How to Grow Beautiful Aquarium Plants on a Student Budget

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Introduction

Hello all. This is Jim Kelly who posted last summer about the possible importance of cation exchange capacity (CEC) of the substrate in relation to nutrition of plants, and more recently posted a set of instructions for setting up a cheap, successful plant tank which is simple enough for even a beginner to achieve. Many people sent me comments and questions for which I am grateful. This complete revision of the previous posting is meant to address the questions and comments I received, as well as add new information I have stumbled upon since then. The one big change in the method is the use of potting vermiculite in the lower substrate layer with the soil, rather than sand. This soft material resists becoming compacted quite well.

The method outlined below has grown beautiful aquatic plants for me with a minimum of cost and maintainance, and I believe it is repeatable. I originally tried it on a 10 gallon which had done poorly for 1.5 years which had gravel-over-peat substrate, CO2 and mirconutrient fertilizers, and no substrate aeration (actually Crypt. affinis and *Ludwigia repens* had done ok, and all others poorly). This time I used vermiculite mixed with Yolo loam (a local silty loam) on the bottom, covered by #3 sand. I pushed pieces of the pond lily tablets into the substrate (both the loam and the lily tabs were suggested by Tuan Nguyen, a former UC Davis student). This tank was exceptional right from the start. A pitiful group of *E. tenellus* literally exploded into a grassy field, with runners shooting out all over the place. It looks like a small patch of the *E. tenellus* field in Amano's book. This was encouraging. A pitiful *Nymphoides aquatica* which I moved from the dying 55 gal. immediately put out giant underwater leaves like those pictured in Schuermann's book (2.5" in diameter is the biggest). *L. repens* shot up with *HUGE* leaves, requiring frequent pruning. Except for the 1st month after setup, there has been no visible algae. This was my best tank yet. (I should mention also that the nitrates measure zero no matter how much of the pond lily tablets I have pushed into the loam). I attribute this success to: the fine soil fraction at the bottom which provides high cation exchange capacity, intimate root contact, and holds the fertilizer nutrients in the soil; the pond lily fertilizer tablets which contain nitrogen (both soluble and insoluble), phosphates, potash, iron, and other stuff listed below; and the soft vermiculite layer which makes root penetration easy (and may even help curtail metal ion toxicity problems often present in freshly submerged soils).

The notes below started out as notes for relative beginners who had seen the UC Davis greenhouse tanks and had asked for advice on their own setup. The present version provides much more detail and I no longer consider it to be for just beginners, but I think it is easy enough for beginners to implement successfully. Most of it is based on conventional net wisdom, but there are notable differences which I think are keys to my

success. The only thing that still is a minor nuisance for me is algae. Some of my tanks are algae-free (none visible whatsoever), but the higher light tanks still have some algae (though not a big problem). I am currently following some leads for algae control based on DIY phophate-limiting agents which are cheaper than the "Phos-Sorb" type resins. This is based on the ideas in my previous post on soil chemistry, which I will post the relavent sections of immediately following this post. The soil chemistry is more technical, but the suggestions below are meant to be self- contained.

(I should mention that it seems to me that substrate aeration is not needed for the tanks that I set up, but they are all fairly young. The two-level substrate I use seems to allow an aerated space on top with lower nutrients and a rich, fine grained low aeration section on the bottom for those roots which care to penetrate. I have noticed that fine Crypt roots stay in the upper layer, and grow just fine there.)

