



NuLeaf Tech Inc.
Better Solutions. Naturally.



NuTree User Manual

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Congratulations on your new NuTree Bonsai aquaponic system! From all of us here at NuLeaf Tech, we thank you for your support and we welcome you to the rewarding world of home aquaponics.

As a courtesy, we have included with your purchase this pamphlet providing an overview on how to set up a Walstad Tank, what plants and fish to choose, and how to care for the NuTree Bonsai. There is also some information about Aquaponics as well.

This is the NuTree User Manual! For more information on how to construct the unit itself, please see our NuTree Construction Manual.

*This can be found on our NuTree Bonsai/DIY Aquaponics Page at:
<https://www.nuleaftech.com/diy-aquaponics-landing>*

Whether you are an experienced gardener or this is your first time exercising your green thumb, this packet will provide some useful information to getting started so be sure to give it a read.

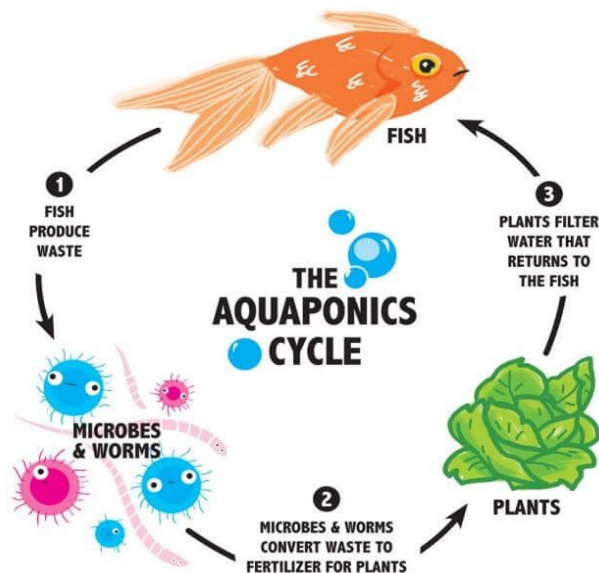
Please Note: *This is a starting guide in terms of picking plants and fish. Don't be afraid to get adventurous and try new types of plants. Post a photo with the results for us to see on social media!*

AQUAPONICS



Your NuTree ecosystem uses a method called aquaponics to grow your plants and raise your fish. As defined by the OED, aquaponics is:

“a system of aquaculture in which the waste produced by farmed fish or other aquatic animals supplies nutrients for plants grown hydroponically, which in turn purify the water.”



A simpler way to think of aquaponics is as a mix between an aquarium and a garden. In a traditional garden, the fertilizer and water needed to grow your crops are wasted after use, and consistent supervision is needed to ensure the ideal environment for your plants.

With aquaponics, the fertilizer for your crops is provided by fish waste and wetland microbes living in your “aquarium.” After the nutrient-rich water is used to grow crops, the clean water is recirculated back for the fish. Plants in the fish tank can also provide food for the fish. The system is constantly circulating so very little maintenance and supervision is needed to sustain a healthy environment.

This guide will also help you pick the right type of fish and plants for your goals, as well as how to set up a Walstad Fish Tank. A Walstad Tank is more like a pond in the sense that the ecological nutrient cycles balance themselves and there is even less aquarium maintenance. Even less work for you with some tasty herbs!

Let's Build a NuTree!

So you've bought a NuTree and you're ready to start setting up the tank and choosing plants and fish. Congratulations on this first step in your home gardening adventure!



THE WALSTAD METHOD



Developed by Diana Walstad, the Walstad Method is a method of designing aquarium ecosystems. In a Walstad tank, aquatic plants are grown in a bed of soil at the bottom of the tank. These aquatic plants then recycle the waste produced by the fish in the aquarium. This process creates a balanced ecosystem for each organism, and generally a more pond-like, natural tank. Traditionally the Walstad method is for indoor tanks, but can also be adapted for outdoor use.

The wetland basin of your NuTree is, in essence, a Walstad tank. We chose this method due to its ease of use and low maintenance. A traditional aquarium or aquaculture tank requires constant monitoring and maintenance. However, a Walstad tank maintains a natural cycle on its own to create a balanced ecosystem like a pond. This means you will have to do much less to keep your fish and your crops healthy.

Below we have provided basic instructions on setting up your wetland basin and a few recommendations for which aquatic plants to include in your setup.

