

How to Create an Organic Aquarium

*The Beginner's Guide to Soil-Based
Freshwater Aquariums*

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Plants

WHICH PLANTS SHOULD I GET?

An organic aquarium needs plants. Lots of them. It needs plants which can produce consistent, healthy growth in low light and with moderate levels of carbon dioxide. There are four categories of plant that every organic aquarium should have:

1. FLOATING PLANTS

Floating plants are typically small, fast-growing species such as duckweed, Amazon frogbit, red root floaters, and salvinia. They require no substrate and float freely on the water's surface, making them easy to manage in low-tech setups. In an organic aquarium, floating plants are essential. They absorb excess nutrients, provide shade that limits algae growth, offer shelter for fish and fry, and even slow the rate of evaporation.

What makes floating plants especially valuable is the 'aerial advantage'²⁶. They live above and below the water. Floating plants absorb nutrients from the water column and tap into atmospheric carbon dioxide, which is hundreds of times more abundant than dissolved carbon dioxide underwater. Remember Liebig's Law of the Minimum? By accessing atmospheric carbon dioxide, their growth is not limited by the carbon dioxide produced through decomposition

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within the aquarium. As a result, they can grow rapidly, even in low-tech setups.

Their fast growth enables them to remove ammonia and other waste nutrients from the water more efficiently than submerged plants early in the tank's life. This helps prevent nutrient accumulation that could otherwise fuel algae blooms. Furthermore, floating plants create a pathway for atmospheric carbon to enter the system: carbon dioxide is drawn in through new growth, and older leaves release it into the system as they decompose. Aquatic systems with floating or emergent growth (some aquatic plants can grow up and out of the water) exhibit up to three times the biological activity of systems without them²⁷.

2. ROOT-FEEDING PLANTS

Root-feeding plants are typically rosette-forming species such as cryptocoryne, echinodorus, sagittaria, and vallisneria, which anchor deeply and draw nutrients primarily from the substrate.

As discussed in Objective 3, plants that develop extensive root systems oxygenate the substrate. The oxygen-rich areas surrounding plant roots host a thriving community of microbes, which in turn, unlock nutrients that would have otherwise been unavailable to the plant. With time, this partnership builds a biologically active substrate that nourishes plants and microbes.

3. WATER COLUMN FEEDERS

Water column feeders are typically fast-growing stem plants such as bacopa, rotala, hygrophylla, and pearlweed, as well as free-floating species like hornwort, which absorb nutrients directly through their leaves rather than roots.

Fast-growing plants are essential during your aquarium's early stages. These plants rapidly absorb excess nutrients and ammonia from the water. This fast growth stabilises your aquarium environment and helps to prevent early algae blooms. They might dominate at

the beginning, but as your aquarium matures, they can be gradually replaced or pruned back to allow more space for slower-growing species.

4. EPIPHYTES AND MOSSES

Epiphytes are technically defined as plants that grow on other plants. In an aquarium, they are attached to hardscape via their rhizome: a thick, horizontal stem that anchors the plant and produces both roots and leaves. Be careful not to bury the rhizome in substrate, as doing so leads to rot and eventual plant death. Epiphytes grow slowly, but their steady presence offers long-term stability with minimal maintenance. Common examples include Java fern and anubias.

Mosses are small, non-vascular plants (meaning they lack the internal tubes that vascular plants use to transport water, nutrients, and sugars). Instead, they absorb moisture and nutrients directly across their entire surface. Unlike rooted plants, mosses don't need soil and are often used to cover hardscape or create natural-looking drapes and carpets in the aquarium. Popular aquarium mosses include Java moss and Christmas moss.

Epiphytes and mosses are attached to surfaces such as rocks, driftwood, or decorations and absorb nutrients directly from the water. They maximise planting space by thriving in areas where other plants can't grow.

At the end of this book, you will find a field guide with an overview of common plants in each of the above categories. It will help you navigate the decision-making process.

HOW MANY PLANTS SHOULD I GET?

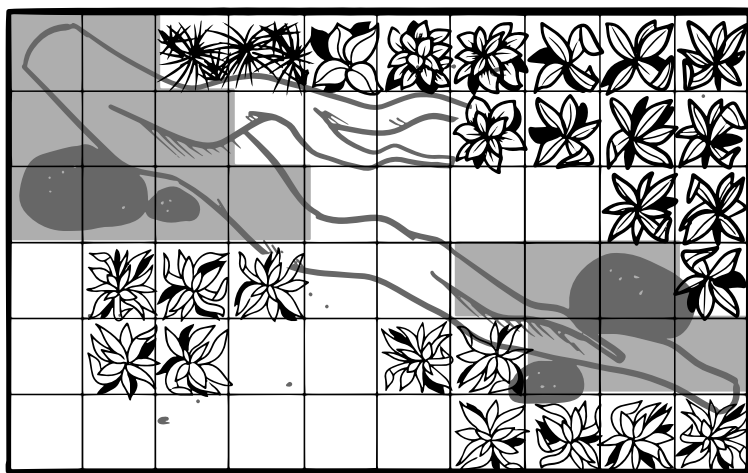
Aim to cover at least 50% of the substrate (excluding hardscape) with plants at setup. In ecological terms, this is known as basal cover: the portion of the ground occupied by the base of the plant. It's different from foliar cover,

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which refers to how far the leaves or stems spread out above ground.