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The Article

Below I list details of my method for growing lush aquatic plants on a very limited budget. These same exact principles are used in the maintainance of my own aquaria. If you have continually failed at growing aquatic plants then you are not alone. Most people fail for a long time or give up before they have success. The problem is that there are very few good references with correct and essential information, and that pet shops that sell the plants do not know how to keep them alive and spread false rumors. Some pet shops even sell terrestrial houseplants for aquaria because, "the true aquatics always die and the terrestrials don't decay for a much longer period of time, so customers are more satisfied." (An employee actually said this to me in a low whisper once.) Pet stores are generally the worst place to look for help (I'm sure many exceptions exist, but I haven't found any yet), and aquatic plants books give very little useful information. The only place with truly outstanding information at the time of writing is the internet. If you're a student with an internet account, find out how to subscribe to the newsgroup 'rec.aquaria', where you can ask questions to the best people in the world who grow aquatic plants and keep fish. Even better is the World Wide Web site that you can reach on Mosaic at the address 'http://www.actwin.com/fish/'. Ask your computer friendly friends how to use Mosaic. This site contains the best postings from the aquaria newsgroups from the past, and is where I got most of my info, and elaborates extensively on what I say below. IT IS THE ONLY PLACE TO CURRENTLY GET THE NEEDED INFORMATION (that I know of)! With this information you should be able to grow plants better than 99.99% of people that ever try to. You may have to buy a few low price items, and mail order places are usually half the price of retail pet stores and carry a larger selection (see the CHEAP ITEMS section below). Here are my humble remarks on the cheapest way to cover the most important bases for planted aquaria, which have resulted in very lush planted aquaria.

LIGHTS

If you're lucky enough to have a 55 gallon or close-sized tank, good lighting can be quite cheap. Our local hardware store sells Liteway shop-lite fixtures which hold two 4-foot fluorescent bulbs for $8.99. I use two of these fixtures (holding four 40 watt bulbs total) over my 55 gallon tank, with Phillips F40D bulbs ($3.99 each locally) in them. (Many people say that they can't fit two fixtures over a 55 gallon "show" tank, but the brand Liteway is only 4-1/2" wide and a pair fit nicely just laying on the cover glass. Other brands I have seen are unfortunately wider.) This setup satisfies three important factors for aquarium lighting:

1. Uniform lighting over the entire top of the tank so that there are no dark corners or walls in the tank. Dark areas may be aesthetically pleasing to you, but I think healthy plants are more aesthetically pleasing.
2. Full spectrum lights. This means they match the spectral output of sunlight closely, which the F40D does. The correct spectrum is obviously important for photosynthesis, as plants have evolved to work best with the sun's spectrum. "Cool White" and other cheap $0.99 bulbs won't work as well or look as good as a light source since they differ considerably from sunlight, but they can grow undemanding plants if you're broke. Also, don't buy the EXTREMELY overpriced bulbs sold by aquarium specialist companies (up to $30). And don't be fooled by the fact that "daylight" bulbs don't look as bright as "cool-white" bulbs, since cool-whites put out the highest intensity in the frequencies where your eyes are more sensitive, which are not the most useful frequncies for photosynthesis. Any "daylight" or "full-spectrum" bulb will do.
3. Proper intensity. Most people agree that four 40 watt bulbs in a 55 gallon tank is enough light. Really, as long as you have no algae problems and the tank is not overheating, you can't have too much light intensity. Practically speaking, it may be too much (I have experienced "green-water" algae in the past with 2 daylight bulbs and two cool-whites over my 55 gal, which some people say is a clear sign of too much light) so I have adjusted the intensity down a little in the past by putting strips of toilet paper between the lights and the glass cover when algae have gotten bad. This is better than just using 2 lights with no light blockage, as you don't sacrifice item (1). However, algae are often a sign of other problems which are correctable (see algae section). In the end I have always removed the tissue blocking the light after the algae is cured, to provide the plants with as much light as possible.

Finally, if you have the money, buy a timer to turn the lights on and off at regular 12 hour intervals, so the plants won't get confused if you're not home to turn the lights on and off at the correct time, or are on vacation. These run about $10 at our local hardware store. If you have a small or odd sized tank, the hood that came with the tank will satisfy neither (1) nor (3) above. That's ok, just buy plants that do not require a lot of light. As a general rule, dark green plants are ok with low light levels, and light green or red plants need high light. If you can afford it, add a second light fixture to the aquarium so that there are two light strips above. You will notice a marked improvement in growth. I have modified some fixtures to fit three 15 watt bulbs over my ten gallon tank, although the plants could

get by with two. The intensity of flourescent bulbs goes down dramatically in the first 6 months of use, so having a lot of wattage means that you don't have to worry about replacing the bulbs every 6 months.

