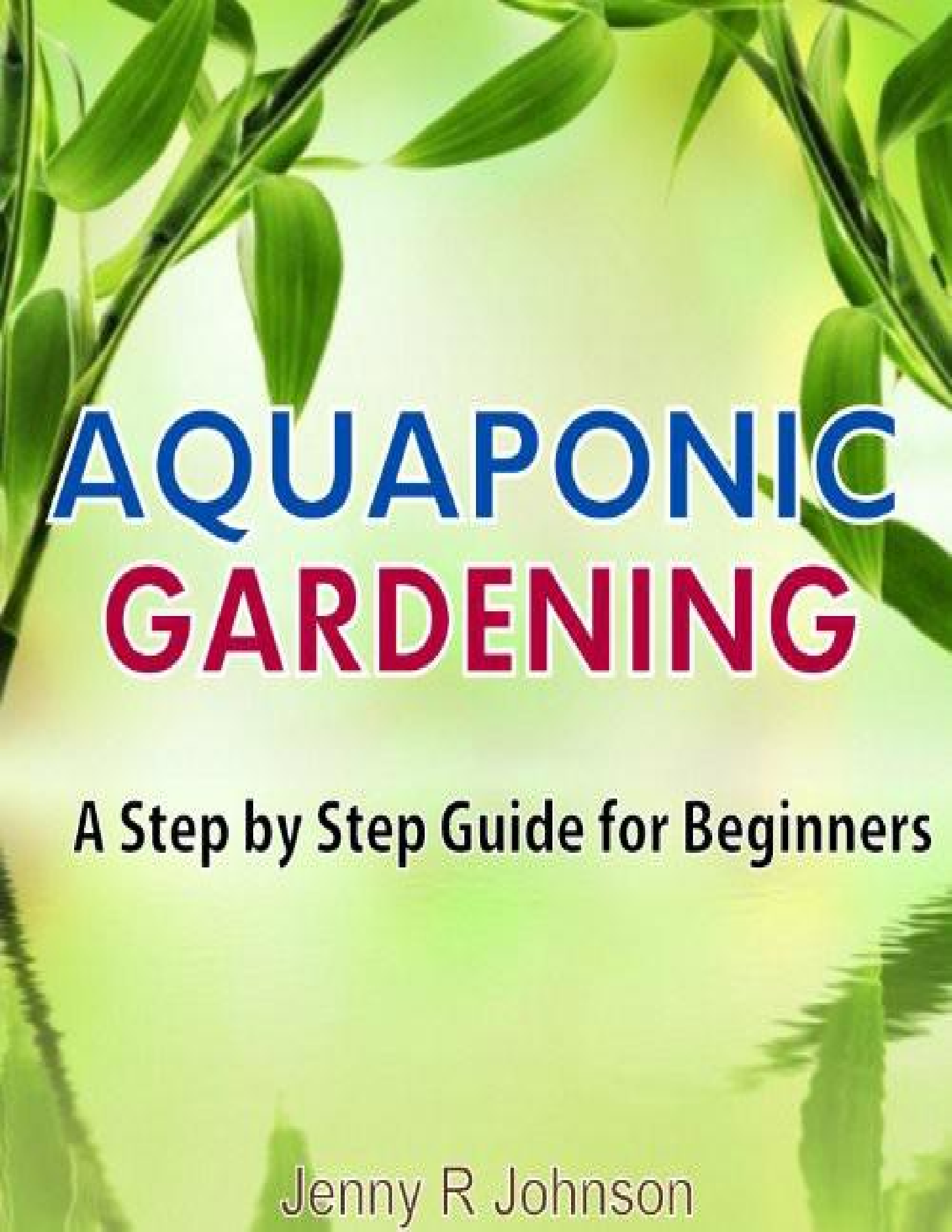
AQUAPONIC
GARDENING
A Step by Step Guide for Beginners
Jenny R Johnson

AQUAPONIC GARDENING:

A STEP BY STEP GUIDE FOR BEGINNERS

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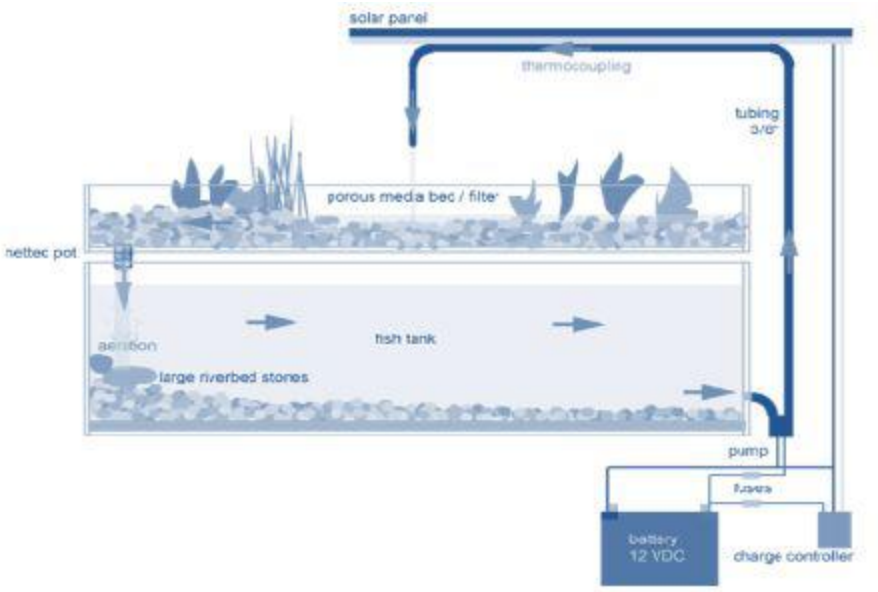
1. What is Aquaponics Gardening?



