Plantednanotanks.com presents:

Planted Tank How to Guide by

Frank Wazeter

(adapted from his original post which can be viewed HERE)

Contents

Introduction

"How do I create a beautiful mixed carpet in my planted tank?"

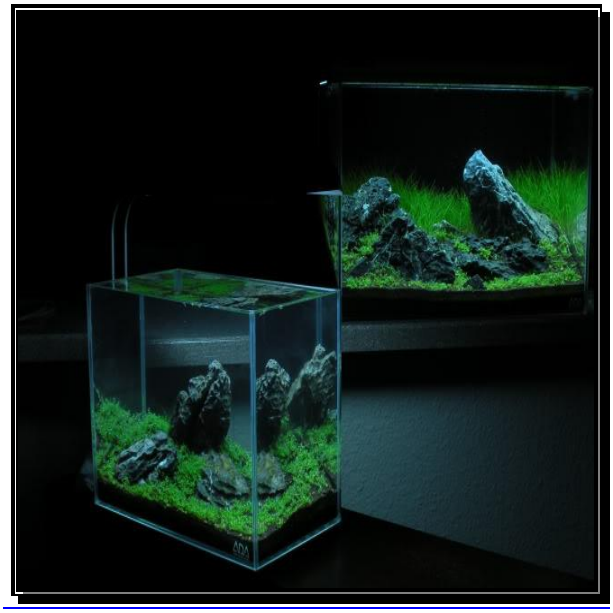
If you've ever wondered how to create a mixed carpet for your planted aquarium or amazed at how Amano does it, through the course of this eBook you will learn how to grow just that.

Sometimes, the task can seem impossible or overwhelming. So before I really begin to share these secrets, allow me to bring you along my history and development with planted tanks. You will see how you can create a fantastic layout, even if you are starting from humble origins.

Sit back, relax and read every word carefully, because it all starts with a vision:

My Background History:

At this point, I've thoroughly mastered growing single carpets as can be illustrated here:



Of course, this would also include your foreground and background stuff (for example, HC and hair grass), as you can see a relatively old example here (left):

An older (yet more recent example) of an aquarium I never quite did take a finished photograph of (right):

That one taught me quite a few lessons about riccia: you see those bald stones? that was from a few pieces of riccia that were "spoiled" when they arrived, Lesson: always use the greenest and freshest riccia!

Something Important to Know: I will always recommend that you master growing one species of plant at a time.

Why? because this will give you the greatest skill in manipulating, shaping the plants growth, while knowing at what speed it grows and what it's nutrient requirements are. Think of it like breaking down a math problem into easy, simple to digest and understand components in order to solve a very complex problem (in this case, the mixed carpet).

Along the way there have also been some mishaps and failures (below):

How about this blast from the past (2008? 2009? I think):

This was my first ever attempt at a mixed carpet. It went surprisingly well, but I never did try to that extent again. See a close up from Glosso and HC growing together:

Oh, and of course, there was the first iwagumi (below)i:

I didn't even remember that somehow I had managed to get Riccia to intertwine with HC in that layout (e.g. it was a Random A$$ Accident):

Oh boy! Look at that algae! Honestly I think that accidental mixing has been my best attempt yet...3-4 years ago...

And finally, there was my very, very first planted tank:

Man, how embarrassing is that?

There have been some other successes and failures over the course, but honestly? The failures teach you the most. The successes just give you some extra confidence.

Which brings me to some other examples:

I probably should have spent some time polishing that one up a bit. Now that I look back on it, the sparser growth actually creates a nice effect for what I was trying to achieve.

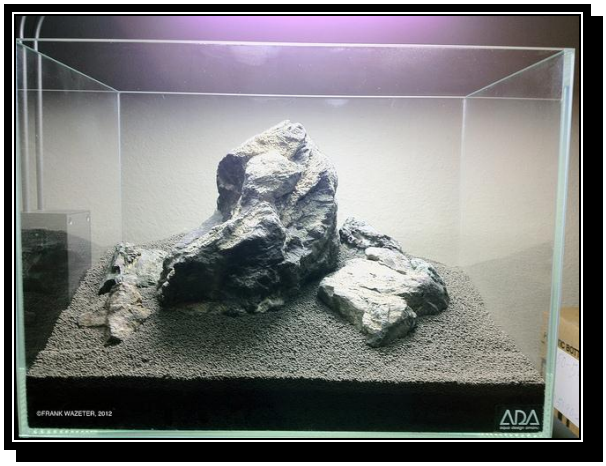
This was the very first layout I had worked on at Aquarium Design Group: and also the first time I had done -anything- with driftwood. I wish I had taken a full shot of this tank then.

With that said, what's the next objective? Mastering the Mixed Carpet.

Before I delve more into How-To and the fun of keeping the journal going, let me preface:

There will be mistakes. There will be frustration. And my intent is to teach you how to master these principles so that you can learn quicker than me. This is why I've had a lot of fun going over some of my past layouts, success, failures, embarrassments and all.

So, without further ado, here is the newest layout I've set up at home:



I promise not to bore you with equipment details: I'll only share them when necessary and when it's valuable and worth your time to know.

Before we go on further, I have a homework assignment for you:

Important Exercise: Visualize your ultimate layout you want for your aquarium. Now, picture yourself successfully planting each individual plant, and then watch the plants grow. Imagine problems coming up and solving the problem. Watch as the aquascape evolves from freshly planted to completed, and imagine how you feel when you've accomplished the task.

Now sit back, subscribe and continue to watch for updates to take the next step, and the next exercise. Make sure you catch me on my next major update where I'll teach you the fundamentals behind setting the substrate, and if you're lucky, the arrangement of the stones!

Step 1 - Getting Started

Before going further with post updates, I want to give a little insight into how you can learn how to **unlock Amano Magic** in your own planted aquariums.

Each new major post will have an easy to follow format designed to teach step by step (and if you already know the basic steps, it will be good review to master them!) so you can begin to fully master the techniques that will lead to you fulfilling your vision.

At the end of every post, there will be a simple and fun homework assignment that you can do to really improve your planted tank skills quickly. Most people who participate in these simple exercises find ways to instantly improve their layouts, whether they are completely new to the hobby or have been in it for years.

Continue to read every word carefully and you will know the secrets of the professionals without having to go through the hassle of learning the hard way.

To get your mind situated right, here is the **universal starting point** for all of us:

The only difference here on out is **skills** and knowledge, which you will learn here.

Have you done the visualization exercise yet? If you haven't, stop reading and immediately refer to pg.10 and do it! If you have, then great! You're ready for me to move on to the next step, which starts with an important question:

"How do I start?"

How do you start out your planted aquarium optimally for success?

Most people understand that it is easier to start right the first time, rather than dealing with the problems that occur when you get off to a rocky start. You need to get the aquarium to stability and growth as quickly as possible. Master this skill and you will enjoy beautiful layouts, look over it, or ignore it, and your planted tank will be an emotional battle from day one.

STEPS TO STABILITY:

STEP ONE: Bacteria

The most vulnerable time for your planted tank is when you first set up. We need to cycle the tank with beneficial bacteria, not only for the nitrogen cycle (ammonia), but also for synergistic bacteria which grow and thrive amongst plant roots.

These bacteria form a "micro-filter" in your aquarium that work for you to break down negative elements and create positive ones that help your plants grow with health and vigor and your fish to be healthier.

Action Step: the quicker you can provide this bacteria, the faster your aquarium is stable and the less chance for algae.

STEP TWO: Chemistry

Water balance (pH & kH) is **critical**. Neutral water has a pH of 7. Alkaline water is above 7, and acidic water is below 7. Too much acid and the plants will fry like an egg on a skillet, too much alkalinity and the plants will bleach out. The healthiest pH ranges for planted tanks is about 6.7-6.8 (slightly acidic).

On a less extreme example, higher kH and pH values (alkaline) makes it harder for plants to grow. Why? Imagine the mineral values in typically really high kH and pH water literally blocking the cells of plants, making it difficult for them to absorb nutrients, anything above 7.6 pH is usually harmful. A pH that is too low leads to plants burning themselves (browning out, etc) on the water. These values are typically between 5.8-6.2 (excepting in certain rarer plant conditions, I'm only talking about averages).

Action Step: the closer you can maintain your standard pH & kH values to a pH of 6.8 and kH of 2, the more effective co2 distribution and nutrient absorption will be!

Pro Secret: ignore pH values taken while co2 is in the aquarium: the lowering of pH from co2 does not have a harmful effect on the "real," pH. Don't worry if your co2 levels push your pH readings down into the "low" acidity ranges.

Health Reference: the human body's healthy pH is 7.35 to 7.45, even tiny variation outside of this requires the body to adjust the pH values (requiring more energy and making you less energetic). Even a minor change outside of this pH would result in death! It's a good thing our body works to regulate that pH just like our body temperature!

Health Tip: Most of the foods we eat are highly acidic. Stress also increases acid levels in the body. Eat more alkaline foods and you'll see a big boon in energy. Which foods are alkaline? Greens! Who knew there was a really good reason behind Mom complaining to make you eat more vegetables?

STEP THREE: Nutrients

It would be silly to think that plant's can't grow without nutrients. Just imagine how long you can live without food. The nutritional aspect for plants is largely covered by nutrient rich substrates such as Aqua Soil, which cover all of the essential macro nutrients required for plants to grow.

Later on, I'll show you what nutrients specifically are being provided, but in the mean time just know that Aqua Soil takes care of this for you without the need for you to worry about it. Of course, if you want to create your own substrate that will require more research.

Action Step: Investing in the best substrate system you can gives you the best advantages for success. Never short-change your substrate, because otherwise you will have long term issues.

Pro Secret: Pro's Cheat. Yes they CHEAT! They never go into a situation with a planted tank without making sure they have rigged the odds in their favor and **neither should you**.

Fun Exercise: Look at an aquarium, now picture yourself shrinking and going deeper and deeper into the aquarium. The fish become larger, the plants become monolithic. You're still getting smaller, so small that you can't be seen without a microscope and visualize what you see: billions and trillions of other organisms the same size as you, working, growing and synergistic-ally processing elements. Imagine them lighting up in concert like electricity and steadily expanding to the exact needs of your planted tank. Watch them as they go through their life cycles: living, multiplying, dying. Recognize that this is the very foundation of your aquarium.

Substrate system completed in the aquarium.The magic is below the substrate.

Make sure you continue to read every word, and next time I'll go underneath the soil into the setup of the substrate system so you can learn to **cheat to win like the pros**.

Step 2 - Setting the Substrate

Getting Started with the Substrate

Earlier I mentioned that professional's "cheat," and the **first step** towards cheating to stack the odds in your favor is having a killer substrate system.

If you refer to my previous major post, I went over a series of three steps towards starting out right with your planted aquarium. Step one: Bacteria & step two: Chemistry is the area where you will want to focus the most on when setting your substrate.

Of course, Step three: nutrients is wildly covered by Aqua Soil Amazonia, and doesn't need much to talk about: it really just is the work horse of growing plants.

Side Story: Awhile back I had a customer come in and ask about Amazonia, saying he wanted to give it a try. He had been using eco-complete and flourite for years and I told him a simple fact: "if you can grow plants in eco-complete and flourite well, you will be a god with aqua soil." Sure enough he showed me a few photographs of his plantings, and he could indeed grow plants quite well with eco-complete and flourite.

Sure enough he got some aqua soil, and for a while I hadn't heard back from him, and to be honest, had completely forgotten about him. Well, the other day he comes back and shares his enthusiastic results with Amazonia saying that the plants grew so fast that he was able to achieve in 3 months what took him 2 years to grow using the other substrates.