Setting up your wetland basin:

1. Cover the bottom of your basin with 1in of unfertilized soil.
2. Add no more than 1 inch of fine gravel on top of your soil. Be sure to cover the soil completely.
3. Add ~2 inches of water to the tank, being careful not to displace the gravel.
4. Once you have chosen which aquatic plants to put in your basin, simply plant them in the soil and brush a layer of gravel on top of them. ***For this entire setup process, you want to make sure the entire layer of soil is covered by gravel.***

5. Fill the rest of the basin with room temperature water. You will want to do this slowly so as not to displace your gravel layer.
6. It is best to wait a few (2-3) weeks after setting up your wetland basin before adding in fish and surface plants like duckweed.

CHOOSING AQUATIC PLANTS

Most aquarium plants will do well in a NuTree, but we do have some recommendations well suited for the Walstad method. These are general suggestions, but geography and exact

location will have an effect on what is available and what grows well. This is especially true in an outdoor tank.

Soil Plants

These are plants that will grow in the soil layer of your basin. You have a lot of options here but we (and Diana Walstad) recommend that you start with a few different types of quick-growing plants to get the ecosystem cycling well. Here are some top picks:

Amazon Sword Plant



Growth Rate: Fast

Care: Minimal

The Amazon sword plant is a great place to start as it grows very quickly and is generally quite resilient. It does not require an enormous amount of light and can survive in temperatures ranging from 60 to 85 degrees F.

Dwarf Sag



Growth Rate: Fast

Care: Minimal

Dwarf sag is another good choice for your wetland basin though it will not grow as quickly as an Amazon sword plant. Dwarf Sag does well even in high pH water so long as the temperature is kept between 70 and 83 degrees F.

Guppy Grass



Growth Rate: Very Fast

Care: Minimal

We have had a lot of success growing guppy grass in our NuTree and we highly recommend trying it out. Guppy grass will do well in temperatures between 50 and 80 degrees F. Goldfish love to eat this fast-growing plant and will help you keep it to a manageable level.

Floating Plants

It's usually a good idea to include some floating plants in your wetland basin. They will help to combat algae and provide more oxygen to your basin while adding a nice flair to the tank. Again, your options are plentiful but we've recommended a few common choices to get you started. To plant these simply drop them into your wetland basin and they should begin to grow on the surface.

Duckweed



Growth Rate: Fast

Care: Non-existent

A popular plant for aquaponics, Duckweed will grow on the surface of your basin in almost all water conditions and temperatures and proliferates very quickly. Duckweed can be contained to a section of the tank by a looped piece of tubing, often called a "Duckweed corral."

Water Sprite



Growth Rate: Fast

Care: Easy/Moderate

Water sprite is another popular choice for floating plants but it may require a bit more maintenance than duckweed. It grows well in temperatures between 65 and 80 degrees F but may become a bit of a nuisance as leaves falling off the stems may require trimming.

Frogbit



Growth Rate: Medium

Care: Moderate

Frogbit will give your wetland basin a pond-like look and is best kept in water between 64 and 84 degrees F. The main thing to consider with frogbit is that you need to keep the tops of the leaves dry to prevent rotting. Some thinning of the leaves may be needed.

CHOOSING CROPS

Now that we have covered aquatic plants the biggest question most people have is ‘what kind of crops can I grow in my NuTree?’ The answer to this is complex and varies significantly based on gardening experience, but to get you started we have provided an overview of some of the most popular aquaponics crops.

Herbs

Herbs are generally the easiest thing to get started growing with your NuTree. Though there are many different options for herbs with varying levels of difficulty, here are a few of our recommendations:

Mint



Level: Beginner

Seasons: All

Growth: Fast

Type: Perennial

Mint is a fast-growing herb that is very tolerant of abuse and will grow in cool or warm climates. Mint is a perennial plant which means that it grows continuously for many seasons. In colder climates, mint will have a dormancy period in the winter months but much of the time in warmer temperatures it will grow all year round.

To harvest mint you can simply cut off the leaves as needed, leaving the stem in-tact for future growth.

Parsley



Level: Beginner

Seasons: Spring, Summer, Fall

Growth: Medium

Type: Perennial/Annual

Parsley is another very good option for beginners as it is relatively resilient and can be grown in most climates for most of the year. Parsley can be a perennial plant if the weather is warm, but in colder climates parsley will die during the winter making it an annual crop. If you are in a warmer climate, you can actually start growing parsley in the late winter though it will grow more slowly during these periods.