Aquaponics gardening is the amalgamation Aquaculture and Hydroponics. This system was first seen in Asian countries like South China and Thailand where they cultivated paddy fields along with fishes like the Oriental loach and aquatic snail. It is a revolutionary system of growing plants from the wastes produced by the fish in a closed structure.

An Aquaponics Garden can produce numerous fruits and

vegetables depending upon what you are interested in growing. And since everything is grown by you, you’re aware of its growth and safety, unlike in the case of vegetables sold in the supermarket. You can easily yield organic vegetables and fruits with the added benefit of fish protein. Studies have also shown that Aquaponics Gardens are four to six times more productive than normal farm fields which grow vegetables and fruits. Also, Aquaponic Gardens require less effort in comparison to regular farm fields and there is no plowing, digging and heavy lifting. On a larger scale, it can be an answer to rising food insecurities and overfishing.

a) Hydroponics

Hydroponics comes from a Latin word which means “Working water,” which means that plants are grown in water. Hydroponics comes from the Hydro culture which is a method of growing plants without actually planting them in the earth; these plants are instead grown in water that has been augmented with mineral nutrients.

The reason why Hydroponics is more effective than normal soil plantation is that the soil acts more like a mineral reservoir and the soil alone is not necessary for the plants' growth. Hence, if the plant is provided with all the vital nutrients and minerals it requires in order to grow then it’ll grow much faster and more efficiently in water. It also might yield high quality products in comparison to the ones that come from the soil. In Hydroponics, the plant’s roots are immersed in a chemical liquid which provides the plant with all the right minerals and nutrients in the correct proportions.

b) Aquaculture

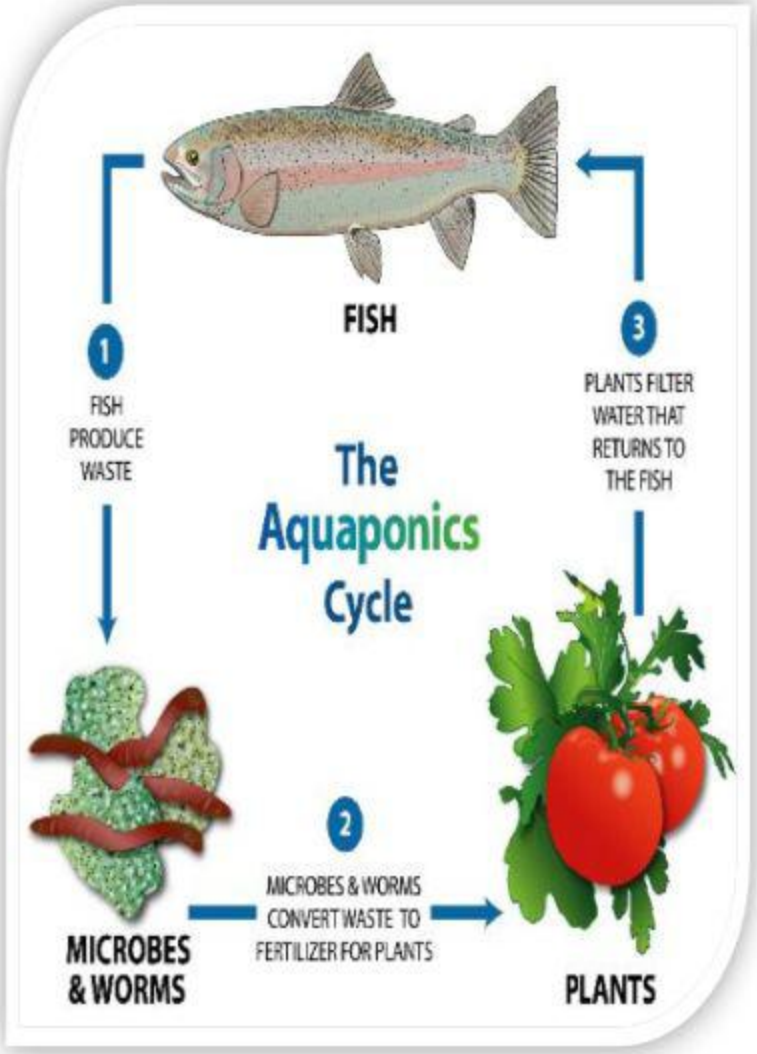
Aquaculture is the term given for the breeding and growing of underwater vegetation, fishes and other species. Also known as ‘Aquatic farming,’ Aquaculture has been practiced since well before the Common Era. The earliest known existence of aquaculture could be found in 2500 BC in China when goldfish were raised by the Tang Dynasty.

In other words, Aquaculture is done to produce more fish and to yield different breeds of marine species. Since there is an astonishing decrease in marine life due to over-fishing and the destruction of habitats from oil spills and other man made errors, it is important to restore a good balance.

Marine habitats are very sensitive and the absence of one or two species, whether it is vegetation or fish, can cause an imbalance and might destroy it. Therefore, the primary role of Aquaculture is to not only produce fishes and marine vegetation for human consumption but to also restore the waters around the world.

2. THE PRO’s & CON’s

Like any other system, method or application, the Aquaponic Garden also has its merits and demerits.



