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If youre new to growing plants hydroponically, terms like Deep Water Culture can sound like theyre straight out of a science-fiction movie. Compared to soil gardening, hydroponics may seem more complex, but its really not. There are many types of hydroponic systems, and many have confusing-sounding names (nutrient film technique, deep water culture, ebb and flow). But thats why were here to break it down. Lets take a look at one of the simplest and most popular methods of hydroponic gardening today: Deep Water Culture, or DWC. If youre more of a visual learner (like me), check out the video I put together on my YouTube channel below. It gives an overview of how the system works and what you need to get started. Before we get into the nitty-gritty details, lets start with a high-level overview of this type of system. In a DWC system, a plants roots are suspended in a well-oxygenated solution composed of water and nutrients. There are three critical parts of this solution: Oxygen: Because the roots are submerged in water and not soil (which has gaps and holes where air resides), the water needs to be well oxygenated so the plant doesnt drown. This is accomplished with an air pump and air stone. Water: Think of this system as if youre growing in soil and permanently watering your plants. This is one of the reasons growing hydroponically is so beneficial you never need to water again. Nutrients: Good quality soil contains all the micro and macro nutrients a plant needs to survive and thrive. Because we have no soil, we need to supplement the oxygen-rich water with nutrients so our plants can grow. This method is called Deep Water Culture for two reasons. First, you typically grow with a reservoir that can hold a decent amount of water. More water means more stability in your nutrient solution, which means less monitoring and maintenance for you. The second reason is how much of the root mass you submerge in the water. Other methods expose your plants root zone to air and drench them in water just a few times a day (ebb and flow systems are a good example). In Deep Water Culture, most of the plants root system is submerged 24/7, hence the name. This method is popular for its many benefits. DWC systems are popular for many reasons, the primary one being that theyre among the simplest types of systems to start with. The only system thats simpler is a wicking system. Here are a few other benefits of growing in a DWC system: Very low maintenance once set up Extremely fast growth compared to soil (Ive grown lettuce to harvest in 30 days instead of 60 in soil) Very few moving parts and minimal assembly Maintaining water is vital to prevent issues. However, its not all sunshine and roses. There are some potential issues with this type of system that can cause problems. Most of these are avoidable if youre actively maintaining your garden: In small systems, pH, water level, and nutrient concentration can fluctuate wildly Its easy to over- or under-calibrate due to the small scale If theres a power outage or pump failure, your roots may drown in low-oxygen nutrient solution It can be difficult to maintain a consistent water temperature Certain tools are essential when setting up this system. Traditional DWCs are the easiest to build. Heres a list of the parts youll need to set up your first system: 5-gallon bucket Air pump Air stone Airline tubing Net pots Growing media Hydroponic nutrients pH control kit PPM meter The method is simple: connect the pump to the tubing, the tubing to the air stone, and place the air stone in the bucket. Fill the bucket with water, adjust the pH, add your nutrients, and start your seeds. Once your plants begin to germinate and the roots start to reach the water, youll see an explosion of growth. Instead of spending energy growing roots to search for pockets of water in soil, your plants can simply absorb as much water and nutrients as they need right away. If the water is properly oxygenated, theres no reason your plants roots cant remain submerged in the water (hence the name) for the entire life cycle of the plant! Because of the highly oxygenated and nutrient-rich solution, plants grown in a traditional DWC system can be harvested up to twice as fast as soil-grown plants. Ive personally harvested a head of lettuce in just 30 days from germination. The fastest Ive ever grown lettuce in soil is 60 days. This system is easy to scale, requiring more materials and tools. The traditional method is amazing for beginners, but what if you want to scale your system to the next level? Most people move to an RDWC, or Recirculating Deep Water Culture system, when theyre ready to upgrade their garden. If youre looking to grow at scale, the last thing you want is 10 individual buckets, each requiring its own calibration and adjustment. If youre growing the same plant across 10 different buckets, doesnt it make more sense to have one main reservoir and feed that nutrient solution to all 10 buckets? If you said yes, you just invented the RDWC system! You might be wondering how oxygenation works when you have multiple buckets chained together. Just as it would be inefficient to have separate nutrient solutions for each bucket, its also inefficient to run an air stone system for each one. This is where the recirculating part of the name comes into play. As water moves from bucket to bucket, its shuttled around via spray nozzles that oxygenate the water. The beauty of this modification to the classic DWC system is that you only need to calibrate, oxygenate, and top up water from one central location, and it gets fed out to all buckets immediately. 