FILTERS

This is not a big issue in planted aquaria as long as you don't have TOO many fish. The plants love to absorb any waste products that the fish give off, so you don't need huge cultures of nitrifying bacteria. Filters serve other purposes though:

1. They remove floating debris from the water so that the tank is nice to look at.
2. They provide water circulation, which is important because the plants absorb CO2 and nutrients through their leaves, and in the absence of good circulation a layer of water which is depleted in CO2 and nutrients will form between leaf and the rest of the water.
3. They provide a convenient place in which to inject CO2 into the water (see the section on CO2).

I use Hagen "Aqua Clear" back filters for my aquaria. Any filter that uses an electric motor (not air bubbles) and is not an undergravel filter will do.

HEATERS

These are unnecessary in most houses that are comfortable, but they're cheap so you might buy one anyway and set it at 74 Farenheit. Temperatures near 80F are too hot for plants, and should be avoided unless the fish cannot acclimate to lower temperatures.

UNDERGRAVEL FILTERS

Don't use them in planted aquaria. Plants like fine soil at their roots and UGF's will pull the fine clay below the filter plate. I remember someone once saying, "undergravel filters grow beautiful roots and poor plants." The roots love to be able to respire, but many nutrient ions will be oxydized to unavailable forms with all that well-oxygenated water flowing through the substrate, and the plants will suffer.

AIR PUMPS/BUBBLERS

Don't use them. Any fresh air contacting the water will deplete the CO2 dissolved in the water to very low levels. The plants produce enough oxygen to last all night even for most tightly sealed aquaria. However, if your fish are gasping at the surface in the morning (I've never seen this) then turn on an airstone ONLY AT NIGHT when the plants don't use CO2.

POWER HEADS

These are not necessary, but if you already have one you can use it for additional water circulation in a 55 gallon or larger tank. Don't use it with an undergravel filter (since you shouln't be using one anyway).

GRAVEL/SUBSTRATE

This is one of the most important items to consider for healthy plant growth. I have gotten absolutely superior growth (after having tried many other substrates with much less success) from the following formula. There are two layers:

- For the bottom layer mix potting vermiculite (from any nursury) with enough water to wet the vermiculite well but not so much that it floats. Squeeze and knead the vermiculite to get as much air out of it as possible, and also to separate the different layers of the vermiculite granules, making the mixture as fine as possible. When your hands look like they're covered in gold dust, you're done. Now add some soil that you have dug from outside (garden topsoil). See the suggestions for soils at the end of this section. You should mix in enough of this to turn the vermiculite from its shimmery golden color to grey. For example, I used about two gallons of Yolo loam with enough vermiculite to make a 3-inch layer in a 55 gallon tank, or about a quart mixed with enough vermiculite to make a 1.5-inch layer in a 10 gallon tank. The precise amounts are not important. After mixing in the soil, the mixture should no longer be runny with water. If it is, your tank will be quite cloudy when you add the water to fill it, so add more soil and vermiculite until it is no longer runny with water, but comparable to prepared cake mix before you cook it. This bottom layer forms a rich, soft medium for roots to penetrate into and obtain nutrients from. This layer should be as thick as possible, within aesthetic limits.
- The top layer is simply sand. You need about a 1 inch or more layer, simply to keep the lower layer from clouding the water. The best is #3 sandblasting grit, which our local gravel yard sells in 100 lb. bags for $10. Any sand that is not from the sea and is not too fine will do. #3 sand is about 2 mm in diameter. Just pour it on top, and level it out. Wash it first if you think it needs it. This layer should be at least 1" thick, and not more than 2".

Now you can carefully add the water to the tank. Put down some paper or something flat at the bottom of the tank to keep the soil from being stirred up while you add the water. If you are careful, the water will be crystal clear when you finish. If you stirred up the soil by accident, it will take 2-5 days to clear up, so be patient. A small puff of soil will come up when you uproot a plant, but does not present a problem. After you have planted the plants, you can add a small amount of solid fertilizer to the bottom layer of the substrate (see the fertilizer section).

