The Importance of Aquarium Plants

Plants are more than just a decorative addition to your aquarium. They play an important part maintaining the correct environment for your fish to thrive. During the day plants produce oxygen and absorb carbon dioxide produced by the fish in your tank. At night this process is reversed. At nighttime the plants take up oxygen and produce carbon dioxide.

Plants also play a major part in the breakdown of the waste products produced by your fish by acting as natural filters to keep the aquarium environment healthy.

Aquarium plants produce oxygen with the help of green pigment called chlorophyll. Like all plants (land and aquatic) sunlight is used as a source of energy. The green parts of the plant use energy from sunlight to make the carbohydrates from water and carbon dioxide. This process is known as photosynthesis, and produces oxygen as a "byproduct."

In fact all oxygen on earth is produced this way. Without plants life on this planet could not exist.

Other Important Aspects of Plants

- In an aquarium plants help clean the water by absorbing waste materials introduced by the fish and the fish food.
- Healthy plants give off small amounts of oxygen in their root area which prevents the bottom from decaying.
- Exterior and small algae which settle on the plants are also helping to clean the water.

Aquatic plants have adapted to their environment in an intriguing way. They have developed a system of cavities that run through the entire plant. These cavities are filled with air to help the plant maintain buoyancy. That way the plant is supported by the water and needs far less support tissue than its land counterpart.

The upper surfaces of leaves that are turned toward the light are usually brighter green in color than the undersides of the leaves because it is the upper side which contains the chlorophyll.

Aquatic plants are permanently submerged so their leaves can be thin and delicate. Aquatic plants are also capable of absorbing gases and nutrients directly from the water. For many species the roots are mere clamping organs.

Of course aquatic plants need to have sufficient light and warmth and are naturally dependant on the quality of their primary element -- water.

We will dig a little deeper into this substance in the following article.

Oxygen

The single most important element for all organisms is oxygen -- both plants and animals must have it in order to live. As well as plants and animals, many types of bacteria also depend on oxygen to breakdown waste materials. They can only do this when there is sufficient oxygen is available.

Most of the oxygen found in water comes from surface air. Aquatic plants also produce a portion of the oxygen in your aquarium by a process called photosynthesis.

Oxygen Deficiency

Poorly maintained aquariums are at risk for oxygen deficiency. This can occur because:

- There is too large of a fish population and not enough aquatic plants
- Filters are dirty which results in muddy bottoms and large accumulations of food leftovers or dead organic materials
- Poor lighting which prevents the natural process of photosynthesis
- Starving plants caused by poor water conditions e.g. lack of nutrients; over or under heating.

When an oxygen deficiency occurs you will see fish at the surface of the water gasping for air. The fish are at the surface because that is the only place where there is still oxygen dissolved in the water. This oxygen is coming from the surface air. Oxygen deficiency also causes bacteria to die resulting in an accumulation of waste products which the bacteria are responsible for breaking down.

An oxygen deficiency requires radical improvements to your aquarium. You must think about the lighting, water quality, fish population, and an adequate number of aquatic plants.

Oxygen surplus

When the aquarium is well maintained it is possible that a surplus of oxygen develops. This is also a serious problem because water with a high oxygen level has insufficient nourishment for the plants. If left unattended the water will balance itself by causing the plants to die off. This will result in the lowering of oxygen production and also more oxygen being absorbed by the bacteria which breakdown decaying plants.

Carbon dioxide (CO_2)

Carbon dioxide is the most vital plant nutrient. It must be present in sufficient quantity in every aquarium if you want your plants to thrive. It is not unusual to see a carbon dioxide deficiency in aquaria. Usually the fish don’t produce as much carbon dioxide as the plants in your aquarium need. However, after installing a new filter, cultures of bacteria

will start to grow in it. This is a very good thing. These bacteria are using large amounts of oxygen and are also giving off large amounts of carbon dioxide. This is exactly the situation we want.

Even with bacteria cultures, though, a heavily planted aquarium may still need more carbon dioxide than both the fish and your bacteria cultures can supply. If that is the case you have to add additional CO2 by means of a CO2 diffuser. There are plenty on the market to choose from.

Carbon Dioxide Deficiency

If there is insufficient carbon dioxide available to your aquarium plants they will be unable to produce the oxygen the fish need. They will also fail to produce enough carbohydrates necessary for their own growth.

If your aquarium is suffering from a lack of CO2 you can take advantage of the many CO2 fertilization devices on the market. You can even solve the problem by making your own Fermentation device. These simple devices use yeast and sugar to produce alcohol and carbon dioxide. Most of the time fermentation is used to produce alcohol but in this case we are more interested in the CO2.

CO2 devices only need to be used during the day. At nighttime your aquarium plants only respire so they don't need any additional CO2.

Carbon Dioxide or CO2 surplus

Just as with deficiencies, high concentrations of CO2 are also bad for your aquarium. It usually won't kill your aquatic plants but it will sure kill your fish. Luckily, excess carbon dioxide can be easily expelled from the water. It can be done with an airstone or even vigorous motion of the water. Water agitation, however, can be a potential problem as well as a cure. Agitated water is advantageous for your fish, but it also robs your plants from its most valuable nutrient -- namely CO2. A delicate balance must be maintained to keep your aquarium in good condition.

Photosynthesis

This is a process that is powered by the energy of light. In nature the light source is of course the sun. In your aquarium artificial illumination provides the needed energy.

During photosynthesis carbon dioxide is absorbed while oxygen is expelled. These two gases enter and leave the plant through very tiny pores. The green pigment called chlorophyll is the substance that is responsible for this process. Photosynthesis also produces simple sugars like glucose which are the building blocks for the plant. Glucose

in fact is the food of the plant. Oxygen is only produced as a byproduct while carbon dioxide is only necessary to keep the photosynthesis process going.

Since photosynthesis is most active in the blue and red portions of light you should choose aquarium lights with that in mind. There can be only photosynthesis when there is light – the process stops when there is no more light available i.e. nighttime.

Respiration

Knowing that photosynthesis stops in the night raises the question about what is happening during those dark hours. Don’t forget that your aquarium plants usually have originated in the tropics where there is about twelve hours of daylight. During the other twelve hours the main process is respiration. This is in fact the opposite of photosynthesis. During darkness food substances are broken down (with the help of oxygen) and carbon dioxide is produced as a byproduct.