A tank with high basal cover will stabilise faster, outcompete algae, and provide better water quality. Sparse plantings leave excess nutrients in the water column and slow beneficial bacterial activity in the soil, which can trigger algae blooms and delay cycling.

To help visualise the required coverage, picture 5 cm squares covering the entire floor of your tank, like a chessboard. Now, block out any squares that are occupied by hardscape. From the remaining squares, half need to have at least one plant in them.



For example, a bushy rosette like *echinodorus* may have large leaves that stretch over multiple squares, but if its root base only sits in one, it only counts as one. What matters most is how much of the substrate is in contact with roots, not how leafy the plant looks from above.

This doesn't mean you need to go out and buy dozens of potted plants; you can easily divide one plant across multiple squares. Likewise, if you're on a budget and can't plant densely right away, that's okay. Many aquatic plants can be propagated by trimming and replanting healthy growth. Just be aware that this will delay how soon you can add fish – since low plant mass can lead to toxic ammonia levels – but waiting a few extra weeks can save money and still allow you to reach the critical plant mass needed for stability.

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Some plants may not thrive immediately. It's normal for new additions (especially those grown out of water before sale) to 'melt': shedding old leaves as they adapt to submerged life. This doesn't mean the plant is dead. If melt occurs, trim the disintegrating leaves but leave the roots undisturbed; the plant will typically produce new growth once it has adjusted to its new environment. Be careful not to discard a plant which is still adapting.

When starting out, focus on function and variety rather than creating the perfect layout. Choose a mix of species that include at least one plant from each of the four categories.

DO I NEED TO FERTILISE MY PLANTS?

Plants need a mix of macronutrients (e.g. nitrogen, phosphorus, and potassium) and micronutrients (e.g. iron, boron, and zinc) to grow. As established earlier, all the essential plant nutrients are provided passively by the soil and actively each time you add fish food to your aquarium²⁸. But even with your detrital crew cycling nutrients, there are two that may require your attention: one macronutrient, potassium (K), and one micronutrient, iron (Fe). These nutrients are often the first to be depleted in the water column and can halt plant growth.

Potassium is essential for healthy plant function. It helps regulate water balance in plant cells and supports overall growth. Unlike nitrogen or phosphorus, however, potassium is not sufficiently supplied through fish waste or decomposition. If your tap water and soil are both low in potassium, your plants may begin to show signs of deficiency. Symptoms of potassium deficiency include yellowing or browning along leaf edges, and tiny round holes in leaves (often called pinholes) which gradually widen and die back.

Iron is crucial for chlorophyll production, which keeps leaves green and supports photosynthesis. In an organic aquarium, iron is available to rooted plants through the soil, but it's absent from the water column. This causes problems for floating plants as they do not have access to the substrate iron. The classic symptom of iron deficiency is chlorosis: the yellowing of new leaves while older ones remain green. You may also

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notice slow growth or pale colouring in species that are normally vibrant.

The simplest and safest way to correct either of these deficiencies is to use an off-the-shelf liquid potassium and iron fertiliser. API® Leaf Zone is the perfect complement here as it contains just potassium and iron, with no nitrogen or phosphorus. This means it will support your plants without upsetting the balance of your ecosystem.

Only dose if symptoms appear (as they are not necessarily in every system) and dose lightly, starting at half strength. Observe and only increase if deficiencies persist. When you're just starting out, skip DIY mixes as finding the right dose can be difficult and unpredictable.

HOW ARE PLANTS SOLD?

Most aquarium plants are sold either as potted or in-vitro specimens. Both options have their place, but if you are on a tight budget, start by trying to source free local cuttings to build up your plant mass.

POTTED PLANTS

Potted plants are the most common option found in local aquarium shops and garden centres. The plant is usually rooted in rock wool, a sponge-like material that holds moisture. This must be removed entirely before planting, as it can trap debris and restrict root development. To free the plant, gently split apart the rock wool, then use a fork to remove any remaining material from the roots. Potted plants are typically more robust than in-vitro plants and allow you to inspect them for health before purchase. Be mindful that plants may carry unwanted snails, algae, or other hitchhikers. It's recommended to rinse them thoroughly in dechlorinated water and inspect each plant carefully before introducing them to your aquarium. If you're unsure, a short quarantine period in a separate container can help reduce the risk of introducing pests into your setup.