Alternatives to Aqua Soil: Hagen has recently released a new product, Fluval Substrate. Third party testimony says that it grows plants fairly well, however I have not had any first hand experience with this product and cannot honestly give a side by side comparison, though I'm sure others can.

Back to Basics: Starting the Substrate

Aqua Soil leaches a lot of acidity. If you refer to the previous post, you know the effects of excessive acidity: the plants are burned at the root. While aqua soil by itself does not provide enough acid to burn plants out, plants -do- wildly benefit by a way to neutralize the acidity at the root level.

Penac P & Penac W: Add three spoons of each

These two additives come in first, and they do precisely two things: neutralize the over-acidification of soil and rapidly oxygenate the water at the substrate level.

This means two things for you: plant roots grow easier and are more healthy and it means that the initial rapid oxygenation helps spurn bacterial growth immensely.

Adding Penac P (spoon comes included with all ADA additives):

Spread Penac P evenly against the bottom pane of glass:

On top of Penac P, add Penac W in the same way, and you'll have something that looks like this:

Tourmaline BC: add ten spoons

Referring back to Step 1, it's important we foster bacterial growth and longevity as quickly as possible to get the aquarium as stable as possible so we do not have to deal with **major algae** outbreaks.

The best way to think of Tourmaline BC is to think of it as a high purity carbon (which it's not, but it does a similar task) which purifies water and helps in the break down of toxicity, waste, etc.

Adding Tourmaline BC:

CLICK HERE TO BUY ADA PRODUCTS NOW!

Now your Aquarium should look like this after 10 spoons of Tourmaline:

The importance of tourmaline is that it helps to break down the waste that builds up over time in the substrate and makes it harder for plant roots to grow.

Next up: Adding Power Sand

In Nano-aquaria, Power sand is not necessarily needed due to size, however in this case I want some heavy slope, so using power sand helps to stabilize the soil and slope for build up without break down.

However, normally what Power Sand does is serve as a "home" for the bacteria to thrive in: like biological filter media it provides a highly porous surface area which allows these bacteria to thrive. Meaning that when plant roots reach and attach to power sand their roots essentially become super charged!

Power Sand also contains peat, so it has extra nutritional additives to the aquarium, but again, Amazonia does the bulk of the work on this front.

Spread the Power Sand evenly across the bottom, and leave the front open to prevent power sand from being seen in the viewing panel

Adding Bacter 100: The Bacteria - 3 spoons minimum, I used 10

Next up, Add Bacter 100. This is the dormant bacteria which will do all of the heavy lifting with promoting healthy roots through synergistic bacteria. It is not possible to over dose this additive.

Spread it evenly so that the Bacter will thrive in the Power Sand.

Bacter 100 spread evenly over power sand (you can also put this underneath power sand on the glass, either or works):

Another use for Bacter 100 is to eliminate cyano-bacteria should it appear in the tank, apply directly on top of it and it will eat it away.

Add Clear Super: 3 spoons, food for bacteria.

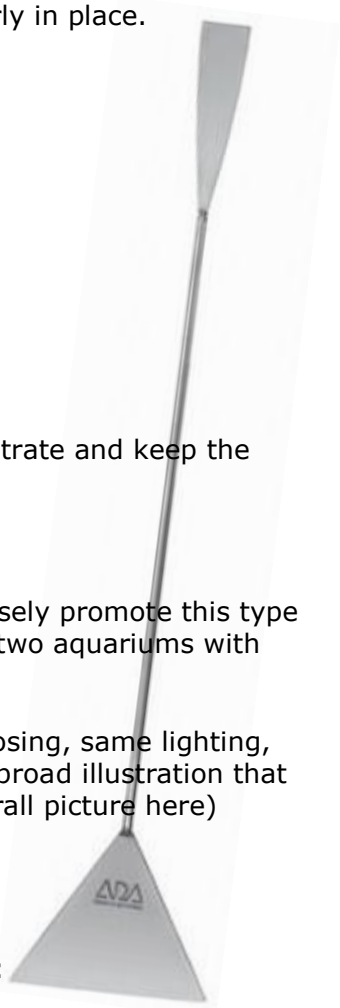
Clear Super is simply a food source for the bacteria. Until the aquarium becomes established we have to add a food source for them to grow and thrive, otherwise the bacteria will die off.

Add three spoons of Clear Super over Bacter 100:

The Completed Substrate system:

Last Steps: Adding Aqua Soil

For a nano aquarium we use powder type since it allows smaller plants to spread roots easier as well as to keep the perspective in the Nano aquarium properly in place.



Afterwards, use a tool, such as Sand Flattener to smooth out the substrate and keep the substrate line straight in the front.

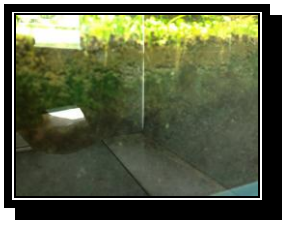
Do the Additives really do anything?

The key to long term healthy plants is root health. The additives precisely promote this type of growth and health. For comparison sake here are two examples of two aquariums with and without additives and their roots.

These aquariums have been up for the same amount of time, same dosing, same lighting, same core products (aqua soil), while not an exact one for one, it's a broad illustration that you can evaluate for yourself the differences (it's more about the overall picture here)

Take note of the root growth and cyano bacteria in substrate:

Glosso (below):



Blyxa and Rotala Stems (below):

Now, with additives:

Hair Grass (note, hair grass has pretty insane root growth regardless, pay more attention to the overall substrate 'health'):

Penac Pearling

Take this post as an interpretation of what-you-will, but these are effects that I've never experienced without the use of Penac P & Penac W in the substrate, and i'm always amazedwhen I see it at the start of a fresh tank.

This was 5 minutes after the tank was filled:

Now my timer is set for 7pm CST to 5am CST so I can see the tank, so when I woke up this morning at 9 AM, this is what the tank looked like:

Rapid Oxygenation (ignore the riccia stone on the rock, I had an extra I tied I don't know what to do with yet) :

Kind of beautiful, don't you think?

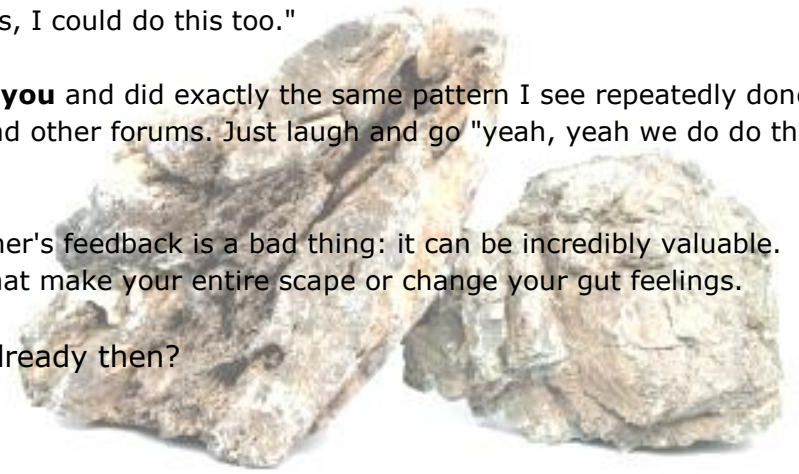
Step 3 - Laying out a hardscape - Stone Arrangement

Secrets to Successful Stone Arrangement

Most people see the beautiful works of renown aquascapers and wonder: "how do I do that?" Before they know it, they attempt it and in frustration can't figure out how to make their layout look like the pictures.

I'm going to give you the number one secret to stone arrangement, and it's not about having the fanciest looking stone (although that certainly helps), for perspective, the stones I used in this layout contain nothing but "left-over" material that no customers wanted (after 6 months of sitting on the shelf!), and so it found it's way into my personal collection.

You've probably spent hours fiddling around with stones in your aquarium, in what started out as exuberant enthusiasm ended in frustration and headache. You then probably posted pictures of your hardscape to other people on the internet in hopes of feedback and tweaks, and in the end you have three or four copies of a layout that's based on what someone else thinks and no matter what you do it just doesn't feel "right." It seems "forced," when it grows in and you then said something like "eh, Iwagumi just isn't for me," or "man, if I *just* had better stones like the pro's, I could do this too."



Don't worry, I was **just like you** and did exactly the same pattern I see repeatedly done over and over again on TPT and other forums. Just laugh and go "yeah, yeah we do do that a lot don't we?"

I'm not saying that getting other's feedback is a bad thing: it can be incredibly valuable. Priceless even. But don't let that make your entire scape or change your gut feelings.

Jesus! What is this secret already then?

Frank's Iwagumi method:

The first secret is simple, remember my first exercise? VISUALIZE! Don't visualize mountains or landscapes or any of that. But, visualize your aquarium layout, how you want it, regardless of what you have now, and you will succeed invariably with it. Focus on how the plants will grow in.

In other words BEGIN your layout with the END in mind. The number one reason why most layouts fail is because they begin at the beginning, and not at the end. If that doesn't make sense, imagine yourself shooting free throws in basketball. If there was no basket to shoot at - you wouldn't have a goal to aim for and score. You would be just throwing a basketball aimlessly in a random direction: how can you hope to succeed like that?

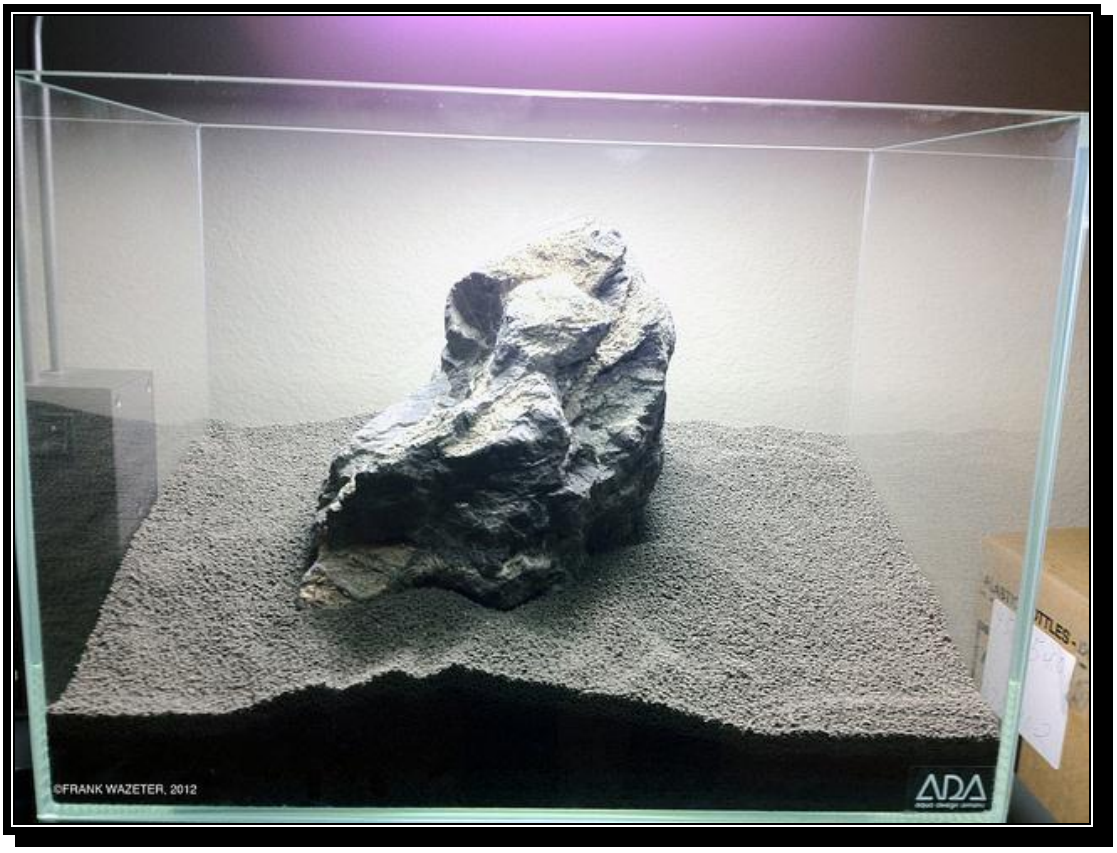
State of mind is extremely important to scaping in general: it should take you no longer than 15-20 minutes to lay down an aquarium, and in a nano tank i'd even say about 5 minutes. You need to be relaxed: not stressed or frustrated or your layout will show it.