Like mint, parsley can be harvested by simply cutting the outside leaves as needed. If you are in a colder climate growing outdoors, be sure to harvest your parsley before the first freeze of winter.

Basil



Level: Intermediate

Seasons: Spring, Summer

Growth: Medium

Type: Annual

Basil is a very popular herb for home gardening, but it is far less resilient than parsley or mint. Basil is extremely sensitive to cold so if your NuTree is setup outdoors you will likely only be able to grow basil in the spring and summer. Basil also needs a decent amount of sun to grow well, though it is possible to grow with only 5 - 6 hours of sunlight daily. Basil may present a bit of a challenge for those new to gardening but it can be used in a variety of recipes and we think it is well worth a spot in your NuTree.

Like other herbs, basil can be harvested by cutting or picking leaves as needed. Be sure to harvest your whole plant by mid-autumn if you are growing outdoors.

Thyme



Level: Beginner to Intermediate

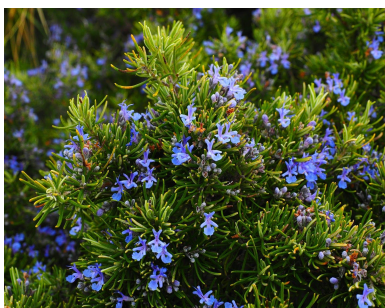
Seasons: Summer, Fall

Growth: Medium

Type: Perennial

Thyme adds a great aroma to your NuTree. It loves the sun and warmth and, therefore, can be harder to maintain and will have noticeably less growth in colder weather. Although French and English thyme are the most common types of thyme, there are over 50 different types for various culinary uses or tea leaves. We particularly love lemon thyme for its fragrance. Thyme also produces lovely bee-attracting flowers so this herb has a lot to offer! Thyme can be harvested by cutting or picking leaves as needed and is easy to shape.

Rosemary



Level: Intermediate

Seasons: Summer, Fall

Growth: Medium

Type: Perennial

A member of the mint family, rosemary is a classic herb in any garden! Like thyme, rosemary favors warmer weather and lots of sun, ideally 6-8 hours, so it is often better to plant outdoors. In addition, rosemary is generally pest resistant as well but can be prone to powdery mildew if being grown indoors. It is a slow-growing herb but can still provide year-round harvests and grows lovely purple-blue flowers. Rosemary can be harvested by cutting or picking leaves as needed and can be easily dried and stored as well.

Leafy Greens

Leafy greens require a bit more TLC than herbs but they are still very easy to grow in a NuTree system. While growing herbs can be great to enhance your recipes, this is where we get more in the realm of growing your own food. Here are a few of our top picks:

Bok Choy



Level: Intermediate

Seasons: Spring, Fall

Growth: Medium

Type: Annual

Bok choy and other mustard greens are a good place to start when growing leafy greens in your NuTree. Bok choy is fairly resilient and only needs about 3 - 5 hours of direct sunlight each day. Bok choy can be reliably grown in the early spring and again in the midsummer for a fall harvest. In winter bok choy does not grow but exposure to a light frost in fall can improve the flavor.

To harvest bok choy, simply pull out the full plants and store them for use in your kitchen. Do not freeze bok choy or other leafy greens for later use.

Kale



Level: Intermediate

Seasons: Spring, Fall

Growth: Medium

Type: Annual

Kale is an ever-popular ingredient in salads and other dishes, and it is relatively easy to grow in your NuTree. Kale needs lots of sunlight to grow (about 6 - 8 hours daily) and may attract pests like aphids. Though it is reasonably frost resilient, severe freezes will damage your kale. Plant in late winter or early spring and again at the end of summer for a fall harvest.

To harvest kale, you can cut the leaves as they are ready and keep the central stalk growing for a better yield. Harvest in full by the first freeze of winter.

Collard Greens



Level: Intermediate

Seasons: Fall, Winter

Growth: Medium

Type: Annual

Collard greens are a delicious and nutrient-rich crop for your NuTree. Collard greens need lots of sunlight (about 6 hours a day) but are very resilient to cold. Collard greens grow best in cool weather so planting in the early autumn for a winter harvest is ideal. If you live in a colder climate, consider planting earlier for a late autumn harvest. You may encounter some pests but it is not as common as in kale or lettuce.

To harvest collard greens, cut leaves as they are ready to eat. Harvest in full before it gets too cold.

Fruiting Plants

Fruiting plants can be a challenge to grow in a NuTree but we have done it ourselves so it can certainly be done. The yield will most likely not be as good as herbs or leafy greens, but you can certainly see some good results if you work at it.