For those interested in what to look for in a soil that will grow aquatic plants well, here is additional info. Don't use bagged potting soil, peat moss, or compost (They will decay under water and prevent good root growth. See the recent article by Diane Walstad in the Sept. 1994 issue of TAG. They offer a short-term supply of nutrients which will have to be replenished with solid fertilizer eventually anyway, so you might as well just use a

solid fertilizer from the beginning and avoid the problems associated with decaying organic matter, such as hydrogen sulfide formation.) Try to find a soil low in organic matter and high in fine clay particles. It should not be sandy soil or very firm, fine clay either, but somewhere in the middle. Sand has insufficient cation exchange capacity and is too coarse to contact the roots on their entire surface area. These are the two most important factors which influence how well roots can obtain nutrient ions from the soil. Very fine clay (close to Play-Doh texture) might cloud the water when you uproot plants in the aquarium. If you are a student, you might want to go to the university library and look up the types of soils in your area and their properties in government soil survey books which usually have maps telling you where to find the different soils, as well as important chemical properties. You want a soil that has a high cation exchange capacity and low organic matter content, and has metal ions which are present in only moderate quantities (too much can be toxic to plants). I have used "Yolo loam" from the UC Davis campus with great success in my home tanks. It was not chosen specially, but it is just what is available locally. Here is the analysis:

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Yolo Loam (from Yolo county, CA)

% sand (2mm to 0.05mm) 28.7%
% silt (50 microns to 2 microns) 46.4%
% clay (< 2 microns) 24.9%
pH 6.7
% carbonates (not tested)
phosphorus in soil 12.5 ppm
Fe as Fe2O3 (not tested)
Ca 10.5 me/100g
Mg 10.8 me/100g
Na 0.3 me/100g
K 0.1 me/100g
cation exchange capacity 26.5 me/100g
% base saturation 81.9
% organic carbon 1.38%
% organic nitrogen 0.125%
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WATER

I have heard many people say (including all of our local pet shops) that you can't grow plants in Davis water, and you have to use bottled water. This is simply false. Look at their plant tank displays and you will see that they don't know the first thing about growing aquatic plants (at least at the time of writing). Davis water is hard and has a high pH, but almost all plants will thrive in it given good conditions. You should change some of the tank water each week to replenish the trace elements, unless you add them separately. Some plants react extremely unfavorably to long periods with no change followed by a large percent change, but most are quite forgiving. Our local water has the following analysis:

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Davis City Water (all values are averages given in ppm):

Nitrate 18
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Hardness (CaCO3) 393
Fe 0.1
Ca 37
K 2
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CO2

The importance of CO2 injection cannot be overemphasized for growing beautiful planted aquaria. Sounds complicated? Actually it's easy and cheap! Aquarium companies sell extremely overpriced CO2 setups costing at least $200 for no frills models. These consist of a high pressure tank of CO2 and a pressure regulator, as well as a reaction chamber where the CO2 is dissolved in the water. The setups on the my aquaria cost about $5 for supplies that will last a year (this includes 2 liters of Coke that you get to drink). Here's the idea (which is due to Thomas Narten off of internet as far as I know). CO2 dissoves into (and escapes out of) water very quickly, so we need a way to produce bubbles of CO2 and to hold them in contact with a fast flowing stream of water so the CO2 has time to dissolve. CO2 is produced by yeast fermenting sugar into alcohol, so take a 2-liter soda bottle and fill it with lukewarm water to about 2" from the bottom of where the screw cap would be. Pour the measured water into a bucket and add approximately 2 cups sugar and 1/4 teaspoon baking yeast (e.g. Fleishmann's brand from the baking section of Safeway). Stir until both are dissolved, especially the yeast which is harder to dissolve than the sugar. Pour this stuff back in the bottle and fill to the point it normally would be filled with soda. Drill a hole in the center of the top of the cap which is just wide enough to tightly fit a piece of aquarium airline tubing into it, and glue the tubing into place with aquarium silicone sealant. Leave the cap off the bottle to dry for a day. Then screw on the cap and put the other end of the air tube into the intake tube of the filter, so that the CO2 will bubble into the filter. The CO2 may start bubbling the next day, or maybe not for up to 3 days. The bubbles get sucked into the pump propeller and some end up in the filter sponge where they slowly dissolve into the water where the plants can use it for photosynthesis.