Pros

a) Usage Of Water – When compared to traditional soil farming, Aquaponic gardening uses about 90% less water, whereas in the case of soil farming, plants have to be watered almost twice a day.

Since all the water that is used in the making of an Aquaponic garden is recycled, less waste occurs. The water is only changed in emergencies, thus making it easier on local water supplies than with soil farming.

b) Growth – The growth that you'll see in your garden is faster in comparison to a traditional garden. The quality of what you grow may also be substantially better than what you'd get out of a traditional garden. This is because the soil generally contains all the nutrients for the plants and the soil sometimes doesn’t hold all the nutrients in the right places for the roots to have access to them whereas in an aquaponics garden, the nutrients are mixed in water and in their correct proportions in accordance to what the plant needs. They will grow better than traditional soil-farmed plants.

c) Output is bigger – Fruits and vegetables grown in aquaponic gardens are bigger than in comparison to plants grown in soil. This is thanks to the added nutrients used in the process.

d) No Need Of Fertilizers – Since the plants are kept over the fish tank and the same water is recycled between the plants and fishes, there is no need to use additional fertilizers as the wastes that come from the fish can nourish the plants. These are essentially used as manure in your area. Things are very different in traditional soil farming because a lot of fertilizers have to be added. Also, if fertilizers are added to the aquaponic garden, the garden might be at risk.

e) No need for Artificial Filtration – In traditional farming, the water needs to be filtered for its ammonia levels and for any other harmful chemicals. There isn’t a need to use an artificial filter in an Aquaponic garden as the ammonia which is present in the system is absorbed by the plants and the fish are safe.

f) All year Use – One of the biggest advantages of an Aquaponic Garden is that it can be used all around the year, be it the winter or any other season. Traditional farmlands tend to freeze in wintery conditions and there is no possibility of any crops to be produced. The same happens in the case of strong rainfalls as the

crops are drowned in vast amounts of water if the field is flooded and destroyed, whereas you can always access your Aquaponic garden and pluck some fresh veggies at any time.

g) Organic - Since there isn't any type of chemical fertilizer being used in the growth of your plants, it'll be clear that you're eating organic fruits and vegetables. Of course, you have to make sure you only feed your fish organic foods to make it a truly organic garden.

h) Reduced Damage – Aquaponic Gardens are less likely to suffer from damage when in comparison to traditional soil farm plants, as they're kept in a sanitized area. Though it'll be false to say that they don't suffer any damage at all, the odds of a garden like this being harmed aren't all that strong. There might be slight damages to the leaves on the plants but it will still stay strong. Any kind of pesticide that you could use must be avoided as they can harm the fishes.

I) No weeds – One of the best things of having an Aquaponic Garden is that there will be no weeds. Since the tanks in your garden are at a waist height, the gravitational pull can keep the water circulating. As a result, weeds will not grow.

Cons

a) Expensive – The system that you install for your Aquaponic garden in your backyard can be an expensive investment. The need to get a plumbing system, piping features, fish tanks and plant beds can send you running for your money. About $2000 can fetch you enough hardware to build a small one in your backyard, but if you're looking for one that can feed your family every once and a while then you will have to pay around $5000-10000.

b) Green House – If you want your Aquaponics garden to be as good as it should be then you will have to build a green house around it. The plus point of a green house is that it'll shelter your

plants, provide necessary warmth and keep it safe. This in turn increases the cost again.

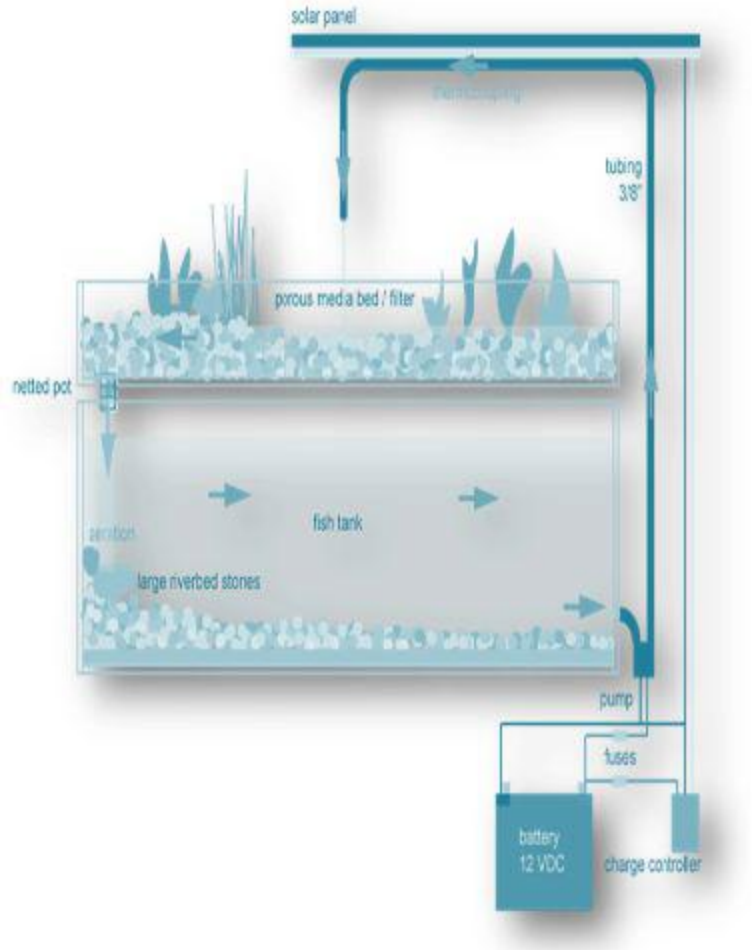
c) Technical Knowledge – Before you start creating your own Aquaponic Garden, it is important that you have a basic knowledge of the cycles and patterns that are to be followed into the system, otherwise you might have too much bacteria breeding into the fish tanks. These would either kill your fish or your plants. The fish stock rates have to be maintained properly and can't be ignored.