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Maintaining a Deep Water Culture System Once your system is ready to use, you may have a few questions on how best to use it. Here, we break down common questions and answers. A single setup is ideal for beginners. If youre just starting out, go with a single reservoir setup. You can build them yourself or buy one of the many on the market. A modular DWC system is better for growers who know exactly what they want to grow and how much they want to grow. Start small and scale up as you get more experience. Some bacteria in the water can be beneficial in these systems. This is not a yes or no question. Some hydroponic gardeners want to keep their reservoir sterile. This means they wont have any of the biological contaminants that might plague a hydroponic garden, like algae. But at the same time, they wont be able to take advantage of beneficial bacteria. If you do decide to add beneficial biology to your reservoir, just be aware that it comes with the risk of having not-so-beneficial biological organisms tag along for the ride. Monitoring pH levels is key. Just because youre growing in a deep water culture system doesnt mean you need to adjust your pH and PPM/EC drastically. The standard range that most plants prefer (pH 5.56.5) is perfectly fine. However, youll want to customize and monitor this based on the stage of growth your plants are in. When theyre in the vegetative stage, aim for the higher end of that range; when theyre flowering, stick to the lower end. As for your PPM/EC, dont blindly follow the feeding schedule on the back of your hydroponic nutrients. These recommendations are typically higher than necessary. Try cutting the amount in half and observing how your plants respond. You can always adjust upward quickly, but adjusting downward is more difficultyour plants may have already suffered from nutrient burn. Temperature control is a challenging part of this system. This is one of the downsides of deep water culture: it can be hard to control the temperature of your reservoir. Aim for no higher than68F (20C). If you get much higher, the oxygen level in your water starts to drop (even if youre oxygenating with an air pump and air stone). Also try to keep it above60F (16C). If it goes any lower, your plants think that theyre moving into a new season, typically fall or winter. This means theyll start to divert more energy towards flowering, which you may not want. Mix in water to the nutrient solution as needed. The longest you should wait before changing out your solution is three weeks, but this is just a general case. It depends on: The type of plants youre growing The stage of growth theyre in The size of your reservoir If you want to avoid a complete change, you can try to add water with some nutrient solution mixed in to get the right balance again, but this is difficult to do. A complete change may be the better route. Small setups might not require a dissolved oxygen meter. Dissolved oxygen meters are available for purchase, but theyre pricey and may be overkill unless you need extreme precision. I wouldnt recommend buying a lower-end one either, as theyre not very reliable. The best way to monitor your dissolved oxygen levels is to focus on maintaining the conditions that keep those levels high: keep the solution at the right temperature and ensure your air pump is running consistently. Only the roots should be submerged. First of all, make sure that only the root matter is submerged in your nutrient solution (not the stem, and certainly not any vegetation). You also dont want to completely submerge the roots. I personally keep about 1 to 1.5 inches of root above the water line. The bubbles from the air stone will usually pop and splash water onto the exposed roots, so you dont have to worry about them drying out. Use an aeroponic cloner. Youll save money on growing mediaand the plants that you propagate will have nothing but bare root when you transplant them into your DWC Monitor your garden for the following issues, all of which are common in DWC systems: Root-related plant diseases like Pythium Rapid fluctuations in pH or PPM / EC / TDS Nutrient solution that is too warm Provided youre doing everything right, plants grown in a DWC system (or most hydroponic systems) will grow at least 15% faster. I have seen my lettuce grow almost twice as fast in my deep water culture setup vs. my outdoor garden. The obvious answer is anything that doesnt have to flower. Many varieties of lettuce and lots of different herbs will work very well in DWC. They grow super-fast and healthy, making them a fantastic option. However, you can also grow tomatoes, peppers, and even larger fruits like squashthey just take a bit more effort. Yes! DWC growers can easily manipulate the amount of moisture in the root zone. 