This mixture usually lasts about a month before you have to mix a new batch (more sugar makes it last longer; more yeast makes it bubble faster but it will run out quickly). Watch for when the bubbles are no longer produced, at which time you'll have a nasty alcoholic swill left in the bottle which I don't recommend drinking. Keep the opened yeast packets in the refrigerator in the meantime or the remaining yeast will die. Some people have to worry about the CO2 lowering the pH of the aquarium water, but Davis water is so hard that the pH will hardly fluctuate at all. If your water is soft the watch the pH closely during the first few hours of bubbling, and harden the water with calcium carbonate (crushed coral) in the filter if the pH gets near 6. I have gotten readings consistently above the recommended level on my CO2 test kit (Tetra), with no apparent harm to the fish. When using CO2 you must have a cover on the tank and avoid using accessories which mix air into the water (the plants add plenty of oxgen to the water), as the dissolved CO2 levels will fall quickly. If you have tried growing plants for a long time with no luck, you will be amazed at the incredible growth that results.

FERTILIZER

Plants need nutrients to grow. CO2 is the most important of these, but the others must be added also. If you feed your fish a lot, then this may supply all of what the plants need. Some people have beautiful plant tanks with no fertilizer other than digested fish food. The unfortunate thing about fertilizing this way is that all these nutrients are available to the algae as well. If all this digested food could be kept deep in the substrate, the plants would have a much easier time getting at it than the algae. For this reason I prefer to feed my fish VERY sparingly and to use a solid fertilizer in the substrate. I have used "Lilipons" brand pond lily tablets with great success (after having tried many made-for-aquarium additives which weren't as good and are generally overpriced). I break the rather large tablets into 8 or 16 smaller pieces (best accomplished by placing a flat-head screwdriver onto the tablet and striking with a hammer) and push them deep into the loam/vermiculite part of the substrate. This helps keep the nutrients out of the water and near the roots. I would use no more than one whole tablet when you first plant the tank, and then add more after making sure the nitrate levels in the tank haven't risen above 5 ppm (see algae and test kit sections).

Plants also require plenty of iron. The "Lilipons" tablets contain iron, and this is probably enough. However, I am paranoid and I have been occaisionally adding aquarium trace element additives (they contain chelated iron and some other important micronutrients which are usually supplied in tap water, and are somewhat overpriced) or garden supply iron ("Security" brand iron plus chelate; about 30 granules per day in a 55 gal.; $5.49 at a local hardware store for a lifetime supply). My paranoia stems from a tank I had set up with only a coarse substrate (no Yolo loam) into which I had put some of the lily tablets. Plant growth really took off for about 3 weeks after the fertilizer tablets were added, but suddenly all the plants began dying. When about 3/4 of the plants were looking pretty sad, I began adding iron daily and all the plants that hadn't completely died put out new shoots and came back nicely. Presumably the roots could not contact the iron in the tablets well enough to absorb it without the fine loam, or there was too much water circulation through the substrate. Anyway, I think the tablets would probably supply sufficient iron (in the presence of clay) to keep the plants happy, but I haven't verified this.

