



Dutch Bucket Hydroponic System

by [jdelta](#) on May 1, 2014

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Retired from the U.S. Navy of 24 yrs. in 1996. Was a Navy Deep Sea Diver for 18 1/2 yrs. Have always loved woodworking and still have all my fingers. Moved a lot in my career and everywhere I lived I was a homeowner. As a homeowner I always improved the home by home improvement projects. I have been working with hydroponic gardening since 4-13. I have researched, watched videos and have just been plain lucky. So far, so good. I joined a winter gardening contest last winter and was awarded the Grand Prize. See what I mean. I hope you enjoy this one. It a prelude to the next one in which I'm sure you will enjoy more. Peace to you

Intro: Dutch Bucket Hydroponic System

Here it is folks, The one you all have been waiting for. The famous Dutch Bucket Hydroponic System I have been telling you about since day one. As you recall I spoke about wanting to try building one like this. I talked about it and now here it is. It has exceeded all of my expectations and many more. I am truly impressed with how it has developed. You saw the grow table in the last instructable and now you will see how I built this. I hope you are not disappointed. I want to thank all of you for your support and comments. You have been very generous and I really appreciate all the advice.



Step 1: Man! Look at All That Stuff

Well, I had to start somewhere so I started by spreading all my parts out. Kinda looks like a big pile of parts and pieces but every item has a place. There's the water pump, air pump, timer, buckets, siphons, filter assembly, tubing, hose, and a bunch of fittings.

For starters I will explain to you what a Dutch Bucket Hydroponic system is. The real name of it is called Ebb and Flow. Also known as flood and drain, the system features a tray and nutrient reservoir combination. The tray, in our case a bucket, can have a growing medium, such as clay pebbles or rockwool or in our case perlite in it and can be planted directly. Another option is that plants are placed in containers, such as net pots, which sit inside the tray. The tray is flooded with the nutrient solution at regular intervals and the solution is allowed to drain back into the reservoir. My system floods at 6 am, 1200 pm and 6 pm for one half hour at a time.



Step 2: Buckets and Siphons

Here you see some of them laid out so you can see the siphon elbow and the inside of them. Notice the reservoir at the bottom of the bucket. The siphon parts were a little tight and I had to trim off some of the plastic where they snap into the bucket. These parts are molded and like all molded plastic there is a little slag on them. I took the information below from the vendor's website. They explain them pretty good. [<http://www.growerssupply.com>]

- Dutch Buckets are designed to be fed by drip emitters and plumbed to drain using a common 1.5" PVC pipe, purchased locally
- Siphon Elbows, regulate safety reservoir of nutrient solution at bottom of bucket to 1" deep. This feature prevents growing medium from drying out and causing water stress between irrigation cycles. Siphon pipe also prevents over accumulation of nutrient solution.
- Each bucket requires two Siphon Elbows.
- Ideal for use with our Horticultural Perlite and Grodan Delta Gro-Blocks.
- Dutch Buckets are available in black only
- Ideal for tomatoes, cucumbers, peppers, scallions, basil, other herbs and more!



Step 3: Sizing Them Up

This frame shows that I have lined all of the buckets up in order to decide where the drains are going to land. I spaced them out trying to optimize the length of the table. I decided that this was about right. By spacing them this distance I would need one more bucket. That figures! But that's ok, just means I can grow some more yummy veggies. That will give me a total of nine buckets. If you notice the width of the bench is perfect. You know I didn't really plan it that way. I had built the table before the purchase of the buckets. That width felt right and it looks like it turned out to be a winner. The next frame will show you the PVC drain pipe going through the center.



Step 4: Hey! That Pipe Has Holes In It

This is the 1 1/2" PVC pipe with 1 1/4" holes drilled in it to accept the siphon tubes from the bucket drains. I had set all the drains on the pipe and marked it where they landed. I then used a hole saw and drilled the holes. I purchased two zinc coated pipe clamps and painted them white. The far end will be the supply side and the near end will be the drain side. I will have an adapter with a valve on it for flushing the drain pipe. This picture doesn't have all the holes in the pipe.