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Here are our suggestions: Our Picks for the 5 Hydroponic Towers,Picks for the 5 BestAeroponics Systems with BuyersGuides and Our Picks for the5Grow TentKits with Buyers Guides. What Is a DWC Hydroponics System?In a DWC system, plants roots are submerged in a solution that contains suitable levels of oxygen and special nutrients. This helps the plants grow at least 15% faster and be healthier.The solution contains the three most important ingredient types:Water.The base of the solution is water. The roots are always moisturized, so you dont need to water plants.Oxygen.The soil has pockets of air in it, while water doesnt. To make sure your plants get enough oxygen, its supplied directly into the water through an airstone and a pump.Nutrients.A full portion of micro and macronutrients depends on the plant you want to grow. Well talk about it more nearing the end of the article.The method is very beneficial since it doesnt need too much maintenance and constant monitoring. The roots are well-fed and ventilated, they are in water, so the need for more humidity is absent. So, the largest part of your job is to assemble the system and follow proper nutrient ratios. The Atwater HydroPod - Standard A/C Powered DWC/Recirculating Drip Hydroponic Garden System KitMost efficient use of water compared to traditional gardeningDual outlet air pump, Nutrients are Included!Kit contains everything you need to start your own garden (minus plants and water!)Check Price If you click this link and make a purchase, we earn a commission at no additional cost to you. Why deep water culture? Because the roots are fully submerged in a considerable amount of water. A lot of other hydroponics methods involve partial submerging.Pros and Cons of Hydroponics Deep Water Culture (DWC Hydroponics)Lets see all the advantages and disadvantages of such a system.Pros:This is one of the easiest methods a lot of beginners use when getting familiar with hydroponics;Minimal maintenance required after you finish planting;Faster growth than in soil (you can grow lettuce 50% faster, for example);Easy installation due to the minimal number of small moving details.There are cons as well, but we should warn you that they are all avoidable if youre maintaining the system and the surroundings.Cons:If youre working on a small scale, its very easy to choose poor ratios of nutrients and other factors;Also, for small scale, water and pH levels, as well as nutrient concentration, may change rapidly and dramatically;If the air pump fails, the plants will die due to the lack of oxygen;Water temperature might be difficult to keep at the needed level.Deep Water Culture System Diagram (DWC)The deep water culture system involves exposing the roots of lettuce plants to a constant flow of nutrient-rich water, which promotes quick growth and efficient nutrient absorption. 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All you have to do to build the system is:Connect the air tubing to the pump and the stone;Put the air stone in your 5-gallon bucket;Pour water, add pH control and a proper nutrient ratio;Start the seeds.As the seeds start to germinate, sooner or later, their roots will contact the water. From that point, you can have a rest and see how rapidly your plants grow! Such an acceleration is achieved by focusing the roots on nurturing themselves rather than looking for water and food in the soil.If this method seems too easy for you, maybe its time to proceed to a more complicated type, which is the recirculating DWC system.How to Build a Recirculating Deep Water Culture SystemThe next system by complexity is the RDWC or recirculating deep water culture system. Its suitable for larger scales like 5 buckets or more. When using the traditional method, you will have to calibrate every bucket, which might be complicated. If all the buckets are for a single type of plant, you can build a system that will circulate the nutrients. One reservoir will feed all the plants.Recirculating Deep Water Culture (RDWC) Hydroponic Grow Kit SystemReservoir Bucket Connected to 4 Grow Buckets400 Gallon/hour Circulating PumpLarge 5 gallon square buckets, pre-drilledCheck Price If you click this link and make a purchase, we earn a commission at no additional cost to you. The air will also circulate as the water with the solution will be oxygenated with spray nozzles.Well guide you through the building of such a system. Its only 5 steps.Also, I can recommend this article to read about How to Set Up Maintenance?DWC systems are relatively low-maintenance compared to other hydroponic methods. Here are a few key maintenance tasks to keep your system running smoothly:1. Monitor the pH and nutrient levels regularly to keep the plants healthy. Adjust as needed.2. Keep the air pump clean and in proper working condition to ensure adequate oxygen supply.3. Clean the reservoir periodically to prevent the buildup of algae or other contaminants.While DWC systems might not need as much maintenance as some other hydroponic systems, they still require attention and regular upkeep. By staying vigilant and addressing any potential issues early on, you can enjoy a thriving, healthy DWC system for your plants. If youre new to growing plants hydroponically, terms like Deep Water Culture can sound like theyre straight out of a science-fiction movie. Compared to soil gardening, hydroponics may seem more complex, but its really not. There are many types of hydroponic systems, and many have confusing-sounding names (nutrient film technique, deep water culture, ebb and flow). But thats why were here to break it down. Lets take a look at one of the simplest and most popular methods of hydroponic gardening today: Deep Water Culture, or DWC. 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If all the buckets are for a single type of plant, you can build a system that will circulate the nutrients. One reservoir will feed all the plants.Recirculating Deep Water Culture (RDWC) Hydroponic Grow Kit SystemReservoir Bucket Connected to 4 Grow Buckets400 Gallon/hour Circulating PumpLarge 5 gallon square buckets, pre-drilledCheck Price If you click this link and make a purchase, we earn a commission at no additional cost to you. The air will also circulate as the water with the solution will be oxygenated with spray nozzles.Well guide you through the building of such a system. Its only 5 steps.Also, I can recommend this article to read about How to Set Up