By the way, even tap water contains soluble iron, but in the high oxygen environment of your aquarium it quickly turns to rust which the plants cannot use. Chelated iron doesn't oxydize quickly and so will remain available for weeks. (Note that "Security" brand is only 0.25% chelated iron, the rest is unchelated and quickly turns to rust, so I add it every night before bed (since it temporarily slightly clouds the water) hoping that some of the unchelated iron has a chance to be absorbed too. Finally I would like to warn against using the cheap tree fertilizer available in garden supply. A friend tried this not noticing that there was chlorine in the ingredients, and subsequently killed all his fish. Try the Osmocote tablets described below. In summary, I would add some solid nitrogen containing fertilizer in the substrate (especially Lilipons or similar), check for high nitrates (if they're high (above 10 ppm), stop fertilizing with nitrogen and increase water changes until they lower), and add chelated iron if the plants take a turn for the worse.

For comparison with other fertilizers, here are the Lilipons ingredients:

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Lilipons Planting Tablets
10 gram tablets

20%   nitrogen (7% soluble, 13% insoluble)
10%   phosphoric acid
5%    potash
2.6%  calcium
1.6%  sulfer
0.35% iron

Derived from:  urea formaldehyde, calcium phosphates, potassium
sulfate, calcium sulfate, ferrous sulfate.
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They are available from:

Van Ness Water Gardens
2460 North Euclid Ave
Upland, CA 91784-1199
909-982-2425
Fax: 909-949-7217

Prices:

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 10  - $ 3.95
 35  - $ 9.95
 60  - $13.95
135  - $25.95
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A tablet with the EXACT same ingredients and proportions was available in the tree fertilizer section of our local hardware store. It's called "Osmocote (Agriform) Planting Tablets" and are about 1/3 larger than the lilipons for $0.35 per tablet. This seems like a more convenient source, since Osmocote is a big company so these should be available most places. If not, call Van Ness.

(Note: The addition of phosphates and sulfates to the aquarium is not above controversy. I have used these tablets in tanks with NO visible algae growth and without any apparent harm to roots from hydrogen sulfide gas. All I can say is that it works, despite the theory. These tanks have been set up less than one year.)

TEST KITS

I would buy a nitrate test kit (low level), and the nitrates should always register zero or below 5 ppm on the test kit. If they go above 10 ppm then you're feeding or fertilizing too much with nitrogen, and you should increase water changes and decrease feeding and eliminate nitrogen fertilization until they return below 5 ppm. Be sure you push the fertilizer tablets all the way into the bottom soil so they don't leak into the water. A pH test kit is useless in Davis, it will always read high, but you will want one if you have soft water for when you start adding CO2. Keep the pH above 6. An iron test kit is nice to

check the iron levels (if you're paranoid and are adding iron to the water) but they're hard to find and often overpriced, and they won't tell you anything about iron levels in the substrate, which may be sufficient. No other test kits are needed.

PLANTING THE TANK

It is natural to be apprehensive about where and how to position the plants. Look at the book "Nature Aquarium World" by Takashi Amano for artistic inspiration. Then just go ahead and do it, and remember that it won't look good until the plants grow in, so wait a month or two before repositioning anything. Mosy plants don't like to moved too often. One rule that you should follow is to plant very densely. Remember that plants use up available nutrients and thereby prevent algae from getting a strong hold. If you try to save money by planting one plant at a time, you'll only grow an algae garden. Excess space can be filled in with cheap fast growing plants like hornwort, which will quickly use up excess nitrates, and can be replaced later with fresh cuttings of more attractive plants. As a fast growing stem plant reaches the top of the water, you'll want to cut off the top 1/2 to 2/3 of it and replant it, leaving the rooted bottom to produce new sideshoots. In this way a small amount of a stem plant (even one cutting!) can be turned into a thick garden. Rosette plants with roots should be pushed too far into the sand first, then pulled up so that the point where the leaves join the rootstock is above the sand. Small plants can be held down with pieces of bent wire until they root.