Step 5: It's all in the Bucket

I'm at the point where I can begin to think about putting the Perlite in the buckets. One thing that I consider very important that the Tech sheet does not talk about is how to keep the perlite from washing out of the bucket through the siphon tube. I did some research on the subject before I poured it into the buckets. One guy said he didn't think about it and the perlite was washing out and plugging his drip tubes. Another said he used nylon stocking material to cover the tubes and it kept it from discharging properly. It actually acted as a plug of sorts. And then my favorite guy MHPGardener of Youtube said he used nylon paint strainers. He told us he gets them from Grainger.com for about \$5.00 per pack and there are two per. + shipping. He also said when he plants a new crop he removes the perlite and strainer and both are washed and used over again. Awesome!. I use Grainger at work all the time. I recommend them for industrial products, also try McMaster Carr. I like them the best. As I was saying, I purchased five packages as shown and they fit real well. I did not look but I imagine you could purchase them from Lowes or Home Depot. Since I have the system up and running as I write this, I can tell you that I not experienced any problems whatsoever. I hope this helps you.



Step 6: In Goes the White Stuff

I'm at the point now that I can add the perlite. I've got the buckets, siphons, return pipe, the strainers and finally the perlite. I purchased this bag of perlite from my local feed and seed store (Jamestown Feed and Seed) It comes in a 20 lb. bag. This is the same stuff you can buy at the garden center for \$ 5 per lb. This bag had enough in it to fill all 9 of my buckets with enough left over to fill another one. This picture shows the buckets in place with the material inside. I suppose you could fill them in place but I chose to take them outside because it does emit dust as you pour it. I filled them as high as is would go then I used the water hose to give them a good soaking which settled the perlite. I continued filling them to the top.. At that time I let them drain for a while then set them in place.



Step 7: Supply Side

I have just finished filling the buckets up with perlite and set them in place. Now in the process of running the 1/2" supply line. first I rigged the pump and ran the line from it through the nutrient reservoir and filter housing. The next thing to do is install a 90 deg. elbow and run the supply line on top of the buckets to the other end and put a valve on the other end.



Step 8: Supply Line End View

This here is a shot taken at the downstream end of the supply line. I followed the suppliers lead and put a valve on the end of it. I'm thinking they put one on it in the event it got clogged with the growing media. It makes sense, however, they did not use the nylon strainer in their Dutch Buckets. Maybe they had clogs because of it. Who knows? It certainly doesn't hurt it. Also there is a clean out plug on the return downstream side. I guess as time goes I will be glad they are there.



Step 9: Supply Inlet

I have the supply side complete. I've connected the 3/4" black poly tubing to the pump running it out of the reservoir to the filter. From there up and along the top of the buckets with a valve on the end (as seen on previous sheet). Each of the buckets receive two irrigation lines coming from the supply line. They consist of 1/8" white Polyethylene Tubing. On one end a punch is used to put a hole in the supply tube so a T fitting can be inserted. The tubes are then connected to the t's and pushed on the end of a 6 3/8" dripper stake. What happens then is you push the stakes into the perlite so that the nutrients flow to the plant roots. As you will see later the results are amazing.



Step 10: 3/4" Filter Assembly

This is the filter assembly that I used. It is really easy to assembly. For \$1.00 more I bought the one with the stainless steel screen. Take notice that there is a coupling on the inlet side of the filter in case I ever need to disconnect it from the pump side. Below is the description the company FarmTec uses in it's catalog.

Protects system lines and emitters from dirt and debris in the water supply

- Flush valve makes removing sediment quick and easy.
- Manufactured from tough ABS plastic.
- 155 mesh screens.
- 3/4" and 1" Y-Filters both have male inlet and outlet.



Step 11: Heavy-Duty Indoor Digital Timer

This is the timer that I am using. I like it a lot better than the other ones I have, They are the manual dial type. This one is quite a bit more expensive \$36, but you get what you pay for in most cases. At first I had a difficult time setting the specific times desired. Now I have three times programed, they come on for 30 min each time. I have them set to come on at 6 am, 12 noon and 6 pm. I read somewhere that they needed some rest just like we do, so I give them a rest. I might make some adjustments down the road.

FarmTec says:

This Heavy-Duty Indoor Digital Timer offers flexible setting options and worry-free operation.