d) Complex Problems – One of the most complex problems can involve maintaining your fish and seeing that their needs are met. The toxicity level of the fish tank must not rise beyond a controllable level. Apart from the toxins, the oxygen supply should be checked on a regular level in accordance to the number of fish in the tanks. Stocking less fish would put less pressure on the system and would make it easier for alternations to be made in case of an emergency.

e) Series Problem – Another problem with Aquaponic Gardening is that even if one stage in the whole system fails then the chances are pretty high that the whole system might collapse in no time and you might end up losing all or most of your fish. To refrain from all of this, it is necessary to have an advanced system (backups) that provides adequate electricity to keep your system running. Oxygen levels to your fish tanks must also be checked because the plants may last longer but the fishes won't.

f) Restricted farming – You might have to restrict your options for the plants that can be grown in the garden as you will not be able to cultivate a lot of plants, though you might be able if you try, but the idea isn't practical.

3. THE PLAN



Now that you've gone through the merits and demerits of Aquaponic Gardening and are assured that you want to build one in your backyard, there are a lot of things you will need to know and a lot of tools, hardware and stuff to buy. The process of building an Aquaponic Garden will not be an easy one, so if you're still not sure about your decision of making one, think twice.

If you want to grow your own garden then you'll have to think about the type of system that you want to utilize. The following are three different kinds of systems that are used in many cultures:

I. **Media Filled Base –** The media base system is one of the simplest ways of Aquaponic Gardening that you can use. It's also known as the 'gravel bed system' and is the most common method used by aquaponic gardeners. This method uses large containers filled with small rocks or clay pebbles. Seedlings are planted in them and since the clay pebbles are porous in nature, they absorb both air and water. This system can be run by either flooding the container or by keeping the water running; the water from the fish tank is filtered by the pebbles which act as a biological filter to eliminate all unwanted impurities.

II. **Nutrient Film Technique –** The Nutrient Film Technique system, or the NFT system, is one of the more complex ways of Aquaponic gardening that you can use. It's also the most common method of hydroponic farming. In NFT systems, the plants are held in netted pots and their roots are suspended in pipes which have small holes cut out for them. Then, nutrient rich water is made to run through these pipes in small gutters. This system is only suitable for plants with small roots as plants with big roots will not be able to fit into the pipes. Plants like green leafy vegetables are cultivated in this method.

The reason why it is complex is because the system requires two filters: a biological one and a solid one. The biological filter is required to convert the fish waste into nutrients and the Solid filter is needed to handle the solid waste from the fish.

The setup for an NFT system is also expensive in comparison to a media-filled one as the cost of assembling PVC pipes and it costs

more to install a mechanical filtration system.

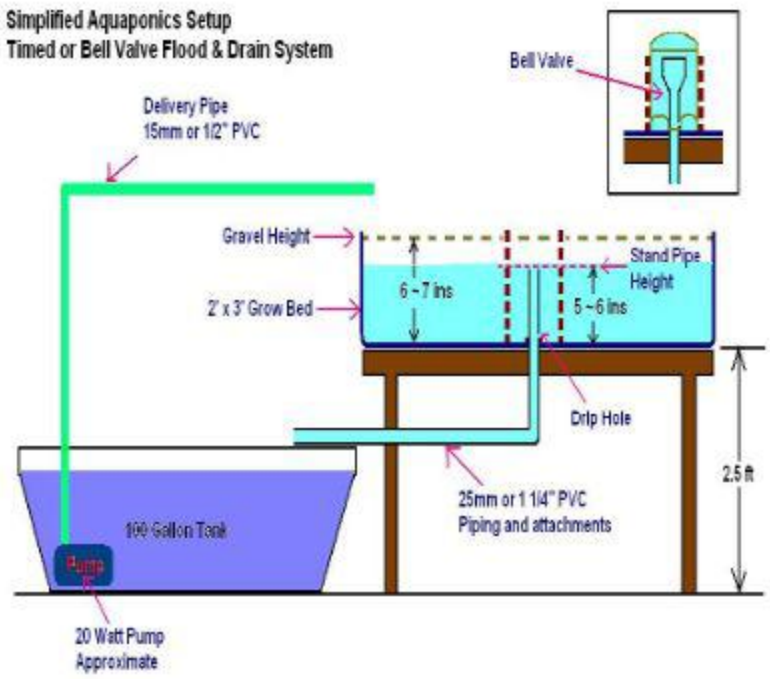
III. Deep Water Culture – The deep culture water system is also known as the ‘Deep Water system’ and ‘Rafting system’. This is another common system used in Hydroponics. This method involves the suspension of plants which are kept in netted pots over water tanks; they are made to float over them in a way that their roots are completely immersed in water. This can be done in a few ways: You can either have the plants and fish both in the same tank or you could have them stored in separate tanks and have the water transferred to the tanks in which the plants are in. If you decide to keep them in 2 separate tanks, a high volume of water will be required and it must be adjusted so the water is stable for both of them.