ALGAE

Among people who can actually grow plants, algae is the main headache. The main rules for algae are don't panic and don't use any algicides. Algicides will kill the plants too and algae can be handled by addressing its causes and being patient enough to try the solutions. One main cause of algae seems to be unhealthy plants. I have used cuttings from algae-plagued tanks when setting up new tanks according to the above suggestions, and have been able to completely eliminate the algae once the plants grew in. It seems that the worst kinds of algae, filamentous algae and red algae, can thrive even in water that is starved of nutrients when they are attatched to a dying leaf (I don't know it it derives nutrients fron the leaf or what). By having only healthy leaves in the tank, you have already elimininated the favorite breeding ground for these algae. Presuming you are starting with no-so-healthy cuttings from an unsuccessful tank, so that most of the leaves have firmly attatched algae, you must grow out new leaves as quickly as possible so you can eliminate the dying leaves. This is the job of the suggestions presented above. In the mean time, cut off any leaves that are badly covered, and as soon as a stem grows tall, cut it off at the point where the algae starts and replant the top, and discard the bottom. For rosette plants just cut off the infested leaves when sufficient new ones have grown. For me this has been sufficient to eliminate all algae problems (to the point of no visible algae) when I followed the setup techniques outlined above in some of my tanks. However, this does not eliminate the chance that variations in your tap water chemistry and fish feeding habits will make your job more difficult.

If the above suggestions alone worked always, many plant keepers would be much happier. The truth is that you can have very healthy plants AND algae at the same time,

due to excess nutrients in the water and (possibly) excess light. If you have a problem test for nitrates. If they're above 10 ppm then add Hornwort which will help to quickly use nitrates, and decrease feeding and stop adding nitrogen fertilizer. If nitrates read zero, there may be too much light and you can SLOWLY lower the light levels by putting toilet paper or equivalent between the lights and the top glass, while continually removing algae and watching how fast it grows back. More likely to cause algae than either excess nitrates or light are excess phosphates originating from fish food or decaying plant leaves. At present the only known ways to remove it are with a phosphate removing resin (Phos-Sorb for example) or by water changes. I am currently investigating home-brew alternatives to the expensive Phos-Sorb for algae control based on the ideas in a soil chemistry posting that follows this post immediately.

There is one type of algae that may thrive despite all this advice: blue-green algae. This algae is actually related to bacteria and will respond to treatment with erythromycin, available at most pet shops. Follow the instructions indicated for bacterial infection of fish on the label, but use only half the dosage. The people at the pet shop will think you're crazy for using it on an "algae", but remember that the pet shops are poor sources of information and that blue-green algae is actually a photosynthetic bacteria. I have used the brand "Maracyn" with success and it has never reappeared. This algae can be identified by the color (usually more bluish than most algae) and the fact that it quickly coats plants/sand in a thin layer like a veil, which is easy to remove from the plant but grows back very quickly. It is not stringy or tufty. This treatment will not harm the filter bacteria if the directions are followed (using 1/2 strength). If you're not sure, get an expert identification before using the medication. Many snails are said to love to eat blue-green algae (e.g. ramshorn and pond snails) and thus provide an organic (but not as quick) remedy.

CHEAP ITEMS

Probably you will need to buy a few items to upgrade your setup. The cheapest general place to buy aquarium supplies is through the mail. I use Mail Order Pet Shop, which ships out of Sacramento. Most items are 50% lower than retail pet stores. You can order a catalog from 1338 North Market Blvd., Sacramento, 95834, or by calling 1-800-366-7387. Other mail order places are listed at the Mosaic site listed in the first paragraph, or by looking in the backs of aquarium magazines. The only items you won't want to buy there are lighting supplies (the aquarium brands are overpriced even through mail order, and lighting is cheap at local hardware stores), iron additive with chelate (buy in garden section of hardware store), and the CO2 supplies (get at Safeway, except the aquarium glue and air tubing). The fertilizer tablets (Osmocote) should be available at you hardware store also.

O.K., that may sound like a lot of requirements, so what is the bare minimum low budget setup? You need at least a full spectrum fluorescent light for the hood you already have, the CO2 generator, a filter for circulation and CO2 injection, the sand/vermiculite/soil combo I suggested, an Osmocote planting tablet or two, and a nitrate test kit. This all should cost about $40 for a smaller tank. The best improvement on this bare minimum would be to add more light.

Hopefully you won't need good luck, but I wish you it anyway.