Strawberries



Level: Beginner to Intermediate

Seasons: Spring, Summer, Fall

Growth: Slow

Type: Perennial

Strawberries are our #1 recommendation of fruiting plants to grow in your NuTree. They can grow in shade or full sun, and go dormant in the winter so they can be harvested year after year if properly cared for. Plant

in early autumn for best results. Slugs are a common problem for strawberries so be careful if you are growing outdoors.

To harvest strawberries simply cut the berries, keeping the plant intact to continue growing. If your strawberries are in good health they may survive the winter and can be harvested the following year after the dormant period.

Tomatoes



Level: Expert

Seasons: Spring

Growth: Medium

Type: Annual/Perennial

Tomatoes are a definite challenge to new gardeners. Though tomatoes are technically perennials, they are grown as annuals in most of the US. Tomatoes need full sun and are very sensitive to cold. In addition to attracting a variety of pests, tomatoes are also susceptible to blight and other diseases. We don't recommend tomatoes for new gardeners as they can be difficult to grow in aquaponic setups. Still, if you are up for a challenge, feel free to give it the old college try.

To harvest tomatoes simply pull the fruit from the stem.

Japanese Eggplant



Level: Intermediate to advanced

Seasons: Summer, Fall

Growth: Slow

Type: Perennial

Japanese eggplants are a small, slender varietal with a sweet, mild flavor and a delicate lavender flower. They have all the great taste of a traditional eggplant with the additional benefit of being able to be harvested earlier in the season than its thick-skinned cousins. They are an excellent perennial plant so long as it is in a frost-free location, although it does prefer warmer weather and full sun and is a nutrient-heavy plant to grow. They can grow to be quite large, but can easily be trimmed back with regular maintenance, and may require a trellis if the plant becomes too heavy.

To harvest Japanese eggplants, simply pick them from their stalks. To increase growth, pinch off the first buds of the plant once it reaches 6 inches tall to increase the growth of side-branches (where the fruit grows). Harvest as soon as the fruit is ready or else fruit production for the rest of the plant will slow down.

Chili Peppers



Level: Intermediate

Seasons: Summer

Growth: Slow

Type: Annual

Add a little spice to your NuTree with Chili Peppers! There are dozens of varieties to choose from, but generally, they love warm temperatures and need full sun. Many will still grow in partial shade but their growth may be slower. Chili Peppers are not frost tolerant. They are a slow-growing plant and can take 2-5 months to bear fruit depending on the varietal. Pinch out the buds on the first flowering shoots to promote more branching and increase the harvest.

To harvest chilis, simply remove from their stalks. These plants will go to seed in the winter and new chilis will need to be planted. Wear gloves if you're handling particularly spicy chilis!

A note on flowers:

You can definitely grow flowers or other aesthetic plants in your NuTree rather than crops. We have focused on crops in this guide since they require a bit more maintenance and TLC generally. That being said, if you are planning on growing flowers more resilient types are probably your best bet. You might want to stay away from growing things like roses as they can be very particular about their environment. We also encourage you to do some research on your local plants!

CHOOSING FISH

Perhaps just as important as choosing which plants to put in your NuTree, is choosing which fish! But before we talk about fish, there are three key factors you may want to consider as you build your wetland ecosystem.

It's possible to not have fish in your system, but you will need to supplement your NuTree Bonsai with hydroponic fertilizer. The plants still need nutrients to grow!

Diet

Firstly, what will your fish eat? If you don't mind feeding your fish every day with pellets or other fish food you will have a few more choices.

On the other hand, if you don't want to have to worry about remembering to feed your fishy friends there are other options. Many fish can survive solely on the aquatic plants you introduced earlier.

There are pros and cons to each approach, but the key is to make sure the fish living in your NuTree can survive on a diet of your chosen food source.

Friends or food?

Another thing to consider is what you plan to do with the fish in your system. Are you raising fish to eat? If you are, having a few larger fish may be preferable. If you simply want fish to produce waste to feed your plants, having a variety of smaller types of fish might be a better option.

The number of fish you can have in your tank is also going to vary greatly depending on the type and size you want. Generally, though, we recommend starting with one or 2 fish for beginners regardless of these factors. As you begin to add more fish, be careful to consider how many gallons of water each fish of a given species needs to thrive.

For instance, a full-size NuTree's basin (~325 gallons) could easily support 10-15 tilapia (or more), but only one koi. When choosing fish species, you can find information about how much water they will need online or from the pet shop or retailer selling to you.