The rafts can be made of Styrofoam or any other material that can float on water without being damaged. The rafts should also be sturdy enough to hold them. If you choose to have both the plants

and fish in the same tank, it would be wise to have fish which are not voracious plant eaters in there. The water in the tank is constantly filtered side by side to maintain the pH level and to make sure it's good enough for both the plants and fishes.

Now that you are aware of all the types of Aquaponic Gardening systems, you can easily decide whichever one will suit you best. You can go for any of the three depending on the space you have allotted for the garden and the budget you have estimated. You do not have to build a huge system all at once; you can start with a small one and gradually build a bigger one. As they say, with time comes experience. You'll learn how to develop your garden into a bigger one after you get a little more experience. If you're stuck and can't choose which one to go with, go for the Media-based system; it's easy to build, easy to maintain, does everything by itself and is not that heavy on your pocket in comparison to the other methods you could use.

4. ENVIRONMENT & LOCATION OF THE SYSTEM



After you've decided what type of system you're going to choose, it's only obvious for you to plan the location for your system. It can be more of a challenge to bear with at times. The thing with the location of your system is that you have to take everything into consideration like the weather and the potential for the power to go out. You have to think about what can happen to your system before installing it.

With regards to both the environment and its location, here are a few options you can consider for the establishment of your system:

I. Summer Farming – Summer farming basically refers to the cultivation of the plants and fish in an aquaponic system during the non-winter season, i.e. starting from the spring season till mid autumn. The ultimatum is that the temperature should always be above 18 degrees Celsius (65 Fahrenheit); otherwise your system will frost up. 18 degrees is the lowest temperature on which an aquaponic system will run and you will be risking it if you are

even going slightly above 18.
Since the cultivation of both fish and plants needs time, its best to start right at the start of spring. As the cycle needs about six weeks for its biofilter to start working, it's best to start then.

The optimum temperature for the bacteria is about 25 to 30 degrees Celsius (77 – 86 degrees Fahrenheit). The temperature conditions for the bacteria to work efficiently is also vital; if the temperature goes above 49 degrees Celsius (120 Fahrenheit) or goes below 0 degrees Celsius (32 Fahrenheit) then everything could be at risk.
So with the given conditions, you can start your system in the spring and shut it down as the winter comes.

II. Grow Indoors – Another option is to grow your garden indoors. Though this might sound very convenient, it only is for a very small system that is half the size of your dining table. But if you want to install a system which is bigger than that, you need to see how large your room really is. You can install it your garage, laundry room or basement while dividing the space in a systematic manner.
Apart from the indoor location, there are few other things you'd want to think of before you get in.

Weight – The weight of the system should be accounted for. The reason behind this is very simple: you wouldn't want your system to collapse and end up on a floor lower than the one that you started on. Hence, you have to plan its weight accordingly.

Humidity – Aquaponics is a water-based system with water tanks installed in your house and heaters to stabilize the temperature of the fish tanks. Therefore, there will be a lot of humidity in your garden. In the summers, this humidity will not be something that you can top up with ice.

Water Spillage – Since there are large tanks of water in your house, there will be days when the floor is covered with water everywhere. Water might spill out if the tank is overflowed with

water or if you spill it while trying to shift the tank. So it's better to be prepared and put safeguards out in case of a major spill.

Light – Unless the room where the system has been installed has window panes and sunlight is accessible, you'll have to provide the room with lighting so that the plants or the Aquaponic garden receives adequate light. You can install a High Intensity Discharge lighting system capable of providing the necessary heat and light for the system. The HID system will provide vital heat can also waste power.

Sound – The system will consist of water flowing continuously day in and day out, creating mild noises which might sound very soothing at first but after a while can become so irritating that you might want to go and pull the plug. So if possible, try to install it in a place where you won't hear much from it and can have a good night's sleep.

III. Grow Outdoors and Indoors – If you don't like the idea of shutting down your Aquaponic garden after the summer ends and the winter starts to arrive then you can always create a dual habitat for it where you can combine the above 2 options. The obvious question here is, how will you manage to transfer the system inside once you've established it outside? The key solution over here is to build your system according to your weather conditions and location priority. If you know you have harsh winters and still want to keep your garden running then you can limit the size of your aquaponic system to be small enough to fit in a room inside your house. Also, design your system in such a way that it is easy to shift it by creating grip handles and suitable places and also if possible to build tank-mountable castors to help you shift the water tanks with ease.
One thing which is important and must be remembered is that the water in the fish tank should be cleared out prior to moving the tank.

IV. **Build a Greenhouse -** If you can afford to build one or get one in your backyard, a Greenhouse would be ideal for your

garden. The following are good reasons why a Greenhouse can be a safe haven for such a garden:

Total Freedom – A greenhouse provides you with the total freedom of doing whatever you want to do with your aquaponic garden; you can grow whatever you want despite the weather outside. You can install heavy lighting and create a tropical summer for your plants with wintry conditions being kept outside the door.

Remote controlled Heat – A greenhouse can not only provide necessary warmth but it can also help you control the heat in strong summers, you can put up shade cloths in your greenhouse to keep the atmosphere cool.

Need Water? No Problem - The second best thing of having a greenhouse is the liberty to have water everywhere; you can get a hose in the greenhouse with a de-chlorinating filter to help you fill up your tanks and water other plants without the fear of ruining the floors and walls of the house.