Scaping much longer than 30 minutes in an aquarium leads to the scape feeling 'forced,' and you lose the ability to 'see,' whats right and wrong naturally. So if you're experiencing scapers block after 30 minutes, leave it and move on and come back the next day: or at least in a few hours.

The second secret is a little unintuitive: the most important factor to an iwagumi is selecting a main stone of appropriate size, not character, for the aquarium it's placed in. Your first focus is size: it needs to fit to scale, the second focus is character and detail.

In most mini's this means that the objective is to select a rock you think is over sized. You want to place this stone first. Always place the main stone first, the rest should follow.Here's some picture references:

1. Placing the main stone *tip, keep the slope fairly high, this gives you greater manipulation of seemingly flat pieces and smaller pieces to look larger*:



In a nano it's okay to be a little centered due to the small canvas size. Place the stone at a pleasing angle. A brief description of angles: straight = stable, flat = stable, 45 degree angle = drama, angles closer to straight = stable, slightly dramatic, angles closer to 45 degrees = dramatic, closer to stable.

With ALL of your supporting stones it's very important to make sure texture and color matches, not just stone type, so select stones that 'feel,' like they are part of the same group.

2. Place the secondary stone (your second largest) :

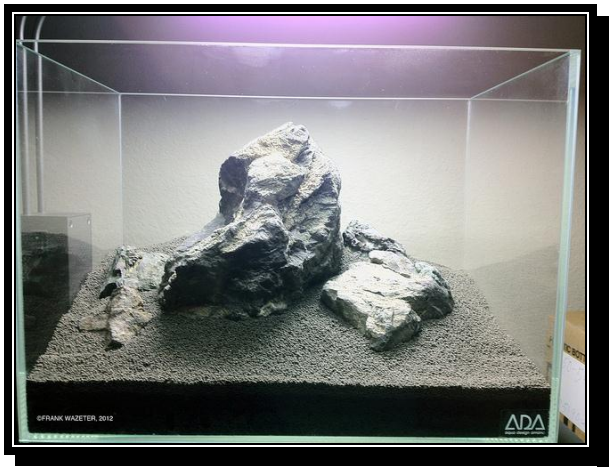
In this example you can see that this stone (which is flat by the way by itself), forms an opposite angle to the main stone, which is situation straight up (stable), this adds a "dramatic" feel to the layout, by redistributing the "energy," or "flow," of the aquascape.

An important note: in an iwagumi, usually the SECOND stone is the most important in the whole layout, as it dictates how the scape will flow and how you plant accordingly to that.
Think of the main stone as the star actor in the movie, and the supporting stone as the director, the star actor has the spotlight on him/her, but the director 'directs,' the whole picture.

3. Next up, we place some supporting small stones:

This stone mostly acts off of the power of the supporting stone, matching it's angle and softening the overall angle of that side of the tank, it will be largely invisible when plants grow in. It's a "hidden" trick, but very important. Even stones that will eventually be covered up by growth are essential for the layout.

4. Finishing the scape, fourth and fifth stone:



These stones largely dictate one thing: they go in motion with the main stone and distribute the "flow" of the aquarium cleanly down into the corner where it pleasantly ends. This completes the layout so that the eye has no place to wander unnaturally, and when placed together like this, form a single "cluster" or grouping of stones that look as if they might appear together.

Important note some of the placement here might look odd at first even, and the reason is, is that the END picture of the scape is for the majority of the secondary and tertiary stones to be completely covered by plants. Here's a great lesson for the necessity of stones, even if you plan on them being covered later on and the necessity for visualizing.

Fun exercise: Go back to the first page, read the end of the first post, and perform the visualization exercise once more (or for the first time).

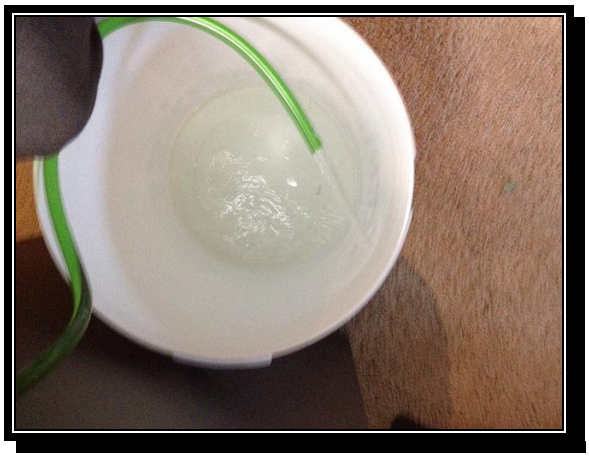
5. Use a sand flattener (or other straight edged tool) to flatten out the substrate line in front. This is extremely important:

Basic Maintenance

Let's fast forward to the present day so I can cover day one maintenance of the tank, i'll keep this short and brief with mostly pictures (for the first week, there will be a water change EVERY DAY, this is huge for preventing algae) :

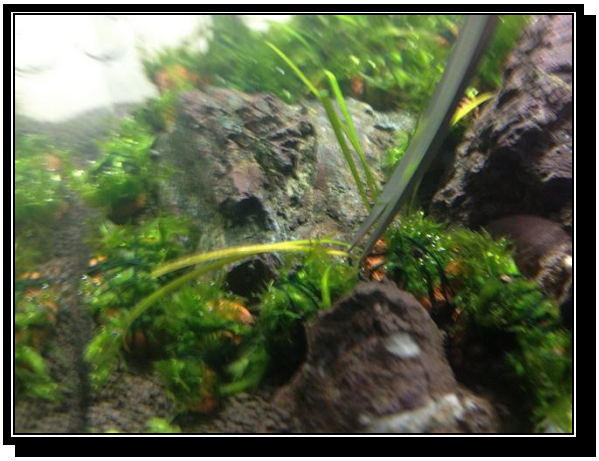
Frank's water change & maintenance methods:

1. Drain water into a bucket with eheim tubing (obviously, you should consider turning off the filter first) :

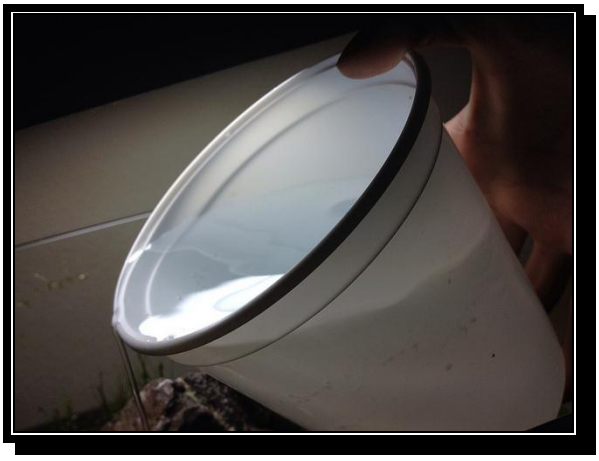


2. Drain to about half full (make sure to leave enough water to fill back up with ease without disturbing substrate):

3. Trim any yellow or brown leaves (these suck out the plant's energy / nutrients so get rid of them asap for best growth) (using Trimming scissors curve type) :



4. Use a small cup to fill over, gently pouring water on the big main stone (this distributes water flow over the tank and doesn't disturb substrate:



5. Turn filter on when the water level is about halfway level with the outflow, this helps to super oxygenate the water at fill up:

6. At this stage in the game, I am only dosing Green Bacter, will start adding Brighty K + Green Bacter on the third day, add about 3-5 drops:

7. Use a net to remove any old or dead leaves at the top (doing this for a few minutes each day keeps the tank clean and makes it so you don't have to spend major time doing it later) :

9. Maintenance Complete (approximately 10 minutes)

One last tip: of course, if you're using tap water add dechlorinator first. I use pure RO/DI water as the water in Texas is very hard. I recommend it for anyone who has the means.

Philosophy - Enjoying the Process

So I was enjoying just looking at my aquarium tonight and decided to snap a photo. Here's a photo of the aquarium looking pretty much exactly like it did yesterday:

This inspires me to have a talk with you about something important, often overlooked:

The Planted Tank, More than Any Other form of Aquaria, is about Enjoying the Process

Do me a favor for just one moment: completely forget about the science, the products, the plants of the planted aquarium. Because this isn't what it's all about.

This is the most important post you will ever read about the planted aquarium, so read every word thoroughly.

Everything you do with the planted aquarium is about one thing, and one thing only: coming to enjoy every process of it. No, scratch that, I want you to LOVE every step of it.

What do I mean by that? I mean that you need to develop a passion so deep, that you enjoy every aspect of it.

1. Nurture a love for doing water changes, understand that water is what gives life itself to the aquarium, and to renew its source on a constant basis means you give it life itself: from the microscopic bacteria to the plants, to the fish & shrimp.

2. Develop a love for the process of setting up the hardscape: do it with decisiveness and confidence. Study the patterns of great aquascapes and approach your own with enthusiasm.

3. Carefully plant every species, showing the plants care, pay attention to them and trim off dead and dying leaves: they drain the plant's resources to grow.

4. Modify your filter media to best suite your aquarium's growth patterns, the planted tank constantly evolves and its needs change over time to require different things.

5. Make it a habit to clean your glassware and net out old trimmings from the top, this keeps the flow of water and distribution of vital co2 in good condition. Be proud of your setups.

To illustrate the points, I have an inspirational story to share:

Not too long ago, a member from this forum came into ADG with his son, Connor. That forum member's name is Dantra. As they came into the shop, they had an exuberant enthusiasm for the two displays we had up. As I had began talking with Dantra, it had begun as a fairly standard question and answer session. I thanked him for his compliments on our set ups, and answered the questions he had.

But then, there was a surprise:

His young son, Connor, was actually incredibly enthusiastic and incredibly knowledgeable on planted aquariums. I didn't know it at the time, but he had been studying the works of Amano, following this forum, and had wanted to come to ADG for a long time to see for himself.

So taken aback by Connor, I took out the last remaining copy of The Book of ADA we had available, to Dantra and Connor's great surprise. When Dantra asked me about the book I said "you can have that one." To which, he replied "I can't believe that, how much do I owe you." I told him then, "no, don't worry about it, I want Connor to have it. It's a rare thing to see in anyone - much less someone his age." To which, the two were completely stunned at.

Just this past week, Dantra gave me a call and asked a few questions, and when asked how Connor was doing, he told me a story.

Connor had become so dedicated to the planted aquarium that he poured over research after research. He - unknown to me, had gone over every old post by planted aquarium experts, had poured over The Book of ADA like it held all the secrets of the universe in it.

More amazingly, he then began applying everything! Dantra told me how Connor was so insistent about doing water changes on schedule, about trimming off dead leaves of plants, about making sure every technique he used was by the book, and more amazingly: **how he was in love with every step of the process**.

