roles, but critically here it is an antibacterial and will keep the tank smelling fresh and clean. 2.5ml/Gal

2. It is important to oxygenate the water.

You need to have an air-stone, fountain pump, or electrolysis to provide O2 to the water. Oxygenating the water not only makes it difficult for harmful bacteria to grow, it is also great for your plants!

3. Chill the Res: Ideal temperature range 65-68f; 18-20c

It is easier to oxygenate water that is cooler. This is why many hydro growers use chillers for their tanks. I do not use a chiller, but I do try to keep my tank around 68f or cooler. I do this the cheap and simple way, dropping frozen water bottles in the Res 1 hour before fertigation events. This is a potential source of bacteria, so be aware of cross-contamination (keep your frozen water bottles clean).

4. Keep the Res covered and protect it from light

It doesn't have to be light sealed, but the less light the better. I like the lid on my Res because it creates a nice seal and is easy to remove. Be sure to keep the lid on and keep the Res as dark as is practical.

5. Topping-Off or Cleaning out

The tank should be completely drained and cleaned about once per week. I have had no problem going up to 9 days between tank clean-outs. The one time it went to 10 days, I thought that problems were starting!

There will be nutrient solution left in the tank when it comes time to clean out. Plan this so that there isn't a lot! I save this water and use it to hand-water the plants. This accomplishes two things: It uses up the water and it helps water distribution.

During the week: You can simply top-off the tank with fresh nutrient solution. Always measure both the EC and the pH in the tank before adding top-off water. Top-off water should be adjusted to bring the tank back to your EC and pH targets. Neither my EC nor my pH drifts considerably now, but they used to. Knowledge is power!

At the end of the week: Drain the tank, remove the pump, air-stone, and thermometer probe. Soak these in a solution of diluted H2O2. Use H2O2 also to clean out the tank. Be careful with this stuff! It will burn the crap out of your hands. Use gloves! Rinse everything and reassemble.

6. Monitor EC and pH in the Res: I take daily samples from the Res to measure both EC and pH.

A bacterial infestation will cause pH to rise and EC to drop. If you notice this pattern in your res it is likely that you have a bacteria problem. When I first started using the system I was using neither H2O2 nor SM-90 and I consistently noticed this pattern. I also noticed that the res started to smell like a poorly maintained fish tank. These are sure signs of anaerobic bacteria (the bad kind). I caught it early and it did not harm the plants. H2O2, SM-90 and weekly clean-outs have eliminated the problem. Monitoring EC and pH are the best ways to get an early read on these issues. Since pH can potentially drift out of range, it is also important for plant nutrition to keep tabs on the pH in your Res.

Adjust EC and pH issues to bring the res back to your targets. For pH, add pH up or down. For EC, add stronger or weaker nutrient solution. But then look for the underlying issue. Ideally, your EC and pH should be pretty stable.

Water Distribution: Hand-Water once per week

Regardless of the drippers/halos/or soaker hose that you are using, the distribution of water in a drip system is always less than perfect. Do your best and be sure to use at least four points of fertigation as I discuss above. SM-90 is also a surficant and will help distribute the water more effectively. However, you should still plan to hand-water at least once per week. This will act as a mini-flush that will remove salt build-up from areas that do not get much flow. Use a little more than the normal amount of water. I always do this on tank clean out day with the water that was left in the tank. It is still clean enough to feed the plants, but I don't want to put it back in the clean Res, so it is the perfect option for hand-watering.

Fertigation Event Timing:

Duration: You need some way to adjust the flow to individual plants. If using the same drippers as I use, this is done by twisting the heads of the bubblers. If using Halos, you will need barbed valves on each line to regulate flow. These are pictured in my supplies photo above, but I wrote that "I did not use these" over their image.

Once the system is installed run it and wait for run-off. Run-off should appear from all pots at about the same time. Adjust flow to accomplish this. Note the time it took and establish fertigation event durations. My events are all 2 minutes long, which is about 1 quart per plant.

Frequency: You set event frequency based on factors that I describe in [my Coco guide](#). Generally, 2x during Veg and 3-4x during Flower. For timing events, one hour of "lights on" is equivalent to two hours of "lights off". So, on my current 4x schedule, the interval between events during "lights on" is 4.5 hours, and during "lights off" is 9 hours. Timing for these events works best as I describe below:

- 1x daily: At Lights on
- 2x daily: (for 18/6 lighting) At lights on and 12 hours later
- 2x daily: (for 12/12 lighting) At lights on and 8 hours later
- 3x daily: (for 12/12 lighting) At lights on, 6 hours later, at lights off
- 4x daily: (for 12/12 lighting) At lights on, 4.5 hours later, 4.5 hours later, 6 hours later (9 hours before cycle repeats)

As always, **I welcome your questions, comments and/or suggestions**. I have really loved having this system in place and I hope it makes your grow run better and smoother as well.

Grower Love!

Updated 6/9/18