

Aquarium Substrate Heating

Aquarium substrate heating can be useful both during the initial period after setup and for the long-term stability of the aquatic plants.

By Karen Randall

Q. I recently decided to put live plants in my 40-gallon aquarium. I've mixed laterite into the bottom half of the gravel (the pieces are 3 to 5 millimeters in size), and above this I added 1 inch of fine gravel (1 to 2 millimeters). Trace elements are added weekly, and carbon dioxide is provided via a solution of baking yeast, sugar and water. The carbon dioxide is connected to the power filter for even distribution. The tank is heated by a 150-watt submersible heater.

With all this done, I've managed to see some growth from my plants. I wonder if I should have gone with a heating cable system for the substrate, but the systems on the market are really expensive. Should I stay with the setup I have right now?

A. Substrate heating can be useful both during the initial period after setup (when it encourages root growth) and for the long-term stability of the tank. On the other hand, it is entirely possible to maintain a top-quality planted tank for upwards of 10 or 15 years without the use of substrate heating. Substrate heating will also not solve problems caused by deficiencies in other areas.

Substrate heating keeps the substrate from becoming chilled and stratified. Set up properly, it also produces convection currents in the substrate that draw nutrients from the water column into the substrate. When the nutrients are drawn into the substrate they are available to plant roots, but not to the algae that grows above.

To prevent the loss of heat through the bottom of the tank, simply set the tank on a sheet of Styrofoam. If the tank stand for an established tank allows access to the bottom glass, you can just tape or glue the Styrofoam in place. If your tank sits on a solid wood stand, the wood itself will work very well as insulation.

Heating cables move water (and nutrients) into the substrate through convection currents, but healthy growing plants can perform the same function. A properly designed substrate in a healthy, heavily planted tank will not become seriously anaerobic (low in oxygen), even without the regular gravel vacuuming done in a fish tank. Understand that slightly anaerobic conditions are necessary for the plant roots to be able to make use of the nutrients in the substrate.

Sometimes, around the three-year mark, a tank that has been growing well and is algae free will begin to have algae problems. This may be a sign that phosphate (and other nutrients) are beginning to leach out of the substrate. This can be alleviated by removing the plants from a third of the tank, thoroughly vacuuming that area and then replanting. Three months later do the next section, and then the final third three months after that.

Many, if not most, aquarists alter their tanks frequently enough (for a number of reasons) that heating cables have very little benefit. Only if the tank will remain set up for an extended period, and all other requirements for excellent plant growth are being met, does it make sense to spend the money on a commercial heating system or go to the trouble of building your own. If the system is well designed you won't be sorry.

If you are struggling to buy adequate lighting and CO2 equipment, I certainly wouldn't spend the money on cables. And let me caution again that heating cables will not solve problems of poor growth in a tank that is not doing well.