Oasis-like Feeling – For people who really like gardening and like to escape the world's reality and chaos, a greenhouse is nothing less than an Oasis. The smell of fresh mint and basil are enough to calm your nerves and can easily help you to de-stress.

While the installation of a greenhouse can be expensive and might take off a huge chunk of your season's savings, it's important that you build your Greenhouse the right way and not just for the sake of it. Here are a few things you should look into while building it:

Exteriors – The first thing to look into while you're erecting your greenhouse involves the exteriors of the house. Make sure that the insulation barriers are properly installed or your greenhouse will be like an an igloo in the winters. The insulation will stop the warm air from slipping through.

Directions – You will want your greenhouse to face the sun and not show its back in the winter. Make sure your greenhouse is facing south for the best results.

Recycle – The best thing you can do while building your greenhouse is to use salvaged materials like glass sliding doors and double paned windows. Try your best to get secondhand construction materials as they will not only reduce the cost but will give actual meaning to your 'Greenhouse'.

Steady Supply – An Aquaponics Garden will only act as a burden if the greenhouse you install it in doesn't have a steady supply of water or electricity. There's no fun in carrying buckets after all.

Power Backup – There should be a constant flow of electricity to your greenhouse. If there's no energy coming in then the fish will not have oxygen and die out. Also, the water filter can stop working and the environment will become dirty. To avoid this problem, you can install solar panels and connect those to a battery inside the greenhouse connected to the system. This can create power in the event that the main source of power stops working.

5. THE HARDWARE

Now that we've gone through Aquaponic gardening from top to bottom, it's about time we started building a system. So in order to build an Aquaponic Garden, you'll be required to buy or collect the following bits of hardware. And since it's your first Aquaponic garden, we'll go for a smaller variant that's easier to build. For that, the following things will be needed:

Beds and Fish Tanks

Once you start to look into the growing beds and fish tanks, you'll realize that there is more to them than there is to just contain the fishes and the plants. The following aspects need to be considered:

I. Waterproofing – The container or tank which stores them should be waterproof, though it may seem obvious, but while making plumbing holes you will have to be cautious so there are no passages for the water to get into.

II. Strength – The potency of the structure is also something which should be of a primary concern. There will be no point of building the system on a tank which can't hold the growing beds or the fishes.

III. Non-Toxic – The tanks or containers should be built with non-toxic materials or plastics. This is because your food will not be the only thing growing in there; it’ll also contain living things like worms, fishes and bacteria.

IV. Inert – Apart from being non-toxic, you’ll have to see that the container does not react to the processes that go on inside of it. The bacteria should be able to travel through a fish tank and into your growing bed.

The following things can be used as fish tanks and growing beds in an Aquaponic System:

Aquarium – One of the most common choices for use, an aquarium can feature the growth bed on the top with supporting pipes and casings around the entire body of the space.

Bathtubs – After aquariums, bathtubs are regarded as the safest option for an Aquaponic system as they are both easy to find and inert. Also, you can easily build your system in a bathtub.

Grow bed & Fish Tank Conclusion

The fish tank(s) and growth bed(s) are the pillars for your Aquaponics garden. You'll need to work on them very carefully. They will facilitate the path of your system and how well it can run.

6. THE PLUMBING

The bed has been made and the tank has been decided upon; now it’s time to throw in some water. Apart from the physical structure, the most important thing in an Aquaponic system is the flow of water, as everything depends on the uninterrupted flow of water from the fish tank and to the grow bed. It is vital that you pick the necessary tools for the job.
The following will be required so you can make plumbing adjustments in your system:

Electric Submersible Pump – To have free flowing water in and out of your system, it’s important to have an electrical pump. You can also rely on the law of physics but it's better to get a quality electrical pump for your use. The pump should be built to operate in a watery environment with plant waste and fish remains. Magnetic drive pumps are the best as they have their own compartments and never leak out any oil into the fish tank. Be attentive while selecting your pump.

Bypass valves – Now that you've got yourself a pump to get the water flowing, you need to control the amount of water that flows in and out of the system, thus leaving you with a need for a bypass valve. The Bypass valve will allow you to control the water flow and help you keep it at an optimum level.

Threaded Adapters – An Aquaponic system will require you to set in both male and female threaded adapters; these will allow for an easy connection between the growth bed and the fish tank.

Reducer – Along with the threaded adapters, a reducer also needs to be fit into the container. This is a piece which will slowly pass the water which is then transferred into the growth bed back to the fish tank.

Bell Siphon & Media Guard - The bell siphon is a very efficient method of gradually flooding the growth bed and then straining it rapidly. This happens with a non-motorized action without breakable parts.

Pipes – Usually the piping used in Aquaponic systems consists of PVC's (polyvinyl chloride) or CPVC's (chlorinated polyvinyl chloride) as they are dust proof, durable, eat to cut and affordable.

Attachment – Attaching pipes to the beds can be a tricky business. You have to make sure the holes you drill are of the right size. To make sure that the hole is sealed and there won't be any kind of leakage, you can use the following items:

Marine- Grade Silicone – This is the least expensive adhesive which can be used to seal any gaps or holes between the PVC and the surface. The problem with it is that it doesn't last for a long time and may cause leakage in between, so you might have to keep a regular tab on it.

