Carbon For Your Aquarium Plants - Why life depends on it!

February 27, 2013 at 9:46am

Carbon – The backbone of your plants

By Shane Matheson

Carbon is an amazing element. It is the basis for all life as we know it, and every single plant and animal requires it for life. Plants use carbon to photosynthesize. Photosynthesis is the production of oxygen and carbohydrates like glucose using this reaction:-

CO_2 + Water + Sunlight -> glucose + oxygen
$6CO_2 + 6H_2O$ + sunlight -> $C_6H_{12}O_6 + 6O_2$

With this simple equation we can see why plants require carbon and water, and simply how they convert it into food while producing oxygen for us to breathe. Amazing right? So now we know that plants NEED carbon to grow and survive. So how do they get it? We all know about greenhouse gases and CO_2 in the atmosphere. Plants can utilize this source of CO_2, essentially 'scrubbing' our atmosphere clean and replacing it with oxygen. The problem that aquatic plants face is that this free floating form of CO_2 is not readily available to them underneath the surface.

CO_2 exchange takes place at the surface of the water and the amount that gets absorbed is directly proportional to factors such as pH, carbonate hardness and only a very small amount can be absorbed. Couple with this the fact that any surface agitation will quickly release any carbon added and it starts to become a challenge. Plants require good circulation but too much surface agitation and our carbon will be re-released into the atmosphere. Carbon will almost ALWAYS be the one crucial element that your plants are lacking to thrive. Adding CO_2 can have an incredible effect on the health of your plants and your overall growth rate!

CO_2 Injection

This is the process by which we artificially add CO_2 into our aquarium water column in order to increase the amount of carbon available for our plants to use. This is done in a number of ways. I will quickly explain each one here.

DIY – Do It Yourself Method

This basically involves using yeast (either bakers or brewers) and sugar to induce a fermentation process within a container. The CO_2 is produced as a byproduct and we can siphon this off and channel it into our aquarium. This is a cheap, easy and effective method, though will require replacing every month or so.

Soda Stream

Remember the old Soda Stream makers you used to make your soft drinks? Well the CO_2 that it uses to make fizzy drinks is the same stuff that plants need to grow. You can hook up a regulator and bubble counter and use one of these as a source of carbon.

CO_2 Cylinder

This is generally the most expensive initial outlay, however will last the longest by FAR, and is much more accurate to adjust to the amount of CO2 you require.

Pre-Made Kits
There are now a number of pre-made CO2 injection systems from various companies that offer a small canister and all the equipment you need to rig up a simple, small CO2 unit.

Flourish Excel (Seachem)
Flourish Excel is an organic compound delivered in liquid form in a bottle you can buy from your local fish store. It is a fast and easy way to deliver a carbon substitute to your plants. Interestingly, Excel also contains algaecidal properties and will help to clarify your water.

How to know how much carbon to give?
It can be a tricky process regulating your system, but there are a few things on the market that can help. There are a few ranges of CO2 test kits available that utilize a chemical reaction to inform you of your level of dissolved CO2 in your aquarium by changing a liquid from one colour to another. Generally speaking the ideal amount is between 15-25 ppm. Anything more than this and we will start making our fish uncomfortable. Around 50ppm will start to become toxic to them. Less than 10-15 ppm and our plants will get little benefit. Don’t stress though. It is difficult to get lethal levels of CO2 if you are using a yeast system. They simply don’t produce enough in most cases.

This is intended to be a basic guide to inform you of the immediate benefits of adding CO2 to your aquarium, and how simple it can be to get started. For a simple CO2 recipe do the following:-

1 tsp baker's yeast 1 cup of white sugar Chlorine neutraliser 1/2 tsp of Bi-Carb soda

Fill a 2 litre coke bottle 3/4 of the way up with luke warm water. Neutralise chlorine Add 1 cup white sugar and shake Add 1/2 tsp Bi-Carb and shake Add 1 tsp Baker's yeast and shake

Poke a hole through the lid of the coke bottle and push your airline tubing through. Make sure a tight seal is made. Use silicone if required around the hose and around the cap thread.

Run the other end of the airline tube and connect to bubble counter. Attach other end of bubble counter airline to CO2 diffuser and place inside tank.

Good Luck!