Environment & Temperament

The last thing to take into account when choosing fish is the general temperament of the species. Some fish need to be in schools of their own species, while others thrive in a more diverse environment. Some fish can be aggressive and others docile. It is important to include fish that will get along with the other species in your tank, as unhappy, anxious fish will be more likely to die prematurely.

Another environmental factor to consider is water temperature, as different fish survive better in different climates.

Type

Now that you have thought about your food source, environment, and ultimate purpose of your fish here are some recommendations for species to include in your NuTree.

Tilapia



Water Temp: 72 - 86 F

Diet: Food pellets, insects

Temperament: Sometimes Aggressive

Edible

If you are raising fish as food, tilapia is a great place to start. Tilapia are great for aquaponics as they are very resilient and grow quickly. Tilapia are fairly sensitive to cold so a higher water temp is ideal for raising these fish. They can also be aggressive to other species, especially smaller 'prey' fish so if you are raising tilapia a more homogenous environment may be preferable.

Catfish



Water Temp: 78 -86 F

Diet: Food pellets

Temperament: Docile

Edible

Like tilapia, catfish need warm waters to grow well. Unlike tilapia, catfish are more sensitive to water quality and pH which can make them a bit harder to raise. Catfish grow quickly and can get very large so if you are not planning on cooking them, they may outgrow the NuTree before they die of natural causes.

Though catfish are not aggressive per se, they do tend to try to eat anything smaller than themselves so if you plan to raise them be sure to keep them with other large fish.

Angelfish



Water Temp: 75 - 82 F

Diet: Flake food, aquatic plants

Temperament: Docile (Territorial)

Ornamental

Angelfish are a beautiful addition to your NuTree and they are pretty easy to raise too! The main thing to consider with angelfish is water temperature as they are very sensitive to cold. Angelfish can eat store-bought fish flakes and other similar foods. Though they have sometimes been known to eat duckweed and other aquatic plants this shouldn't be counted on as a reliable food source.

Though angelfish are generally docile they can become territorial if there are too many other fish around them.

Goldfish



Water Temp: 60 - 75 F

Diet: Flake food, aquatic plants

Temperament: Docile

Ornamental

Goldfish are perhaps the easiest fish to raise in your NuTree. They are very hardy and are not terribly sensitive to temperature. They produce a lot of waste to feed your plants, and they are easy to find and inexpensive at any pet store. Goldfish get along very well with other fish and do well in diverse or homogenous environments. They can survive on a diet of store-bought fish food or duckweed and other aquatic plants.

Goldfish are a fantastic addition to your NuTree and we highly recommend them for anyone new to aquaponics.

Please Note: It hurts our hearts to say this, but sometimes fish...die. Sometimes you can chase the reason down to water quality issues or disease, but aquaponics does have a bit of learning curve. Go easy on yourself.

BASIC MAINTENANCE

The NuTree is designed to be a relatively “hands-off” system, so the maintenance needed to keep it healthy is pretty minimal. Still, there are a few things you will want to do on a daily/weekly basis to make sure your NuTree is performing to the best of its abilities!

If you decide to add additional fertilizer to your tank, make sure that it is aquarium safe and not simply a hydroponic fertilizer. Although these fertilizers can be great for plants, they can be harmful to your fish so make sure the fertilizer you are using is either aquarium safe or specifically designed for aquaponics.

In terms of drips, the most likely places that these will occur are at the elbow joints of the PVC spiral. This can easily be remedied by applying marine epoxy to these joints, although it will make the PVC spiral harder to disassemble. Another source of drips is if plant roots become too large and start to become unwieldy, and this will cause an overflow. This can be remedied by trimming back the plant or mildly adjusting its positioning. The NuTree is designed so that these drips are contained to fall over the tank and minimizes splashes.

Daily Maintenance

These are things you will ideally want to do every day. Though in most cases skipping a day here and there will not be much of an issue, especially once the system is established.

Prune plants as needed

This one is pretty simple. Basically, you want to remove any dead or excess leaves from your plants to help stimulate healthy growth. Remove any dead leaves from plant nets or the pond basin as they can invite bad bacteria.

Check flow rate

This one sounds much more complex than it is. You want to make sure that the water is flowing into your basin at a more-or-less constant rate each day. If you notice that there seems to be less water flowing into your basin than usual, this could be an indication that you have a root blockage in the spiral terrace, or the pump could be clogged. If you notice algae growing in the small section of hose that goes into the center pipe, we suggest painting that section or covering it with tape.