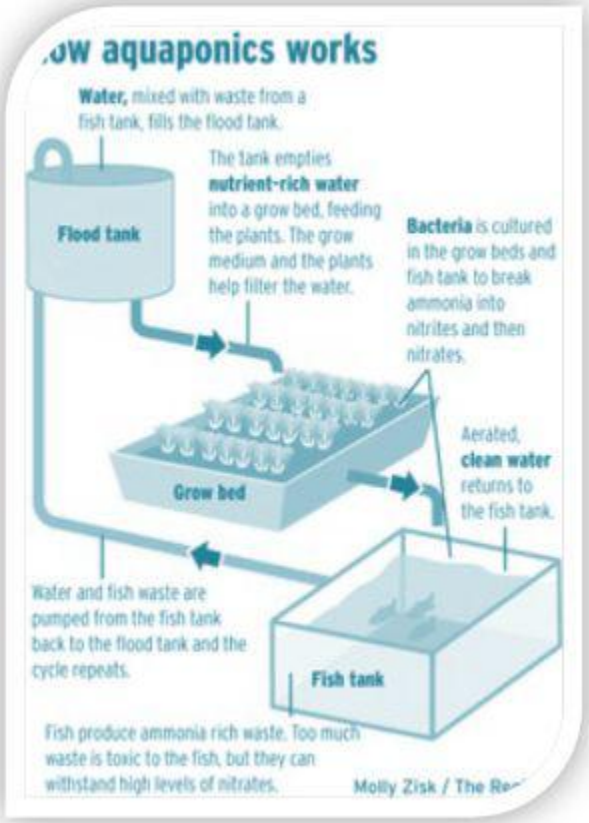
Uniseals – Uniseals are black rubber inserts which are used to seal off the gaps between the PVC pipes and growth bed surface. They come in different sizes and are easily attachable to your

PVC pipes and are pretty reliable. This option can handle a pressure of 40 psi.

Conclusion to plumbing

The best thing to do here is to flood and then drain your media-based grow-beds. The draining act pulls oxygen all the way through the grow beds. The least difficult way to attain a dependable flood and drain formation is to use a timer. While they are more comprehensive, siphons are also exceptional choices for Aquaponics. To make the perfect Aquaponic system, it is necessary that all the above steps are followed properly. A small error during the plumbing process might lead to the failure of the whole system, so to avoid the whole thought of starting from scratch, pay attention to each detail and take every step of the plumbing procedure with utter caution.

7. BUILDING YOUR AQUAPONIC GARDEN



Now that we know what to do, how to do it and where to do it, it's time we start building our very own Aquaponic Garden. To start, we'll build a media-based Aquaponic garden, as it is easy to build, easy to maintain and easy to store. The size of the system won't be very big as we only want to learn how to make an Aquaponic garden. The following steps must work properly:

1. **Grow bed –** To make the growth bed, you will require a container of about 25 liters in size. Remember that the container should be of a non-toxic and inert material. The container can be trimmed from the sides to provide a grip for you to hold onto if you have to physically move it. Also, you can trim it with a saw or wire pliers.

2. **Personal Touch –** The container can be decorated in order to make it look more attractive and appealing. But now matter what you use, none of the decorations must be added inside the

container layers or else they might have an adverse effect on the media.

3. **Pumping –** After setting up the plastic container, its time you made the pump that will channel water into it. A small 600 lph (liters per hour) electric submersible pump will be capable enough to pump water from your fish tank into the grow bed and then back to it. As the water falls back to the fish cistern, it forces any solid trash over towards the pump and is ready to be brought up to the growing bed.

4. **Fish Tank –** Since water will be continuously flowing in and out the system, it is only practical to keep a fish tank slightly bigger than the growing bed so it can hold more water in. Since the bed can contain 25 L of material, let's use an aquarium that can handle 50 L of space. The goal is to have a sensible difference.

5. **Drill in the Adapters -** You will have to drill a hole in the right position in the growth bed—you need to build surety that the female adapter will fit among the wire mesh squares in the container. There will also be a need to make a hole at about 6 or 7 centimeters from the edge of the container in each direction; the hole should form a comfortable fit with the threaded male adapter.

6. **Place the Male Adapter –** The male adapter is supposed to be placed through the top of the growth bed. Then you can fit a rubber Uniseal to the adapter. Next, place the female adapter thread over the male adapter thread and adjust it till there is a comfortable fit (and waterproof). You can add some amount of silicone to the bottom of the container to be sure though it’s not strictly required. Finally, attach a reducer on top of the male adapter. A 25mm to 13mm reducer can particularly do wonders for you setup**.**

7. **The Bell & Siphon –** The most important part of a Media-based Aquaponic system is the bell and siphon part of it. It acts as the natural timer and creates the whole balance between the flow of water from the grow bed to the fish tank. Use a 60mm siphon for your system and make sure that there are holes on it that are no more than 1 inch from the bottom of the pipe. The holes cause water to drain out and then to retain materials at a particular level.

8. **Media Guard -** By using a 100mm media guard in the system we are building, the media guard's job is to keep the media from growing into the bell siphon. The holes in the media guard are there so that it can allow water to flow through it but keep away the roots of the media. In simple terms, the media guard is used to protect the Bell siphon and is placed over it.

9. **Attach the Bypass valve –** After everything is in position, it's time for you to attach the bypass valve to the PVC pipe which is connected straight with the Pump in the fish tank. The bypass valve is a t-bar which has a knob on it. The bypass valve allows you to control the flow of water from the fish tank to the grow bed. The required amount would be dispersed into the grow bed and the rest will be flushed back into the fish tank again.

10. **Finish it Up –** Now that you've attached everything and all the things are in place, make sure that the structure you've built is strong and have a mock drill. Run water through it to test for leaks and any other errors.