IN-VITRO PLANTS

In-vitro (tissue culture) plants are grown in sterile, sealed containers filled with nutrient gel. These high-quality plants are commonly sold through online retailers as they are easy to ship. They're a clean and controlled option, guaranteed free from snails, algae, and pesticides – ideal if you're starting a tank and want to avoid unwanted hitchhikers. Each cup usually contains several small plantlets that can be separated and spread around your aquarium. However, they are more expensive per plant and tend to be more prone to melt during the transition into a new environment. With proper care, most recover and adapt over time.

CUTTINGS

When sourcing from local hobbyists, it's common to receive a bundle of stem plant cuttings rather than potted, rooted plants. Don't worry if they don't have roots yet; most fast-growing species will grow them quickly once planted or even when left free-floating under good light. It's an affordable, effective way to fill out your tank. Just rinse and inspect them before planting.

HOW DO I KNOW IF I'M BUYING A HEALTHY PLANT?

Filling your aquarium with weak or dying plants will not create a healthy ecosystem. To give your aquarium the best chance of success, it's essential to start with strong, healthy specimens. Only growing plants can remove toxins from the water²⁹.

The clearest sign of a healthy plant is new growth³⁰. Fresh leaves, new shoots, and branching roots all indicate that the plant is actively growing and has adjusted well to its environment. If you see signs of fresh, bright green or reddish tips, you're onto a winner.

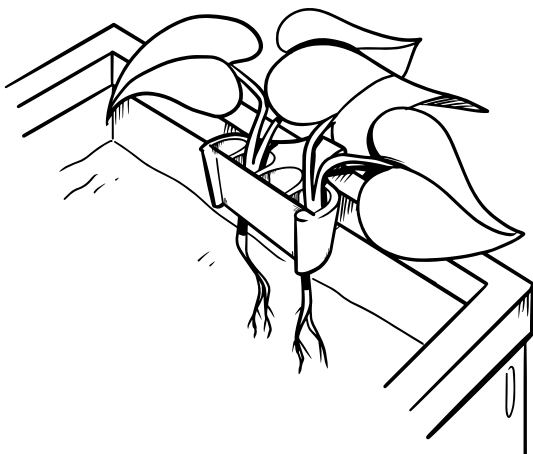
CAN I GROW HOUSEPLANTS FROM MY AQUARIUM?

Many hobbyists enjoy experimenting with houseplant cuttings or even sprouting common herbs and vegetables at the edges of their tanks. These semi-aquatic additions add some novelty and actively support the water quality of your system.

Many common houseplants like pothos, peace lily, or spider plants will root happily in water and thrive in your open-top aquarium. Some aquarists even use the excess nutrients in the aquarium to sprout garlic, avocado seeds, and sweet potatoes. It's small-scale aquaponics, and while you won't be harvesting full meals anytime soon, it's a fun method to recycle nutrients and explore plant growth in new ways.

You don't need a complicated setup to position these plants. Start by removing all the potting soil from the plants' roots, then decide where to place them. The goal is to suspend the plants so that their roots access the water without submerging the plants themselves. If your hardscape extends above the waterline, you can use it as a structure to support your houseplants. Otherwise, you can use soft plant twist ties to hook your plants in place.

Alternatively, you can purchase hydroponic plant holders to hang on the edge of your aquarium. Brands such as Poth-O-Carry® create holders with specific species in mind, meaning they position your plant at its ideal height (and they often look tidier than DIY methods).



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As covered earlier, plants that grow above the waterline have access to atmospheric carbon dioxide. This means they can grow quickly and absorb nutrients efficiently, helping to reduce the load on your in-tank plants. Their roots dangle into the aquarium, taking up nitrogen and nutrients much like floating plants do. In return, they release oxygen, stabilise the water, and offer a simple way to expand the system.

These projects are entirely optional, but they highlight something important: an aquarium doesn't have to end at the water's surface. In an organic system, every part of the tank, and even the space around it, can play a role in the larger cycle of growth, decay, and renewal. Whether you're trailing pothos or watching garlic sprout, these small additions can deepen your connection to the system you're building.

DISCLAIMER: Research invasive species in your region before collecting, cultivating, or disposing of any aquatic plants. Never release plants, cuttings, trimmings, or aquarium waste into waterways, storm drains, or natural areas – even native species can become problematic when introduced to new locations. Dispose of excess plant material by thoroughly drying and bagging before disposal. If collecting plants, verify local regulations and obtain necessary permissions. By acting responsibly, your actions prevent ecological damage and protect aquatic ecosystems for future generations.