Dantra then said something, which we should all take into exact account and learn from:

"you know, he was so insistent on doing water changes, and so insistent on trimming, and adding exactly what was prescribed by Amano, and I told him "Connor, that's just not necessary, you don't have to go overboard like that." and Connor replies (which I might add, is a completely indefensible statement)

"Dad, I remember all your old tanks and your battles with algae, and I'm just saying that if Amano does it, Frank and Jeff (Senske) do it, then we could at least try it. Otherwise you develop bad habits."

So, being unable to defend against such a well argued point (that phrasing is something out of a lawyers playbook!), Dantra let him do it. And sure enough, the problems they had classically had disappeared.

This level of research, the adamancy to technique, the love of maintenance and care for the aquarium and the bonding experience those two had is something that is completely rare and to be treasured.

Before going to sleep last night, I took a few more photo's on the aquarium.

Day 3:

Today (Day 4) when I do a water change, I'll be adding in Brighty K (potassium) to the mix, in addition to already dosing Green Bacter (encourages bacterial growth).

[Riccia Stones]

I took a little bit of extra time when I got home to remove any yellow leaves and melting debris (mostly from the microsword). My guess is that by the end of the week the riccia will start going vertical.

A Nifty angle:

A quick recap:

Day 1-3: no fertilizers, only Green Bacter.
Day 4-7: Brighty K + Green Bacter

Step 4 - Planting and Planning for a Mixed Carpet

Okay, let's get into some more nuts and bolts. You're here to learn, aren't you? Or are you here for my stunningly handsome persona? What's that? you say it's just to learn something? Well, fine, then:

How to Plant & Plan for a Mixed Carpet

So you've got your layout and you've decided on what plants you want to use, and you know basically what you want to achieve (because you've done some visualization right? if you still haven't, refer back to the end of the first post).

For this Mini M, I had a laundry list prepared, but only ended up using the following plants:

Riccia Fluitans
Hemianthus Callicthroides
Willow Moss
Eleocharis Acicularis
Mini Microsword
Echinodorus Tennellus

Before you begin to plant, you're going to have to decide on where and how to plant things. In other words you need a basic plan as to how you want the aquarium to look and grow out.

In order for you to successfully pull this off you need to have knowledge of what pattern the plants grow in, how fast they grow and where to place them.

If you don't have much experience with growing the individual species you use, I highly recommend you practice on growing individual carpets of plants.

Because it is difficult to truly pull off a mixed carpet (due to the trimming methods and growth patterns) I highly recommend you focus on just growing a single carpet plant at a time before you dive into a full-fledged mixed carpet that involves multiple plants you've never worked with before, then start combining carpet plants you've worked with in the past to create a synthesis of the types.

Anyway, so first let's subdivide our plants to work with into categories, for this layout I divided them as such:

Background Primary: E. Acicularis, Mini Microsword (touch)
Foreground & right side: HC, Riccia
Midground, focal point left: Willow Moss (primary), E. Tenellus (touch)

Preparing the Plants

The easiest part of setting up the layout is the actual planting, the hardest part is the preparation. Once the plants are prepped, it takes the little time to actually finish the planting (comparatively).

I start with the most PITA plants first: in this case, tying Riccia to stones (because it floats otherwise), and Willow Moss to porous stones (for attachment).

Plant #1: Pre-prep and Riccia

Healthy Riccia, if your riccia looks any different (unless in emmersed form), don't use it. Riccia spoils easy, so only use green riccia, and remove all brown or decaying riccia, otherwise your plants will suffer later (follow through with this for every plant).

Tools: Riccia Line, Trimming Scissors, Riccia Stones (flat stones)

Before you start, use a spray bottle to wet the stones, this makes it easier for Riccia to "stick" to the stones, consequently making it easier for you to tie the Riccia to the stone.

Riccia never attaches to stone, so it's important to use wire / line that will never disattach. When you are tying the line to the stone, make horizontal patterns across, then corresponding vertical patterns (creating a checkerboard of string tying it to the stone), and knot at the bottom of the stone. Use a thin layer of Riccia on the stone for best growth and do your best to get riccia to cover all four corners.

I couldn't get any pictures of tying the stones, as it takes both hands to do the tying and couldn't use the phone camera. But here's what the finished product should look like:

Next up: Willow Moss. Moss will eventually attach itself to surfaces, so for tying moss, use a type of cotton (Moss Cotton), which will dissolve over time.

Tools: Porous Stones, Trimming Scissors, Moss Cotton

Healthy Willow Moss (again,don't use any browned out plant matter) :

You'll just quickly tie together as much moss as you can. Moss grows slowly, so for a carpet of any means, to out compete riccia and hc, etc. Start out with much more than you think you need.

Wrap firmly around the stone, and tie your knot underneath the stone like the riccia stone.

Next: Hemianthus Callicthroides

Divide the pots HC come into like so:

Make sure you use pincettes to remove any excess cotton wool from the plant roots.

Make sure to wash the plants in water (even moss and riccia) before planting and tying, this removes dirt, debris and dead leaves from the plants, look at the cup of water and see the built up dirt!

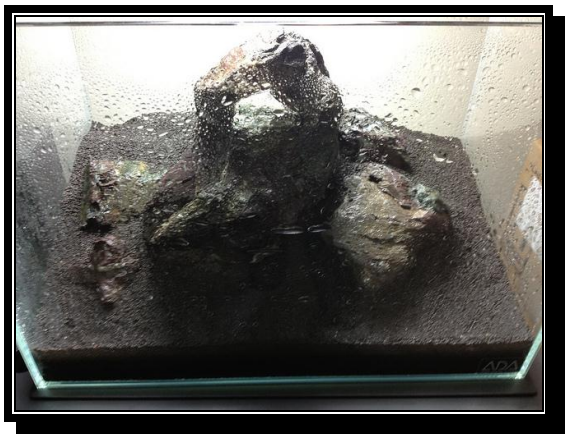
Divide HC evenly into clumps:

Repeat this pattern for Hair Grass (Eleocharis Acicularis), Microsword and E. Tenellus.

Now, Planting the Tank:

Tools: Fine-tipped Pincettes

Before you begin planting, mist down the soil with a spray bottle for ease, and raise the water level to even with the lower substrate line (this makes it much easier for you to plant.



First things first, lay down Riccia stones. Position them around main stones and in areas where you want the most growth. Here I'm emphasizing the back right and front and right corners most, so that's where the Riccia goes.

Next, lay down the Moss Stones, these are situated for me at the left for the primary focal point, behind the secondary stones.

You should lay these plants down first because they will act as a guideline for the rest of the plants for proper mixing.

After the moss and the Riccia, I went ahead and planted the hair grass evenly spaced in the back. For hair grass like this, you only need to plant a little bit, because of how fast it grows.

The Final planting step is to plant HC between all the riccia stones, and across the main panel as it's the primary carpet plant to grow between riccia.

Adding a touch of Tennellus between the moss stones will ensure they grow together with a pleasant contrast, and planting the microsword behind the main stone and as a touch around the right focal point and the left adds an extra layer of texture to the layout.

Finished Planting:

Back to the daily maintenance on this tank:

Day 4 water change was about 75-80%. For the record, this photograph illustrates to you why I do water changes every day during the first week:

You can't detect that green tintish-water while it's in the aquarium, it just looks completely clear. It's comprised of decaying plant / melting plant matter and algae spores. So, an ounce of preventative maintenance is your number one secret to success.

Again, 10 minutes total time spent in changing water. No pruning today, but I've begun to add Brighty K now that the plants have settled a bit.

Upside down due to camera fun. Aerial shot of fertilizers are fun. Only one squirt of Brighty K.

Don't forget, also adding 5 drops of Green Bacter at this point.

On another note: here's the aquarium for today at a different angle than before.

Keeping in line with the spirit of having things updated on the fly:

Riccia growth on Day 4: It's beginning to perk up and go vertical (a good thing).

Speaking of Riccia, it's an interesting plant: here's a species which is basically really moody. I've seen Riccia change color hues, growth appearance, etc. All based on where it is in the light cycle for the day and whether or not you gave it compliments when the lights turned on or not

First Month Filter Setup

Setting up the filter

The point here is to expose **my secret** for the setting up a canister filter for a planted tank.

It involves an easy first step, which we're all familiar with:

If you bought an eheim, it should come with Bio Rings (mechanical filtration), if you'd like to use the ADA version, it's Bio Cubes (which we'll have sooner or later), but for now just have a layer of mechanical. This helps to break down / catch larger debris in the filtration process.

The second step is pretty easy too:

Carbon. (Rinse before use always, large explanation as to why, but just know that you need to do it. Also, don't do it in any area where it can stain the surface, carbon stains stuff. Like, say, in the bath tub. I did that once and it took me like a month to clean the carbon off. Bad idea. Use a stainless steel kitchen sink or the like).

That's it. We're going to **only use carbon and mechanical, at a ratio of 20% mechanical, 80% carbon** for the **first 30-45 days.**

The reason you're going to do it this way is because during the set up, we need the extra purification power of Carbon. This helps to polish the water and remove any negative elements, which there will be the most of during this period.

After the first month or so, we'll no longer need to use carbon (it will have burnt out by this point) and we can switch over to biological to maximize our biological filtration (most important step in filtration for us).

Tips for Carbon

*has surface area for beneficial bacteria to grow on (which is why I use carbon instead of purigen in the planted tank, for a while, I / ADG used purigen in planted tanks, but long-term testing proved carbon to be better for this reason, though you can use carbon + purigen as well if you like, however if the choice is either carbon or purigen, go with carbon).

*choose the highest quality carbon you can get, this leads to the best results and the highest capacity for cleaning the water. NA Carbon is an excellent carbon source, and even better than NA Carbon is sources of Bamboo Charcoal (the best aquaria-related carbon, taken from bamboo).

*avoid carbons that are just powdered or "caked onto filter pads," these tend to come by default with filters, the eheim 2211 i'm using came with one, and they're largely useless. They help some to make the water clear, but that's all they do. You always want a carbon that comes in stick form or that is bamboo charcoal (these types are kind of jagged edges).

Step 5 – Maintenance

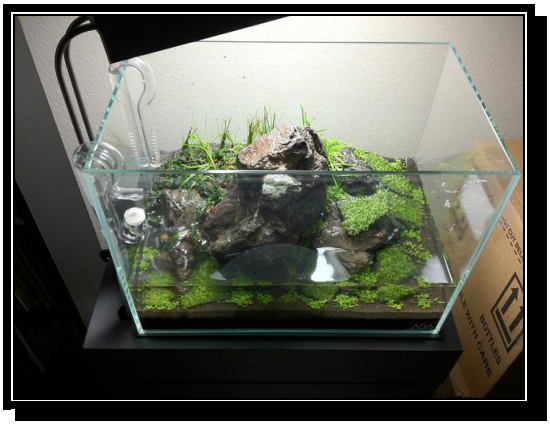
Day 5

So, I got to Day 5 yesterday of the water change cycle, and upon getting home I noticed the water was a little brown. Not super-brown, kind-of-sort-of tannin-ish-but-not-really color. I should further clarify to you about the brown color: more of a slight tint than an actual brown. In otherwords, not perfectly clear water.

What this signaled to me, is that I should be preparing for a diatom outbreak sooner or later (perfectly fine) and that any plants in the emmersed form are currently breaking down and melting (which you can see visibly behind the main rock), a totally normal process.

Because I didn't think ahead and only started to do a water change, rather than getting a picture of the tank with the slight coloration difference (which you probably wouldn't be able to see in a photo anyway), I got you an ever-famous-frank-bucket shot.