Hydroponic Drip Systems.What You Need to Build a Recirculating Deep Water Culture SystemBasically, you will need:A large reservoir for the solution that will feed the buckets;Pots for your plants;Buckets to put the pots in (optional);Tubes for recirculating;Nutrients;pH control kit;Growing medium (optional);Air system.Step 1: Choosing and Installing the Main ContainerThe main container is the most important thing for the whole system. Determine how many plants you will have to grow and choose a reservoir of a necessary volume. We recommend getting one that can be filled with around 15 l of water.See if your plants are entitled to sunlight and choose a regular or a black, light-absorbing container, accordingly. If you have several types of plants that will need the same ratio of oxygen and nutrients, you can grow all of them at once in one system, which is quite convenient.If youre a beginner, we recommend choosing one type of plant and only a couple of additional pots. All you will have to do will be adding the solution to the main bucket when needed. As its linked to all the smaller pots, the solution will circulate freely, feeding all the plants at once.Place the plant in the reservoir to have additional space and have more units as a result. As you learn how to build a simple system, the next one can be bigger, and gradually, youll move to a more professional phase where over 10-20 pots will grow plants at the same time!Step 2: Choosing PotsDepending on what you grow, choose pots of the necessary size. The best type is net pots, but they may be difficult to find. A lot of people choose to make their own DIY pots, which can save money and become a fun and useful experience.If youre sure the holes wont have sharp edges and will be of a necessary size, go for it. However, remember that any sharp part can damage the roots and kill the plant. The roots grow very tender in such DWC systems, so they require a suitable environment without any danger.Choose the pots/buckets, connect them with tubes to the main reservoir so that the solution from it can flow to every bucket, and nurture every root. Make sure theres enough solution both for the buckets and the tubes it will be circulating through.Step 3: Measuring the Ratio of Nutrients and Additional ElementsThe main drawback of such systems for outside use is the limit of temperature the plants will grow in. Make sure your system is covered and protected from too hot or too cold temperatures. The room temperature is fine.As to the nutrients, choose a brand you can rely on. For that, go online and read reviews of other people. This is very beneficial for those who have little to no experience in hydroponics since you can skip the trial and error part and buy nutrients suitable for your greens. The ratio should be mentioned in the manual for the nutrients, and you have to follow it strictly. Such systems are quite fragile when it comes to wrong calculations.The situation with pH is the same. Usually, the level of 5,8 is OK, but you have to learn more about the plants youre about to grow. Some might require more or less. For more guidance, refer to the manual for the pH control kit of your choice.One full reservoir should drain fully in 1-2 weeks for maintenance work. However, if you invest in the EC/PPM meter, you can check the condition of the solution without having to wait for the water to drain.Step 4: Installing an Aeration SystemAn air pump should have the capacity to process twice as much water as there will be in the main reservoir. So, if you have a 15-liter container, choose a system capable of processing 30 liters per hour.The air system will oxygenate the water that will, later on, be circulated through the buckets with pots, offering even oxygen for all plants. No DWC system will work properly if you dont aerate the water. It has to be rich in oxygen so that the roots can breathe. In soil, they do it using pockets of air, but in the water, there are none.TheBudGrower Complete All-in-One Home Grow Solution 4x4x7ft- 2200W(2)LED lights specialty manufactured by VIVOSUN with Samsung LM301 diodes for FULL spectrum lightThe industries most durable grow tent heavy duty 1680d oxford clothMoney & energy saving complete home grow tent kitCheck Price If you click this link and make a purchase, we earn a commission at no additional cost to you. Step 5: Plant the Seeds and WaitPut the seeds in the growing media and in the pots. Take care of them according to the instructions on the seed package. As soon as the tiny young roots touch highly nutritious water, youll see an explosion of rapid growth!What Is the Best Recirculating DWC SystemTheres no absolute best recirculating DWC system. You have to choose one depending on your needs and budget. There are DIY systems made using elements you have at home and some additional solutions for proper pH and nutrition that are as good as purchased whole systems.Determine your priorities:Your budget;Type of plant;Volume;Number of pots needed;Quality;Urgency.Combine the most important criteria, and youll see several suitable options to choose from. We highly recommend making quality one of the top criteria. Suiting your budget is always a good thing, but buying a low-quality DWC system that wont give the desired results will lead to a waste of money.Where to Find the Best DWC SystemYou can find a DWC system of any complexity in physical shops and online. There are pros and cons to every type of store, so you should choose depending on whats more convenient for