Scoop out leaves in the basin

Though this may seem like more of an aesthetic issue than anything else, it is important that leaves shouldn't be left to sit on the water for more than a 24 hour period. If the water surface is covered by enough leaves, it may inhibit the growth of your aquatic plants by

inviting bad bacteria into the tank. Avoid this by scooping leaves out of your basin with an aquarium net and try to remove any leaves that sink to the bottom of the tank.

Check your water temperature

Earlier we mentioned the ideal temperatures for various fish and aquatic plants, you will want to check the water each day to make sure you are within the right temperature range. This can be done with a digital aquarium thermometer or with a water temperature strip. Either can be found at your local fish/pet supply store.

Feed your fish

Depending on your fish/plant setup, you may need to feed your fish occasionally. Consult your local pet supply store or check online to see the type and amount of food you should be giving to your fishy friends. You can use a simple aquarium test strip to check if you are feeding fish too much. If they are overfed then the plants will be unable to keep up with cleaning the excess nutrients from the water and algae may accumulate.

Weekly Maintenance

These are things you don't need to do quite as often, but they are still very important to the health of your ecosystem.

Check plant health

Check on the overall health of your crops. Look for things like wilted leaves, yellowing or browning, or anything else that might indicate your plants aren't healthy. Lift the plants out of the spiral with their plant nets and check the roots and ensure they look healthy.

Although it is rare, *Pythium*, or root rot can cripple the plant life in the tank. It can be common if there is a heat swing and the water temperature rises to over 75 degrees. If plants seem to be wilting when they have plenty of water, that is a sure sign that roots are unhealthy. There are products that help plants recover and others that can be used as a preventative measure. We use Hydroguard, it should be fish safe and is used in very small quantities as a preventative measure.

Add water as needed

This probably won't come up very often, but if you happen to notice the water level in your basin is lower than usual, be sure to add some more to top it off. Check the water temp after adding water too much sure it is still in the ideal range. Evaporation in outdoor tanks is much more common, and you may need to do regular water checks in the summer if you live in a hot area.

Check for insects

Pests are an unfortunate reality of any gardening venture. Do your best to stay on top of them by checking your crops regularly. If you do find evidence of pests, check online for the best solution to your specific pest problem. Plain unscented dish soap and water applied using a spray bottle is a good start for most pest remedies, and mixing this with neem oil is a good preventative measure once the pests are removed.

Check pH/Ammonia/Nitrate levels

Use test strips to check the pH, ammonia, and nitrate levels in your water. These levels have an effect on your plants as well as your aquatic ecosystem so it's important to make sure they stay within manageable margins. The exact ideal levels depend on your fish and your crop setup but here is a general rule of thumb:

pH = 6.8 - 7.5

Ammonia <= 0.5ppm

Nitrate < 150ppm

You can find testing strips online or at your local pet/aquarium supply store.

Other common water parameters to monitor or general hardness (GH) and carbonate hardness (KH). The value for these are often determined more by what water you have on tap than by the fish tank itself, but these need to be monitored so that other parameters, like pH, don't get out of hand.

Depending on the hardness of your tap water or how much chlorine is used at your local treatment plant, you may need to buy a water softener or integrate sphagnum moss (peat moss).

Don't get too stress if your water parameters aren't always exactly inline. So long as your fish seem happy and healthy, it is more important that they be in water with a constant set of parameters than with one that is constantly fluctuating.

Check pumps/plumbing

Here you want to check that all the plumbing is connected and circulating, and you may occasionally have to clean these pipes out to ensure healthy circulation. Water only flows one way, and this shouldn't be an issue in most cases. Optionally, the flexible hose for the air pump can be swapped for a rigid pipe design. We can assist with planning and give suggestions if requested.

Changing water

You will rarely (if ever) have to completely clean out your basin, but periodic changing of about 10 - 30% of the water will ensure a clean and healthy ecosystem. This can be done about every 6 months to a year. If you need to drain water from the basin for any reason, we suggest buying a garden hose fitting from any hardware store along with a small section of ½ in vinyl tubing. You can use this to attach a garden hose to the pump and drain water more easily.

Thank You!

From all of us here at NuLeaf Tech, thank you for supporting our work with your purchase. We hope that you enjoy your NuTree for years to come. If you would like to contact us for any reason, follow the link to our website [here](#) or contact us at contact@nuleaftech.com