I drained the tank down a bit to:



Pro Tip: Exposure to air helps to kill some algae types. In general it's a pretty good preventative maintenance strategy to drain as much as you can on at least a monthly basis.

To spurn some extra aeration on fill-up: I turned the filter on at this water level:

Doing this as a regular practice helps to rapidly oxygenate the water during a water change, which is healthy for the overall environment (due-to-a somewhat long scientific explanation that involves oxygen levels at the microscopic levels, which you don't need to know to know that it helps and is free to do).

Total maintenance time: 11 minutes

Day 6 (post #122):

Alright, it's time for **Day 6** water change. By now you must be sick of getting these pictures! "They all look the same!" I promise you they are new ones every time.

Perhaps when this process is finished, if you're feeling intrepid you can go print out these photos and make a growth flip book.

This time I remembered to take a photo **before** the water change:

See that? it's brown! very slightly!

I drained the water level almost all the way down to the substrate here, and trimmed off a few pieces of riccia that had some algae on it from what-ever tank it came off of (you want to eliminate those pieces as quickly as possible, don't be afraid to make surgical cuts):

And, the now famous bucket shot for you to illustrate:

Now, for the fill up process, again, I'm turning the filter on at about the halfway mark (once the water level is safely above the intake of the intake pipe) for some extra oxygenation fizz:

And then finally, after a **grueling 15 minutes (trimming!)** we're back and filled with water again (seriously, it takes longer to upload these images and write this post than it does to water change...if you have time to make a post, you have time to do a water change on a nano):

Proof that these are new photos each time: you'll notice that extra Riccia stone missing. I decided it was totally messing with my feng shui, and immediately after removing it confirmed this fact. Saving the extra riccia wasn't worth it. Though it is sitting in a cup of water outside in sunlight now.

Dosing: 5 drops of Green Bacter. 1 Squirt Brighty K. Day 6 water change percentage: somewhere around 80-90%.

A photo from a different angle to show a different perspective. Kind of cool, don't you think?

You have probably understood by now that this process has been pretty painless, easy and can be done by anyone: and I hope that the bucket shots have illustrated you in a very real way all the preventative maintenance you're doing for 10 minutes of time a day. You might never look at your tank the same way again.

Are you going to start your journal yet and start using these techniques? If not, what's the hold up! You don't need ADA product to exploit the techniques being used here for water changing and setup!

If you have a 10 gallon tank, this usually takes about 15-20 minutes, and if you have a 20 gallon tank, about 25-35 minutes. Still pretty easy, no?

Day 6 *(post #173):*

Alrighty, Day 6 of water changing here, and today's is a little more intensive. Still got the brown water from before, so it's signaled that it's time to go ahead and take the extra time to remove dead plant matter:

Before any work.

I drained a little of the tank water to make it easier to work with, then turned off the filter and began cutting every plant that was yellowish or decaying. They're doomed anyway so just cut em off and get rid of them.

Not sure if you can see it, but here's the trimmings at the top:

Mostly a few bits of HC (was emmersed), Microsword and some tenellus (also emmersed), The Hair Grass will get it's own unique trim probably in a few days, as it's making the transition as well, and I will wait for more green shoots to pop up.

Use airline tubing to remove decayed plant matter without disturbing planting.

The got-to-be-by-now-infamous bucket shot:

The Riccia Stone outside:

Proceded to drain to this level:

There's an extra step I took today: I filled the aquarium back up to about where you've seen it all this time, at this level:

Now, at this time I noticed by chance an odd filmy white substance on all of the corners of the aquarium in the silicon, so I quickly took a razor blade to remove it after turning off the filter again.

From there I drained the tank back down to the original level and filled her back up and finished:

Total time today was about 30 minutes of work all said and done.

Dosing: Brighty K 1 squirt, Green Bacter 7 drops.

Day 7

Alrighty, let's move straight on to Day 7!

I went ahead and changed the water volume to the same degree that the past few days had been, so you can imagine the change in water volume.

However, this morning I did do one thing different: I decided I wanted some extra oxygenation at night, so I lowered the water during lights off to this level:

Allowing the aquarium to run at this level at night (or raising the lily pipe) helps to maintain oxygen levels in the aquarium and prevent surface film from developing.

The ever-popular bucket shot (i'll continue to post these until you have a thorough understanding of the importance of water change for prevention!) :

After the water change today, I added another fertilizer to the Step program:

Green Brighty Step 1. So beginning today the dosing regime is Brighty K + Green Brighty Step 1, one squirt each. I also dosed Green Bacter, 7 drops. From here on, Green Bacter will be dosed only after water changes (so every 2nd day for the 2nd week).

And here's the full tank shot after the complete water change:

Something that might be hard to notice, is this particular shot:

If you notice the bronze leaf of the E. Tennellus, this is an extremely good sign: this means that there is potent light penetration, adequate Co2 and proper nutrient supplies. The normal coloration is Green, only under a synthesis of great conditions do the leaves turn bronze. This will add a nice touch of color to the tank later.

I will note one thing:

I am not happy with the way the Riccia is growing - well no, I'm happy with the way it is growing, but this SP. of Riccia Fluitans is too broad leaved. What this means is that I will likely be swapping out for Riccia from another source for a more micro leaf structure. I'll give it a few more days to see what it does, but at current the leaves are too large for me to achieve what I want.

This process is totally okay to go through in setting up the tank.

Earlier I spoke about tools and gave a brief overview, now I'll show you a little more about the proper tool set

At minimum, you should have three tools to properly maintain your Nano. This is utterly important to long term maintenance of the aquarium:

From top to bottom you have: Curved Scissors short, Pincettes M, and Straight Scissors.

These tools perform very vital roles and it's important to have a diversity on hand to do the job you need them to do:

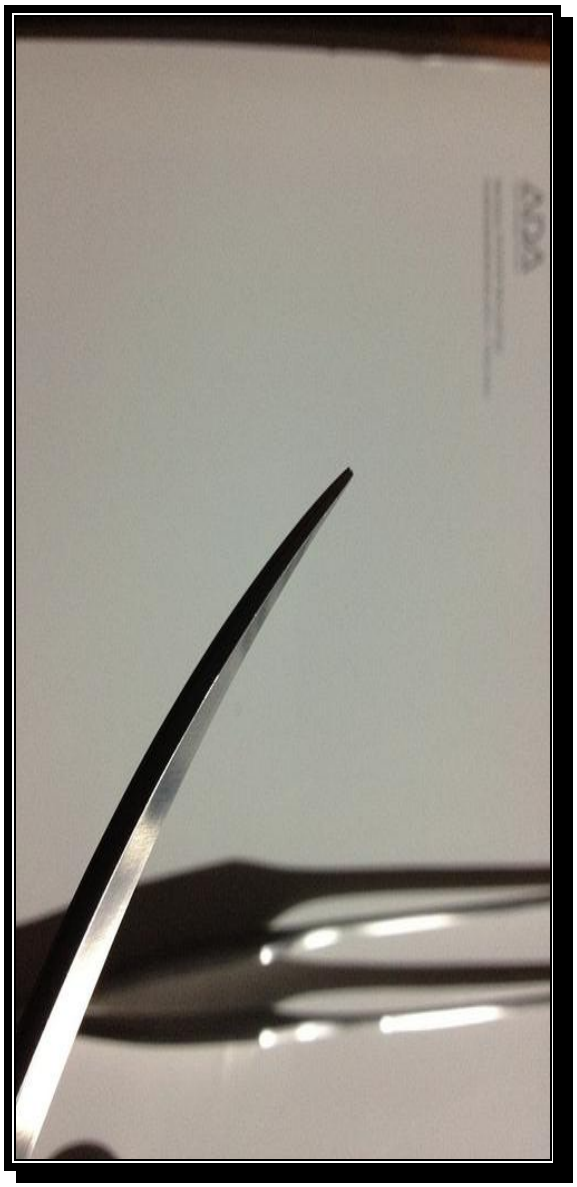
Curved Scissors: for getting around corners, and more importantly trimming evenly across a carpet of plants. This is very hard to do without the curve, since they provide the extra leverage you need to make an even cut at an angle, as opposed to trying to level out the scissors themselves.

Straight Scissors: These are "surgical strike" scissors, which are ideal for trimming stems, or in this application, for cutting single yellowing or dead leaves from the plant with precision. This makes that job much easier than the curved type scissors.

Fine-tipped pincettes: a must for planting. I can't imagine being able to plant without pincettes. That would be a nightmare! Having a set of ones which are fine tipped allows for you to plant smaller plants (like HC) with greater ease, additionally letting you plant deeper without taking a lot of soil or plant matter up with you.

A note on choosing quality:

Quality is extremely important, for scissors you must absolutely have scissors which have very sharp blades and are perfectly jointed to leave no space between blades, as pictured:



If the blades of your scissors are not sharp, they are worthless. You will waste time cutting and cutting and recutting the same plants and be unable to get a proper cut evenly across surfaces (the most important aspect in sculpting your aquascape).

If they joints are not properly aligned and there's any spacing what so ever between blades, then you will suffer from similar problems as if you had a dull blade.

For Pincettes, they should have proper bends that almost feel like they have a spring in them for the best ability to plant firmly doing as little damage to the plant as possible. Pincettes that end up laying flat together when you press them together with no resistance lessens your gripping power on the plant while also making it more difficult to put the plant in place.

Don't add extra hurdles to your maintenance!

For Long-term maintenance, you want to invest in the best grade of stainless steel you possibly can to prevent rusting, while keeping their performance consistent over their lifetime. Always make sure to wipe them down with a towel afterwards. This will ensure they last as long as possible. The first tool set I ever bought was about a $20 one from China, and believe me, it made my life miserable when it came to trimming. You don't need to go with ADA, but get the best quality ones you can afford - with proper maintenance they'll last you for years and years.

As the layout grows, and we begin moving into the transition between growth and stability, I'll be giving more detailed information as to application and when what tool is used where.

End of Week 1

Lessons of the Planted Aquaria

Really, what it comes down to is that the majority have learned how to do things incorrectly from the start.

Most people focus on equipment. Equipment is intricately tied into the success of the planted tank. At the end of the day we need proper filtration, an aquarium, substrates and fertilizers. So, it's no wonder that people focus on that first.

The most common questions are: what filtration, what lighting, what co2 and so on.

If you are new, you've asked these questions recently. If you aren't, you've long since established your bias' one way or another. But the thing of it all is:

Everyone is focused on the 'what,' instead of the 'how.' People also haven't evaluated the 'who,' is using what techniques and which tools.

When our hobby is so *incredibly linked* to the 'what,' it is easy to see how a person focuses almost exclusively on 'what.' Frankly, you aren't drawing on a piece of paper where skill is immediately evident as the primary need. You can have the best pen in the world that does exactly as it says it does in the advertising, but if you can't draw, well, you can't draw, and it isn't the pen's fault.

The other issue with this focus on the 'what,' is that without really knowing any better, you aren't able to judge the difference between the 'what's.'

If your trimming techniques are improper and poorly managed or only done every few months, then there's no way for you to know what to look for in a pair of scissors, or when to use what type of scissor or how.

For example, I'm not a good golfer. I don't know golf techniques and I don't know the mechanics of each club. I know I need to get a ball into a hole on the other side of a really long grassy-knoll thing. I know that I use a driver to get it most of the way, and a putter to get it the rest of the way.

But I have no idea what each iron does, why it's used when to use it or anything. I'm just aimlessly hitting golf balls towards a target and 'hoping,' that I pick the right club.

Would you say that I'm in a position to give advice on what club to use and when? *If you answer yes, please consider a psych evaluation.*

I don't even know -how- to tell the difference between one or another.