you.Physical shops pros:You can see the items right away;Theres no need to wait for the delivery;You can get a consultation on-site by a professional (optional).Physical shops cons:The prices are usually higher than those of online shops;The range of models might be limited.Online shops pros:The range is quite impressive;The range of shops is also wide, and they may be more specialized in a certain type of deep water culture system;The prices are often lower than those of brick-and-mortar stores;You can get a delivery to the door;Online shops usually arent limited in service during quarantine so you can make a purchase anytime.Online shops cons:Not all shops have immediate customer service available for consultation;You have to be sure the shop is legit;Youll have to wait for some time for the delivery.Online shopping is gaining more and more popularity nowadays. Its relatively easy to find what you need because there are lots of reviews of certain models online. You can chat with people who have already bought the DWC system youre interested in and get the best one for your needs.Extra Information About Deep Water CultureThe world of hydroponics is vast, and weve just scratched the surface. To whet your appetite a bit more, lets review some of the other popular topics.DWC Hydroponic Bucket System: One Bucket or Two Buckets?The easiest DWC system contains one bucket. Most such systems do, but you can connect another one. There are lots of advantages to getting such a model. One bucket is better for small plants, but if yours is expected to grow big, the root ball can get as large as the whole bucket, leaving no space for water and nutrients. Besides, youll have to move it every time more water with nutrients is needed. The second bucket solves the problem very well.The additional container will be solely for water and nutrients, and all you will have to do to change the concentration or refresh the water is open the lid of this additional bucket and manipulate the liquid in it. As a result, the plant is still and calm.Also, I can recommend this article to read about How to Set Up Hydroponic Drip Systems. AeroGarden Bounty Elite - Indoor Garden with LED Grow LightWiFi and Alexa Compatible, Stainless Steel Grow up to 9 plants, up to 24duimIncludes everything you need to grow50 watt LED Grow Lights, perfect spectrum for fast growth & big harvestsCheck Price If you click this link and make a purchase, we earn a commission at no additional cost to you. Besides, if you have to leave for several days, an additional bucket will provide a vital solution to the plant when youre not able to do so!Deep Water Culture Aquaponics Vs. HydroponicsAquaponics and hydroponics are similar, except for the first one using live fish to enrich the water with nutrients. Its costlier and requires more sophisticated tech, installation, level of skills, and materials.Hydroponics is much easier to use; its a more beginner-friendly option and requires minimal skill and budget. Youll have to take care only of the plant but not the fish. The nutrients are directed to the roots using a special solution, which is much easier than using fish for the purpose.Deep Water Culture NutrientsTo get a bit familiar with the nutrients, you need to know three main terms:Micronutrients.The plants usually need Chloride, Manganese, Zinc, Iron, Boron, Copper, and Molybdenum. They should be mentioned on the nutrients kit youre going to buy for your DWC system.Meso-nutrients.These are secondary macronutrients, including Calcium, Sulfur, and Magnesium.NPK ratio.These are the three main elements: Nitrogen, Phosphorus, and Potassium (K). These are primary micronutrients, and their ratio has to be mentioned on the kit youre going to buy. The optimal ratio is 4 to 3 to 6, representing the percentage of each respective element in the solution.Making a mixture yourself requires a lot of knowledge and effort. Its better to buy ready solutions. They have every element your plants will need, in proper proportions.Kind tip: change the solution when needed. Usually, the longevity is about three weeks, but it greatly depends on several factors:What plant or plants youre growing, using the system;Their growth stage at the moment when change is needed;The scale of your system.A complete change of water and solution might be difficult labor-wise. The easier way is to add a proper ratio of water and nutrients to maintain the proper ratio in the reservoir. However, the measurements are difficult, so a lot of people choose to change the mixture completely. Lettuce Grow 36-Plant Hydroponic Growing System KitLarge Home Organic Gardening with Self Watering with Pump, BPA Free and Food GradeOutdoor Indoor Vertical Garden Herb Vegetable Planter TowerAll the gear: farmstand tower, water pump, power cord, timer; and Nutrients for 130+ PlantsCheck Price If you click this link and make a purchase, we earn a commission at no additional cost to you. SummarizingHydroponics can help you grow food and plants faster and with better results. The systems arent very difficult to build, but you have to be knowledgeable. There are lots of types of deep water culture systems, and choosing the most suitable for you is a must-do!If youre a beginner, opt for the traditional method or move further to the recirculating system. Make it a hobby, finding out more and more about every method and its use.But before you go, tell us if you loved the article. Did it answer your questions? Do you have a feeling that you can build your own DWC system? Share your impressions in the comments!Happy Growing!

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