- Automatic internal clock with battery backup and low-battery indicator. Timer will automatically adjust for Daylight Savings Time and changing dawn and dusk times for specific locations.
- Random setting turns lights on and off at different times for added security.
- LED display that lists time of day, day of week, events, modes and output status indicator.
- Input: 60 Hz, 102 to 132 V AC and 2.5 W max.
- Output: 15 A, 1,800 W resistive and inductive, 1,000 W tungsten, 1/3 HP. • Two LR44 batteries included. Also includes two grounded receptacles and grounded plug.
- Twenty-eight on/off settings.
- Manufacturer's limited one year warranty.



Step 12: Water and Air Pumps

These are the air and Water pumps I am using. These are the same ones I am using on my NFT system they run 24/7 and have been running since Aug 2013 and have not stopped unless I was cleaning the reservoir. That should tell you how well they have performed. I am using two 6 inch air stones in the systems. Heres what FarmTec has to say about them.....

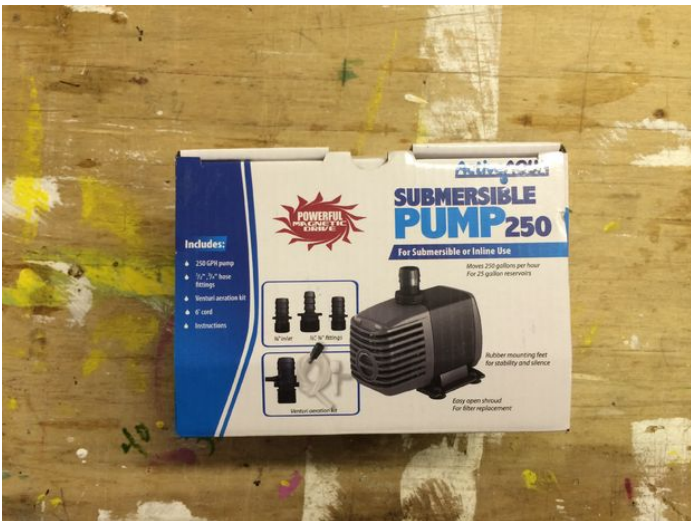
Farmtec Says,

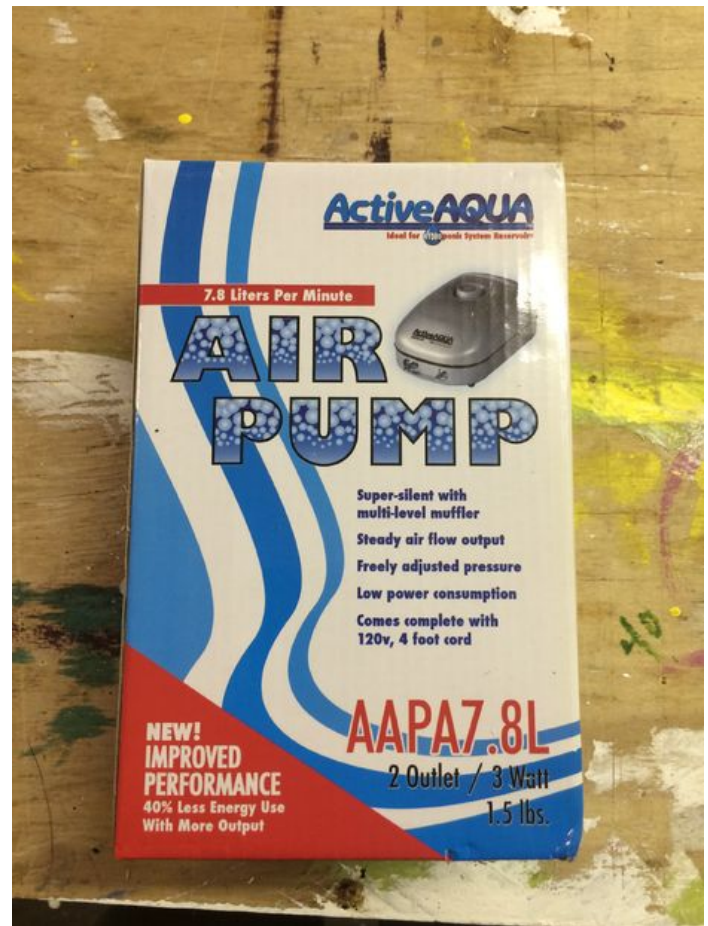
ActiveAqua Air Pump - 7.8 Liter, 2 Outlet Air Pump \$15.95

ActiveAqua Air Pumps• Available 7.8 (3 Watt) liters per minute. • Features silent operation with multi-level muffler. • Special artificial rubber provides a steady air flow output and pressure that can be adjusted on multiple outlet models. • Low power consumption. • 4' power cord. • 120V. 60Hz. • Please note: Always keep your air pump above water level.