Unfortunately, this focus on 'what,' leads to an inexperienced user base, providing feedback on equipment they haven't used, while using techniques that are easily among the worst ways to do something. Skepticism based or spread based on these parameters is nothing more than an uninformed opinion of the worst kind.

You wouldn't want to take advice from that person any more than you'd want to take my advice on what club to pick when you go golfing.

We like to say that there's many ways to skin the cat, that each special snow-flake is unique. And that somehow, when I'm new, and take the advice of someone who has kind-of-sort-of made something work mildly okay that I'm going to magically get a different result. *They have a word for that: it's called insanity.*

Let me use another example here on the predictability of technique *and* tools. **Dollface** started her aquarium following the same water change technique, the same quality of water (RODI), the same fertilization method, the same tools and the same substrate system.

What's the result? She's gotten exactly the same *kinds* of minor algae, the same *growth rates relative to the amount she planted*, and the same water clarity. **Really, the only mistake she's made** is not planting -enough- from the start. She could have started with double the plant mass and had much quicker growth. But we do know that the HC will start kickin' this week and start spreading.

What can be learned from that? All she has to do at this point is follow step-by-step with my journal and will know more or less what's going to come her way and how to deal with it.

That's powerful.
Similarly, if you do the same techniques as someone else, you are going to get their same result. So why on earth would you want to do the same methodology of relatively bland layouts and plant growth? Your result won't be any different!

There really aren't multiple ways to skin a cat here.

Every technique and method system is all based on the same overall way to grow and curate plants. They just do the job to varying levels of efficiency and effectiveness.

If you use eco-complete, you are essentially doing the same function as aqua soil, but the path you take is going to be infinitely more troublesome to get the same result. You could start with literal dirt in your tank: it will do the same function, but not as well and you'll introduce all sorts of weird stuff from the yard.

I'll continue this line of thought later, for now that should be enough food for thought. I would just say to reserve judgment until I post up the whole line of thought.

Last time, I discussed how everyone is focused on equipment versus the "why," and forming technique. This is a continuation of that line of thought.

We left off with talking about different **pathways** to results more or less being the **same way of doing things, but to different results.**

Specifically the eco-complete example: ultimately, you buy eco-complete to perform the same duties of Aqua Soil. However, to get eco-complete to perform to the same level of effectiveness as aqua soil, you would need to use probably about four fistfuls of root tab fertilizers. Even then, there are other issues: such as softness of soil particles to allow roots to spread quicker and better.

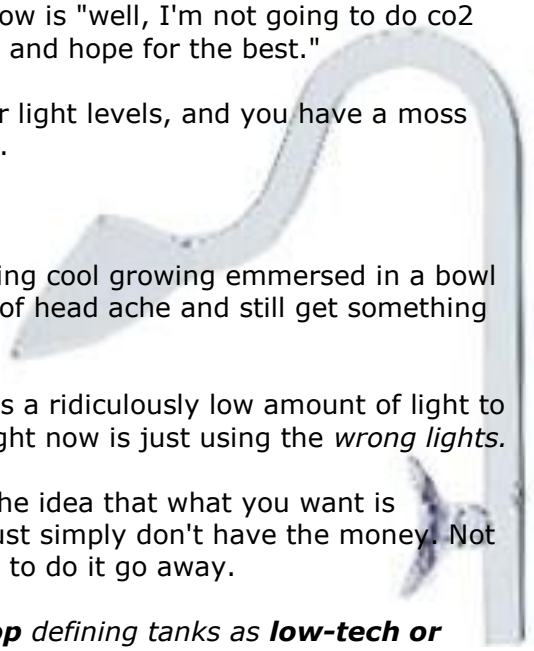
Let's go with another example: the so-called "Natural Planted Tank" method. Here there's absolutely no special reason to try here. You're literally just better off going with even the lowest-quality of planted substrates and rigging something together to make it work than shooting for the 'purist,' method of Natural Planted Tank. All I really need to cite here is, have you ever seen a beautiful NPT layout (don't confuse 'low tech,' with the 'pure' NPT)? If you have, then I would submit that you are either blind, geeking out on the process and not the result (which is fine to geek on the process), or you've found the tank that's touched by the god(s) and should do everything in your power to steal said tank setup for it's magical, ambrosia of the gods elixir and monetize that thing as an immortality potion.

Moral: do not waste your time with the NPT. It's a nifty high-school experiment, but that's about it.

In regards to the low-tech

Okay, here's the thing on low-tech. The current interpretation of a low-tech aquarium is kind of BS.

More or less someone's idea of a low-tech tank right now is "well, I'm not going to do co2 (because I can't afford it), so I'm going to go low-light and hope for the best."



Then we get a list of plants together that grow in lower light levels, and you have a moss anubias tank. Which kind of stays idle. For a long time.

There are two points to stick two on this topic:

1.) If you really want a low-light tank, stick to something cool growing emmersed in a bowl similar to wabi-kusa fashion. You'll save yourself a lot of head ache and still get something that looks great.

2.) The fundamental premise of low-tech is off. It takes a ridiculously low amount of light to really grow almost anything. What people are doing right now is just using the *wrong lights.*

I totally respect operating on a budget. I understand the idea that what you want is something great - you have a passion for it, but you just simply don't have the money. Not having the money doesn't make the feeling of wanting to do it go away.

If all you were to do is stick to core principles, and ***stop*** *defining tanks as* ***low-tech or high-tech***, *you would open yourself up to a whole world of possibilities.*

There is no such thing as a high tech tank. There is no such thing as a low tech tank.

There is only one methodology and one planted tank that works. One that follows rules and secrets to success.

Takashi Amano successfully grew layouts that make the highest tech tanks today look like absolute jokes back in the late 80's early 90's, before the ADA product line was really developed, more or less using a sand gravel bed.

What were the few things that really carried over from those days? Bacter 100, Clear Super, Tourmaline BC, 8000K (flourescent at the time) lighting, Co2.

So if you have the low-tech mind set, stop it.

Your budget constraints shouldn't in any way, shape or form, limit your ability.

Really when we talk 'low-tech,' we're talking Co2 and lighting. Get yourself any cheap fixture that will hold an ADA 27w 4 square pin bulb (on a nano) or 36w 4 square pin bulb (need 2 for a 20 gallon, 4 for a 40 gallon).

Always, always, always use Co2

Even if you cannot afford a pressurized unit, rig up a DIY yeast system and just make it work until you can afford a pressurized unit. Don't even bother trying to do a layout without Co2. It's **not worth the hassle.**

If you can't afford Aqua Soil, get yourself some basic gravel-like substrate, get some root tabs, Bacter 100 & Clear Super and you've at least got something that will work efficiently (efficiency being a measure of doing the job, effectiveness being a measure of doing the job well).

So now I've put together a basic lighting system, a co2 system, and substrate system on the super-cheap.

Congrats. You're now "high tech." Are you starting to see how silly it is to pre-determine yourself as "low tech" or "high tech."

I'll continue on later, but I hope by now you are beginning to understand where I'm going with this, and why you should start focusing on "why," and "how" techniques.

I had covered why using the terminology of why the concept of an NPT and low-tech is more or less cockamamie.

The core idea might be a little unsettling. This is because it is derived purely by a monetary standing. The *classic* idea is that if I have no money, then I make a low tech tank.

Really, money has nothing to do with it. That is purely a human factor in what we can do and how we think we can do it. *Because everything is so product oriented,* we get clouded by either being a **have or have not**. Allowing this to be at the forefront inherently prevents your success.

I've already covered that *Takashi Amano,* has already done absolutely amazing layouts in what we would call today "*low-tech.*"

I've emphasized that all you really need to focus on that end is: proper spectrum lighting (8,000K), proper technique, and a form of deliverable Co2, whether that has to be DIY or more preferably (due to consistency), pressurized.

The idea of high-tech is, also, BS.

High-tech really only means that I have more gadgets than you and come over and take a look at my *hardware.*

Over focus on the *what I have*, versus the *aquascape that I've created,* is entirely not the point. If all you want to do is show off hardware, then go buy yourself a fancy car and do whatever it is you've gotta do to justify the purchase.

Aesthetics do matter - but function and aesthetic is more important than function. Aesthetics are a function of what's pleasing to our eye. Function is the *effectiveness with which it does it's job.*

Of course an ADA Co2 Advanced System is always going to be better than a DIY system. Not because it looks better, but because it's better on a *functional level.*

Only buying stuff because it's stuff, does not enhance your aquascaping skills.

Buying an ADA Cube Garden doesn't by default make you a better aquascaper. Just like buying a Ferrari doesn't make you a better driver by default.

What is high-tech then?

High tech is at best, only stuff that does the job more effectively.

Equipment helps lessen the learning curve and make the job easier. The gap between a badass layout done in 'high tech,' and 'low tech,' is technique and knowledge.

If you can grow plants in 'high tech,' setups, you can grow them in 'low tech,' setups and vice versa.

So the whole idea of "I can't do this, *because* I have a low-tech setup," is only an excuse.

So, what then?

There *are not* multiple ways to skin the cat.

There *are not* high tech and low tech setups.

There is only ***one way*** to have a successful aquascaped layout. **Everything else is based on this all-encompassing one way.** *This one magic formula*.

But Frank, *my tank is different!* ..... *No, it's not.*

The Big Secret:

The debate between E.I. and ADA, or ADA and whatever dosing, is utterly idiotic. They are "grades," or measures of effectiveness and efficiency of **the same universal method.** E.g. one is the kindergarten version, junior high, etc., etc. to think about it.

That has a real application towards the planted aquarium.

Some of you may have wondered how this thread has gone the way it has. There's been a very clear difference in tone - namely from myself.

This has been interpreted in a few different ways, which are all incorrect.

The reason for this line of thought: ***be warned*** *if you've kept reading up until this point you may have the "ah-ha!" moment.*

The NO B.S., Absolutely essential, immensely critical, secret and bag of tricks to growing any plant, at any time, with any setup.

Here's the deal.

Every planted tank, the 'eco-system,' and everything alive and thriving in our tanks follows only one rule. One law.

It is quintessentially Malthusian.

Another, less fun way of explaining it, is that everything follows the law of minimums.

The law of minimums is simple:

> The organism population will only grow to the available supply of the ***least available*** nutrient necessary for survival.

What this means is that if our basic supplement required for growing plants is NPK (there is much more, but please, for the sake of example bear with me):

if **N** is 3, **P** is 3 and **K** is 1 (and if plants require 1 of each), then your plants **will only grow to 1**, not 3.

This is a fundamental premise of E.I. dosing.

This is also a fundamental premise of ADA dosing.

Because it's the fundamental ***premise of everything*** *in the planted tank. It's how plants, the bacteria, everything, grows.*

There is a difference between the two; and there are reasons for the difference, but it's not so major as to call them separate methods entirely.

One is refined and systemized, the other not so much.

With this snippet of information, you should now begin to understand that there are **no multiple ways to skin the cat**. They all strive to do the **exact same** thing.

An Unconventional Example:

Let's take for example this thread. It was first fed on good information. The information is what brought you here. Not a product or a product system.

A good aquascape kept you interested, combined with the information you came back.

But...when did activity explode the most on this thread and the forum?

When there was something controversial. Something that could bring a spark into the conversation. Information combined with Visuals and a flair of drama. If you haven't had the opportunity to see it - by now a page of commentary has been deleted (to highlight how response increased), nothing of value in the deleted posts, but it's a "population" example if you will.

Now, slowly over the course of a few days I let a few things brim. I came out with a bold statement - and flat out said I wouldn't respond to negativity.