11. **Complete the System –** Now for the final bit, add the media into the grow bed. These can be larva rocks, perlite, river stones, hydroton or other similar matter. You are required to use something which will let the water pass through, filter the water and is non toxic.

12. **Bring in the Fish –** It’s a small system and not a big one, the number of fish you’d be required to put in the fish tank won’t be more than 10 and since it's only a 50 liter tank, make sure the fishes are of suitable sizes so that there is enough room.

13. **Regular checks –** Once the cycle starts and there is ammonia and bacteria being transferred to the growth bed, keep a check on the pH level of water so you know when to add fresh water.

Now that you’ve built your own Aquaponics Garden, you might want to know what you can grow and what type of fishes you can breed after you move for a bigger system. Here are a list of plants and fishes which you can cultivate; choose according to the size of your system:

PLANTS

You can grow any green leafy vegetable with small roots or any kind of herb in your garden. Since, you've started, it's better to stick to a single plant like mint. Here are a few of the different vegetables that you can grow:

Cucumbers

Basil

Mint
Lettuce

Parsley

Coriander
Sage

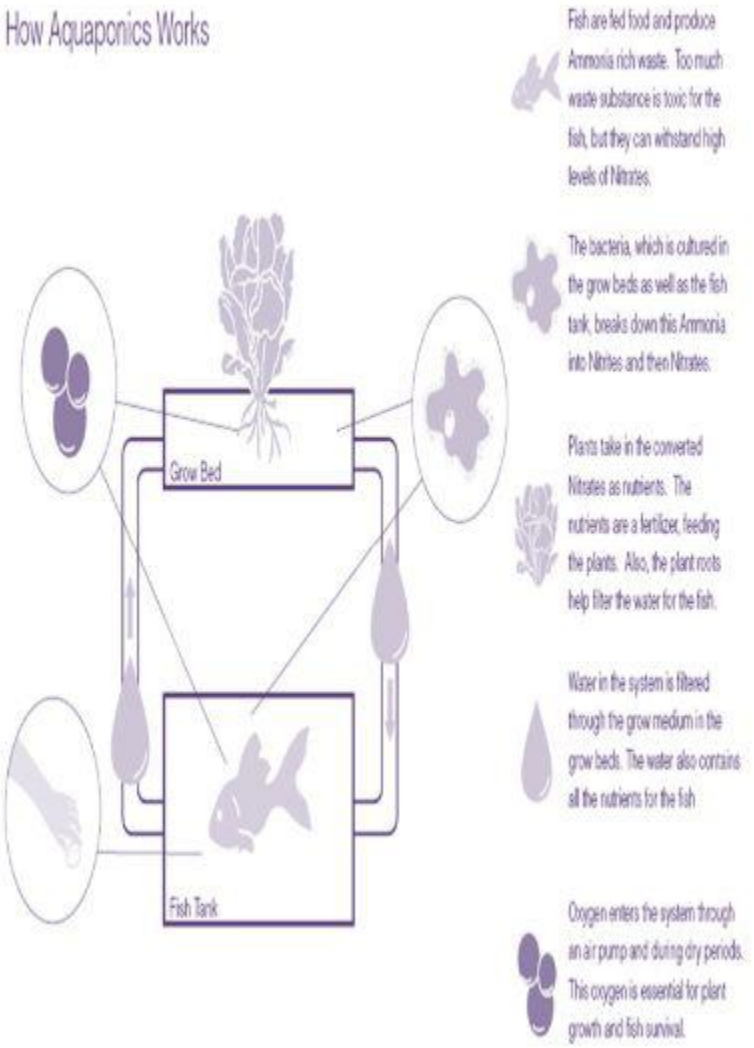
FISHES

Generally, the fish which are chosen to be bred in an Aquaponic system are selected according to the size of the system and the needs of the owner. These are the following fishes that you can raise in a garden like this:

Barramundi
Catfish
Carp
Goldfish
Jade Perch
Koi
Murray Cod
Silver Perch
Tilapia
Trout

Apart from fishes, an Aquaponic garden can also breed prawns, fresh water crayfish and mussels. But since you’re not looking for a chance to commercially farm fish and you just want to develop your gardening skills, a goldfish would be an appropriate choice for you.

8. CONCLUSION



Aquaponic gardening actually begins when your system's cycle starts and the nitrifying bacteria coverts the fish waste into plant

food. But aquaponics gardeners do more than just install aquaponic systems in their homes. Many of them are especially enthusiastic about what they do. They feel that they are on the brink of something new, which is really big and world-changing and really addictive.

Aquaponic gardening can be fun to do if you have a real interest and passion in it. It'll bring out that creative touch in of you.

Aquaponic gardening isn't only about cultivating your own garden; it's also about giving something back to nature. And like anything in life, this also requires hard work and patience. You will not be able to see your plants growing in a day or see your fishes growing in numbers after a week. It requires you to be totally attentive to it, because if you plan on installing or building a system which will be ignored and only be looked after when you feel like it then there is no point of having one.

Setting up the system is only the beginning as you will have to keep updating your knowledge on them and how you can use your system to attain the best benefits out of it. It is also said that your system grows along with you, so the more you increase your knowledge on Aquaponic Gardening, the more success your garden reaps from you.

Be sure to use the details given in this booklet to make your job a little less hard than before and to gain benefits. Apart from the bookish knowledge and information provided to you over this guide, there is no harm in being a little creative and using your own ideas; you never know what results your ideas might bring you.

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