250 GPH ActiveAqua Pump \$27.95

Indoor/outdoor Magnetic-Drive Recirculation Pumps are ideal for hydroponic systems, ponds and more. • Oil free and environmentally safe. • One year manufacturer's warranty. • Available in 250 GPH flow rates. • Multi-use submersible pumps with powerful mag-drive construction. • Outlet fitting sizes: 250 GPH unit – 5/8", 1/2", 3/4". • Removable foam filters and impeller included. • 10 foot heavy duty power cord.





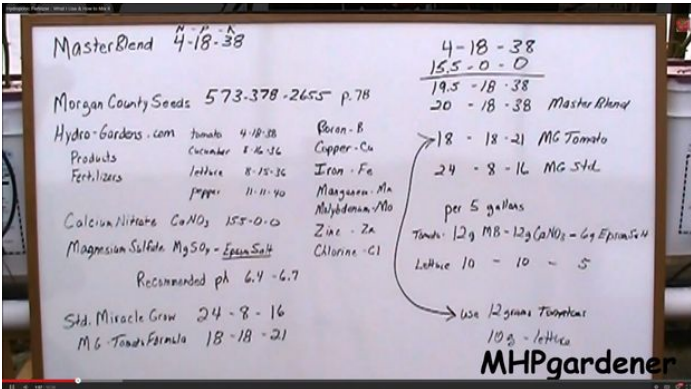
Step 13: The Business End

Here we have the operational side of the system. You can see the return pipe, the timer and the strainer unit. Notice the PVC pipe sticking out of the gravel. I have a 1/2" PVC pipe running under the gravel so I can run the multi plug to power. That's what's nice about using gravel for the floor. So far nothing weird has happened using the gravel .. health wise or contamination wise. Drain Pipe... At first I had not glued the drain pipe together but it kept on leaking because when I was opening the reservoir tank, the lid would knock it around and it would leak at the seams. Not anymore. PVC glue did the trick.. Don't get it on your hands.



Step 14: Pies are Square

I don't know about you but I'm not very happy when it comes to algebra formulas. Give me a measuring tape, square, angle finder, protractor and a sharp pencil and I'm good to go. These on the white board are also considered formulas, units of measurements, a recipe of sorts. This white board gives you the information needed to become a very successful gardener. As you will see further down in the pages. I cut this from a Youtube channel called MHPgardener. This is one smart Dude I'm telling you, and he is very humble. He has a video about this fertilizer. I watched it a couple of times and followed his recommendations and have benefited from it. You don't have to be a hydroponic gardener to use this fertilizer either. I works just as well in soil/ I would recommend you put it in a pump sprayer to apply it not granular. When people say that you have a green thumb you will know why.



Step 15: The Fact of the Matter Is.....

Well, finally some action and not all talk you say. Yep, finally this is where the rubber meets the road. I started these as seeds under grow lights. When they were placed in the buckets about a week earlier, they were about 1/3 as tall as they are now. It seems like I can almost watch the grow just standing there looking at them. I check them at night before bedtime and again in the morning before work. I swear they grow about 2 inches over night. Most of the time they are receiving light either from the sun or the night lights. They usually sleep about 8 hours a night in darkness. They need their rest just like we do.



Step 16: Round-up Free Zone

I wonder where the saying "They're growing like weeds" came from. I guess it's because weeds grow so fast. Now we can say "They're growing like vegetables in a Dutch Bucket Hydroponic System" Really. It has been twelve days since the previous picture was taken. I must say that I am pretty impressed. What do you think?



Step 17: Good Little Plants

That's what I keep saying to them. I even play music for them during their awake times. Not Really, But I do have a 5 disc CD player / cassette player and radio that I scored at Goodwill for 20 bucks. This picture was taken about 4 days after the last one I posted. They are really doing good.