Then, followed that up with something slightly bolder. Consequently responses went up. Then finally today we had an explosion of conversation! Emotion going back and forth and the thread had a great deal of energy about it.

This is exactly how the planted tank goes. This is exactly the concert that plays out between the micro-organisms, the plants and the fish / shrimp.

Now if we missed one of those elements, things would die back down, normalize and the thread might even fall a few pages back completely.

If you can understand that example - and how things naturally played their course, then you can ***do anything in your planted tank.***

In regards to the daily updates on the Mini M at home:

I've added in some Amano's to clean up the place a bit. The small amount of diatoms and green algae will be cleaned up in short order. Dosing has remained at 1 Brighty K & 1 Green Brighty Step 1.

Now performing once every 3 day water changes.

I haven't posted a bucket shot in some time - which I will at the next update, but the water is significantly clear at each water change now, which helps to illustrate the difference in algae growth / decaying plant rate between the first week, second week and third weeks. This is an important illustration of why water changes up front are important to long term success.

I will also have the answers to the "quiz," posted up later!

If you've learned nothing else, at least take advantage of me in this gem to show me what's what. This may be the most important post in the hobby I've ever made, so read it carefully:

Unfortunately, there has been a vital breakdown in communication. The frame of posting I chose was very specific. It had everything to do with attacking conventional thought.

The assumption, for better or worse, is that by saying the other methods are invalid, that the ADA method is the only method to choose.

This is not the case.

Every common word we use to describe a method - is complete B.S. That would include calling it the "ADA" method.

I use only one method. The one that most successfully grows plants. I also have a great deal of useless expertise in "methods," that do not work.

The *framing* was an attack on every supposed method. We are all looking for the plant magic bullet. This *one method* underlies everything as the very foundation.

This may seem like Renegade thinking, but it's the real deal.

Let's summarize (let me again make this clear, there has not, and will not, be any attacks against individuals):

The so-called "ADA" method is B.S.: there's no special, magic ADA juice. There's no automatic-success mechanism with ADA. The only thing that matters is application, which is entirely up to the individual.

The "high-tech" method is B.S.: that's just focusing on the equipment - not the method. Focus on equipment does not equate to growing plants.

The "low-tech" method is B.S.: By no means does equipment limit your ability to greatly create an awesome layout. Equipment is a tool to "level the learning curve."

The "NPT" method is B.S.: while it focuses more on the theory of methodology, if you are doing it out of necessity - then follow the "true method," if you are doing it out of interest in experimentation - it would be more accurate to call it a style.

Okay, so now you might be really angry at me for saying that your preferred "method," is B.S.

I say these methods are all B.S. for one reason, which has come via a lot of pain and suffering, observation and ultimately experience.

It has come from spending a lot of time banging my head against a wall in the quest to take things to the next level. To master the planted tank.

It is an inherently emotional endeavor, and requires two things: stirred passions and dedication.

That conclusion is easy to say now, hard to see before you arrive at it;

There is only one method. The Method. And it has nothing to do with equipment, brands or limitation. It has everything to do with understanding.

The Principles of The Method:

1. All organisms are Malthusian in nature. They will grow and invade to the very limits their environment will permit them.

2. Organisms can only grow and duplicate to the extent that the least common denominator is available. E.G. The resource that there is the least of, is the extent to which a plant, bacterium, etc will grow.

3. Everything is cyclical. Everything is utilized in concert to grow and ultimately be recycled. Molecules, minerals and nutrients are taken in and used by organisms, organisms feed other organisms, and the waste product of those organisms feed yet other organisms.
4. The purity of the environment is directly proportionate to how it will grow. The more "x-factors," and toxins you have, the less successful you will be.

5. It is the **balance** of all these factors that leads to ultimate success. The smallest of details matters.

The Techniques of The Method:

1. Purity of water. Because our aquariums have a finite amount of water immediately available, we must 'refresh,' the water source as frequently as is possible.

2. Supply in relative abundance all of the factors that lead to proper growth of bacteria, plants and fish. Supply only the proper levels relative to the aquarium's rate of growth.

3. Trim vigorously - trimming enables new growth to take the place of the old.

4. Daily attention - if you have the time to make a post, you have the time to give a quick check for anything running amok in your tank too.

The Mindset of The Method:

1. Cultivation and care for the planted aquarium (even the smallest microorganisms) is an enjoyable task, something that's look forward too. There is something irreplaceable in the appearance of a balanced aquarium.

2. Vicious, quick and precise attack on anything that threatens the balance of the aquarium.

3. Constantly seeking new ways to learn and improve. Visualizes success with the aquarium.

Following this methodology, this mindset, means that all others are irrelevant. Because they don't matter - they are parameters set by equipment and predefined 'successes,' rather

than the aquascape and the health of the system at large.

This means that, following the principles:

A "low-tech," tank can easily trump any "high-tech," tank.

The "high-tech" tank is irrelevant because it only describes equipment.

The NPT is just a partial application of the whole picture.

The "ADA" method is just a series of techniques and quality brand tools to 'enhance,' The Method.

E.I. Method is only a fertilizer method. It's based on and a part of The Method, just like ADA. *They are more similar than different.*

I know the path to this point has been a bit controversial. But I hope by now that you've found the value in taking this path, and why this path was taken to arrive at this destination. *Emotional energy,* getting attention, loud and clear, is an important part in true understanding.

Unfortunately, Pain is a greater motivator than pleasure.

We've gone over quite a bit of methodology and philosophy being the techniques lately, so it's time to get this show back on the rodeo with some-good-ole-fashioned technical details.
The Aquarium on April 4th (first water change of the week, week 3 = 2 water changes, 3 days apart)

Now, for the infamous bucket shot:

I post these bucket shots to illustrate examples, and to show first hand **why** water changes are done so frequently up front.

In case you don't want to search the thread for some of the older bucket shots, here's a picture from week 1 (daily water changes) :

So, compare the two side-by-side: first bucket shot is on the third week, for the first water change that week (first of two, 3 days apart).

The second bucket shot is the water change after day 3 on the first week with **daily** water changes.

The aquarium is most vulnerable to algae in the first month, the first week especially. This is why we focus so much on getting started right the first time. Most people fail with their planted tank within the first month because of this curve.

And the finished shot:

Diatom Algae has appeared in the first week.

Don't Panic! This is an easy algae, and is no problem what so ever. Amano's devour this stuff. But we're not ready to add them yet, so airline tubing removal will hold us over in the mean time.

Mini-M, April 5th:

Dosing: Green Brighty Step 1: 1 Squirt, Brighty K 1 squirt.

P.S. an insight that I've overlooked for a while: Nano tanks truly aren't for beginners. They are much more difficult to balance than larger water volumes. Take for example the 60-P vs. the Mini M. The 17 gallon aquarium is much easier to balance and has much less problems to deal with than the 5.5 gallon aquarium. Just a little food for thought.

Ah yes! here are the answers to the "quiz"

#1 Penac W added to boost the water hardness a bit to kH 2. (RODI)

#2 Moved lily pipe outflow to the back of the tank to manipulate circulation of Co2 in the tank to emphasize on the front more - the growth in front left Riccia was suffering a bit.

#3 Trimmed dwarf hair grass to the stub to eliminate emmersed growth.

#4 trimmed any remaining dead growth.

Step 6 – Maintenance Continued

Day 8

Not much for the Day 8 update, just a top off (in this tank the no water change days are basically 20% water changes)(day 9 water change is full 70%)

You can see the residue of some Penac W which will go away over time:

Yesterday you may remember me testing kH and having a value of 1, with the addition of Penac I rose this value to 2: right where I want it.

The only other thing I did was continue to remove dead, yellow or old leaves.

Here I'm using spring curve type scissors, which are easier to maneuver with in tanks of this size since you grip them with your palm and can access areas that are harder to otherwise.

I'm pruning off the old e. tenellus and micro sword leaves as well as bits of yellow HC.

Of all the plants I have in here, surprisingly the tenellus and the moss are doing the best, followed by the hair grass, which is doing the invasive growth hair grass thing.

Very pleased with the bronze tenellus growth: ridiculously happy in fact. This will provide the contrast im looking for. The riccia I have more being shipped in to see if it's a different sp.

For riccia I want an sp that isn't so broad, so hopefully the stuff I'm getting from a hobbyist is the right type. At least from his pics it appears that way.

Day 9

I'm at a stage in the planted tank growth period where there isn't a whole lot you can do except sit tight and keep doing what you're doing.

As you develop good habits, an odd thing happens: you are so happy with the process involved with your tank that you always want to be doing something with it.

However, when appropriate, the best thing you can do is sit tight and wait things out.

For example here I've got two algae's starting to appear: one which is a hitchhiker from the riccia I got from a local pet store (which I am eagerly awaiting to replace with some from a different source), while removal and replanting is typically not something you can do, with riccia it grows quick enough to not have a major impact this early in the game: plus it doesn't root, so there is minimal disturbance.

Aside from that:

Hair grass is doing its viral thing already as this picture illustrates:

By this time next week I'll be trimming away all of the old emerged growth which is largely useless even now to the plant since it has rooted healthily.

I'm still very happy with the way e tennellus and the moss are coming in: much quicker and healthier than I thought they would, which is great.

Micro sword might find itself removed though, the more I look at it right now the more it isn't fitting the feel I want.

That being said: Day 9 had a full water change, Green Bacter x6 drops, brighty k x1 squirt and green brighty step 1 1x squirt.

Ammonia and nitrites are of course still to high to add shrimp (which will quickly eliminate the small green algae growing, which is great to see since its a very easy algae to eliminate).

Day 10

There's no water change today, and algae growth has stymied a bit.

There are two things different here. See if you can notice. Don't read any further until you can guess.

Did you guess it? Yes, I changed out the Riccia stones, three of them, as well as one other change, but first let's talk Riccia.

I've discussed my displeasure with the way the Riccia was growing broad leafed before. In response to this, I obtained more Riccia. Really more Riccia than I know what to do with, so the majority of it is sitting in a bucket pending another layout.

Midway through looking at the Riccia, I discovered that likely it's the same SP of what I've got. So it's 99% likely that my quest continues. However, the Riccia's growth on the right side isn't irritating me as much today, so I'm leaving it there.

Now the other three stones had some growth suffering: the basic stock had some brown spots and was growing in unevenly. So I went ahead and used the new stuff to retie new riccia. This will balance out probably within a week or so. Thankfully, Riccia is very forgiving with it's growth.

The other change:

I removed the Microsword. There was something in this layout causing me tension and I couldn't quite put my finger on it. After looking at it for a bit, I had a hunch that the microsword was messing with the flow of my layout, and after enough frustration of seeing it, I completely removed it from the layout.

And Viola, there's all of a sudden a lot of tension gone from the layout: it flows much better and the planting scheme jives a lot better.

The broad leafed look of the Microsword was just not working with the slender leaf Tennellus and Hair Grass. It's color wasn't meshing with the Moss, and it's positioning on the left of the main stone just wasn't working.

So, compare the this picture with the previous day picture. All of a sudden the right side looks infinitely more expansive.

Now for a picture of my favorite section of the aquarium:

LIKE WHAT YOU'VE SEEN?

ALL THE ITEMS YOU HAVE SEEN IN THIS BOOK

CAN BE PURCHASED HERE!

There's something I want to point out on the difference a single plant makes.

Day 9 Day 10

Looks like the whole scape opened up and became expansive didn't it?

The first picture looks like the main stone is centered.

The second the main stone looks more to the left.

The reason? No microsword to the right of the main stone to focus your attention at a second focal point, therefore centering the scale. All it was was 4 sprigs removed from that one spot.