Step 18: Reach for the Sky

This is one on Mother's side of the GH. Since this is my first go around with growing cucumbers in this system I only grew two on each side just to see how they would grow. Well, I guess I have my answer. I have noticed that the amount of water in the reservoir lowers faster when the plants grow. That should have been expected since they suck it up as they grow. I expect when I add more plants I will need to increase the size of the reservoir just to keep up with the growth.



Step 19: No Nukes - Just Cukes

This Bad Boy is on Rachael's side of the GH. This has exceeded all of my expectations on the way this system was going to operate. One would never guess that this has been in the bucket less than 30 days. I highly recommend this system if you want to grow tomatoes, cucumbers or peppers. Even-tho the NFT system is a great performer and produced some excellent produce. I believe this will outshine it. I'm going to use the NFT for growing shorter leafy vegetables like lettuce, scallions and herbs. I'm growing lettuce in it now. Just for the heck of it I will put a picture of the lettuce here so you can see how well it is working. The tomato plants are doing well also. I'll show you those also.



Step 20: Holy Mackerel Lady!

As you can see these things are getting out of control. They are almost to the roof and that is 12 ft. tall. I believe it might be necessary to go ahead and trim them up a bit over the weekend. One thing I'm not sure of is the energy expended on growing this high and if the plant is remaining healthy and how it produces fruit. One would think that the taller it gets the more energy it takes to reach all parts. I do know it is sucking up a lot of water. The cucumbers are producing but not as well as I thought they would.

I did not know this until just a few days ago when I looking at Johnny's Seeds web site.

There are two different varieties of Tomatoes.

Indeterminate (climbing) the plants should be staked or caged. They need to be pruned and suckers removed for best results. It is said that the fruit is generally of higher quality and tastes better than Determinate. I bought some Sakura cherry tomatoes from them.

Determinate (bush) These do not need to be pruned and may be grown without support. They ripen within a concentrated time period. I bought some Defiant and Taxi (yellow) tomatoes from them .



Step 21: Cherry Tomato Plant

This is what the cherry tomatoes look like at this writing 5-23-14. there are plenty more further up. These should be turning within the next few weeks. When they ripen I like to have guests come inside and we pick them off the vine any pop them into our mouths for a tasty treat.



Step 22: San Marzano Tomato Plant

I thought I would try some of these in this growing. The picture of them on the package looked pretty cool. These vines are indeterminate and have a somewhat longer season than other paste tomato varieties, making them particularly suitable for warmer climates. As is typical of heirloom plants, San Marzano is an open-pollinated variety that breeds true from generation to generation, making seed saving practical for the home gardener.



Step 23: Hydroponic Pioneer

In between building this system and working on this instructable, I have also been working on a Blog. I never paid much attention to what a Blog was. I knew it was like a personal site for people to write about things they were interested in and collections of information they wanted to share. Then one night at the grocery store I ran into my next door neighbor Beth. We were talking about my instructables and my greenhouse. She suggested I start a blog so I could share my stories. Then she told me about being able to put ads on it and if people clicked the ads to look for something of interest I would get so many cents per click. Cha-ching I thought. Sure why not give it a try. So I went to Godaddy .com and bought a .com address and began my journey into blogging. It has been slow going but now I think I might have it down. As you recall I have 3 instructables so far. One of them "Hydroponics and Indoor Gardening in the Winter" was entered in a contest and won the GRAND PRIZE. It netted 90,766 views, 776 favorites and I have 160 followers. So, that being said I would like to invite everyone to my Blog, <http://www.hydroponicpioneer.com> Please view it and give me some pointers on what I am doing right and what I am doing wrong.



Related Instructables



Single Dutch Bucket Hydroponic System - Easy DIY - Patio - Balcony - Winter Gardening (video) by mediamaker2000



Dutch Bucket Grow Table by jddelta



Most Basic Form of Hydroponics by AgentWolf



The Hydroponic, Automated, Networking, Climate Controlled Greenhouse Project: Construction by EcoMotive



DIY Hydroponics Top Drip Bucket System (video) by Get Forked



DIY How to Make an Aeroponics 5 Gallon Bucket Hydroponics System (video) by Get Forked

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