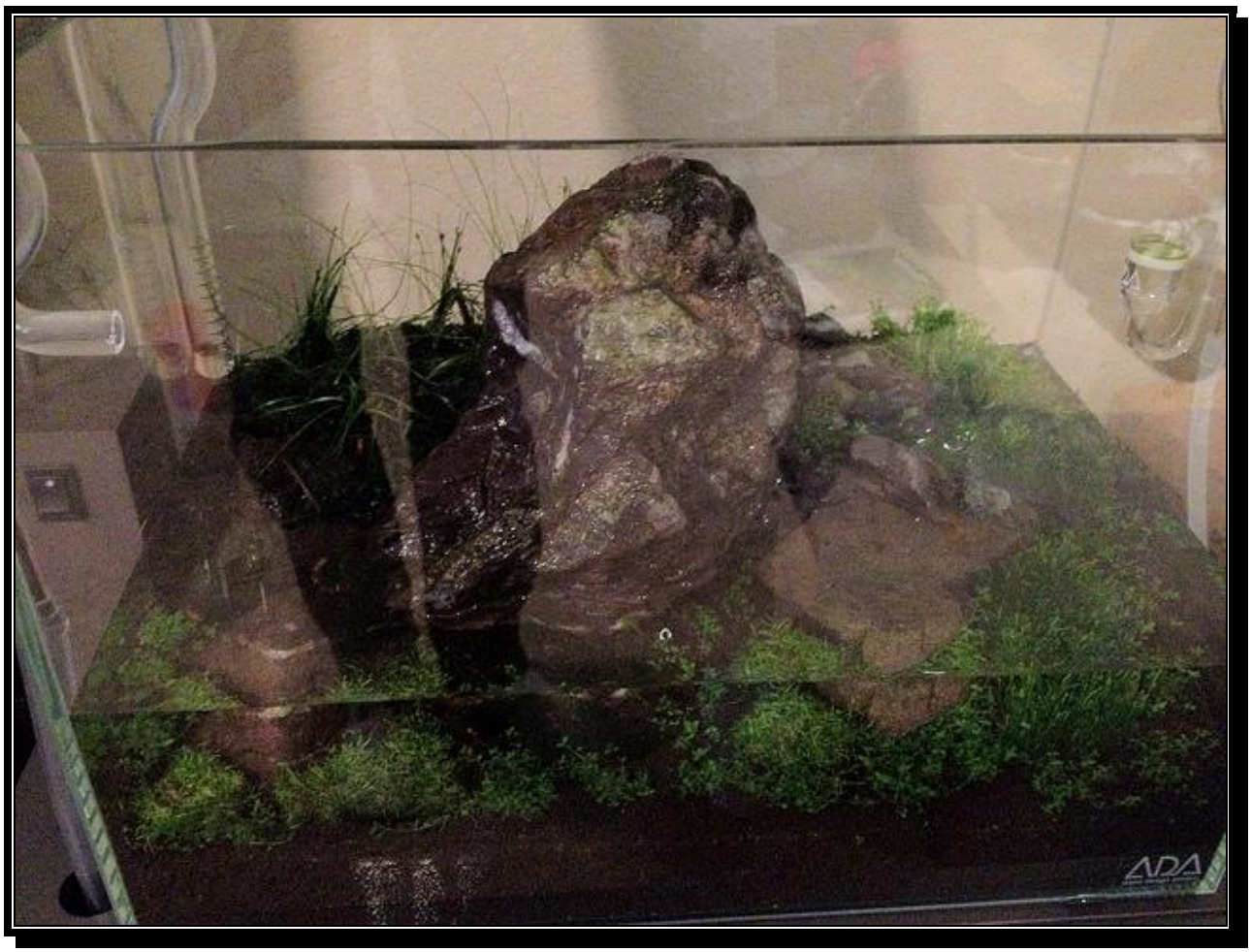
For whoever was keeping track:

Day 1 Day 10:

Day 11

I went ahead and used airline tubing to remove any left over dead matter from the microsword.

Took the water level way down today:



Allowing the scape to breath in open air for a few minutes (5 or so) every now and again will help prevent algae, since the exposure will help kill any residual algae spores, usually useful for non-serious algae types and purely for preventative measures.

You will notice I switched the diffuser sides.

If you read the flow Charts I posted earlier you will understand the reasoning behind this (if you haven't read it, refer back to page 13 or so, it's somewhere around there).

Basically by manipulating where I put the diffuser in relation to flow I can optimize which plants grow quicker.

You will see me manipulating this variable often and it is why I always recommend against reactors. I want you to start looking at these variables and adopting this habit in your aquarium. Just follow along and watch how I do it and you'll pick it up.

So homework for you tonight is if you've had your diffuser in one spot for a long time, move it to the other side and watch what happens.

And a cool shot to end out the day:

Dosing: Green Brighty Step 1 & Brighty K 1 squirt.
Green Bacter: 6 drops.

Here's an equipment shot for you under the cabinet, not a whole lot to see. The filter goes to the wall socket and the light and co2 solenoid (el-valve) are hooked into a timer behind the cabinet.

More Day 11:

Moving the diffuser (and likely, this combined with the fact that I rose the water level up a tad higher) resulted in some heavy pearling yesterday.

Full shot across, since it might be more difficult to see the full details, below are close ups of right and left side.

A beautiful Riccia bed!

The coloration of that Tennellus is going to tie this whole layout together rather dynamically.

It might just be my imagination, but the colors seemed to pop even more vividly yesterday. For me, this layout consistently surprises me as it gets brighter and brighter in color as the plants have made their transitions and are absorbing more nutrients.

Day 12

Dosing: Green Brighty Step 1, Brighty K x1 squirt, Green Bacter x6 drops

I wasn't going to do anything on Day 12, however I ended up getting a wild desire to go ahead and trim the Riccia back on the right.

For trimming Riccia, I used Pro Scissors Spring type to maintain an even cut across the Riccia. Like my hair grass video, the technique was to trim short and trim evenly.

The only difference here is that rather than trim to the base like with hair grass, I'm trimming only about halfway down the total growth.

Many hobbyists like to take out the Riccia stones and trim them in another container to prevent the mess of the Riccia trim from getting everywhere.

However, I don't like the act of disturbing a layout by removing the Riccia stones, as my HC

has already grown "into" the Riccia quite a bit.

And frankly, I'm counting on Riccia to spread everywhere in this layout, I want it entertwined immensely with the HC, even the moss. So a few strands escaping my netting strategy is no problems for me.

You can't notice it in the photo, but I tied more Riccia from the trim to a tiny stone and placed it in between the two support stones on the right.

This is where the real fun of a planted aquarium begins: sculpting the layout via trimming.

Day 13

Really quickly:

Here's the water change on Day 13

Day 14

We're now officially at day 14. Two weeks since initial planting.

Algae is popping up - but relatively easy to eradicate ones. Some diatoms, a little green algae types: all stuff that gets devoured by shrimp.

Dosing is x1 squirt Brighty K and Green brighty step 1

No water change today: but one will be tomorrow.

A photo from different angle:

Angle shots make things look cool.

Classic full shot.

Aquarium Data - Equipment Used

A few of you now have asked me questions about the equipment list that I am running on this aquarium, and while I think that putting it up as the very first thing to do to get people to read a thread is in poor taste, it has become quite evident that you guys find the information valuable, whether that is to mimic the results or to find comparable products on the market.

So without further talk, here's the list:

It's all ADA proprietary:

Core:
Aquarium: Cube Garden Mini M
Lighting: Solar Mini M, Bulb: 27w Compact Flourescent, 8,000k.
Stand: Wood Cabinet Gun Metal Silver

Co2 & Distribution:
Co2 Advanced System (System 74-YA/ver. 2, Clear Parts Set, Bubble Counter (set includes more, but I had a few replacements)
Diffuser: Pollen Glass Mini
Metal Cap Stand
El-Valve (solenoid for automatic Co2 on/off)

Substrate:
Penac P
Penac W
Bacter 100
Clear Super
Tourmaline BC
Power Sand S 2L
Amazonia Powder Type 3L

(for this slope, ended up being about 4.5L)

Filtration:
Eheim 2211 (13mm inflow, 10mm outflow)
Clear Hose 10mm & 13mm
Lily Pipe Mini P-1 10mm (outflow)
Lily Pipe Mini V-1 13mm (inflow)

Filtration Media, Month 1:
Eheim Bio Rings
NA Carbon 750ml

Filtration Media, Month 2:
Eheim Bio Rings
Bio Rio 1L

Filtration Media, Month 4:
Bio Rio 2L (will end up being 1.5L in eheim 2211)
Tourmaline F

Maintenance Tools:
Maintenance Stand I
Pincettes S
Pincettes M
Sand Flattener
Pro Pincettes Spring (Curve Type)
Wave Scissors
Pro Scissors Short (Curve Type)
Pro Scissors Short (Straight Type)
AP Glass Feeder
AP-1 Fish Food

Fertilizers and Additives:
Week 1: Brighty K, Green Bacter
Week 2 to end of Month 3: Brighty K, Green Brighty Step 1, Green Brighty Special Lights (alternate Day 1 = Step 1, Day 2 = Lights, etc Brighty K everyday)

Month 3 onward: Brighty K, Green Brighty Step 2, Special Lights (see above for dosing)

Month 1 onward: ECA (iron, bacterial growth) once a week, 3 drops.

Fertilizer dosings are one squirt per day, by the end of the 2nd month this will likely be two squirts.

Green Bacter: after every water change, always.

Phyton Git: use when algae pops up
Green Gain: after trimming

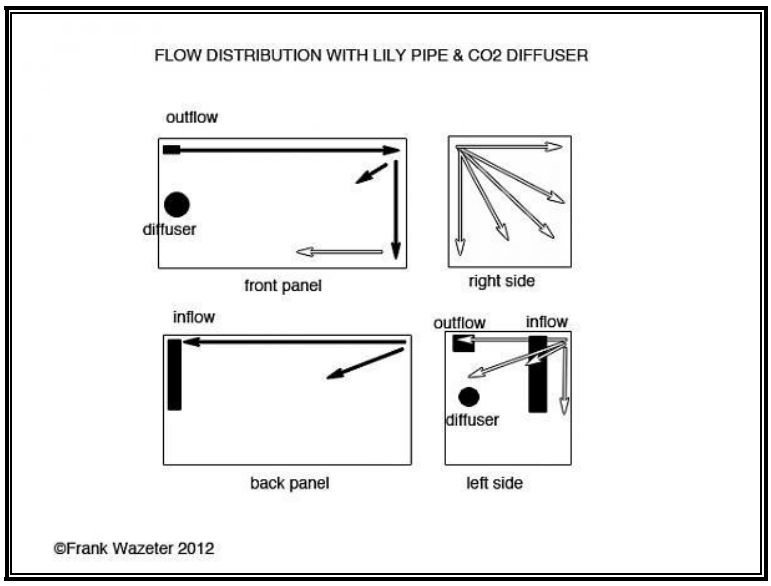
Co2 Distribution:
1 BPS first week
2 BPS second week
3-4 BPS onward, raise as needed.

Average Co2 cartridge lifespan:
4 weeks

How Co2 is distributed by water with a diffuser

I may need to draw a visual aid, don't worry, it's a bit of an advanced concept, and in a nano tank it isn't as critical due to size and scale, you see it much more readily in larger aquariums where the co2 has to travel farther (you begin to really see the effects first hand in 10-20 gallon aquariums).

Here is a picture:



Example: Filtration is on the left (intake and output) and the diffuser is on the left (as pictured in my nano). What this means is that the greatest density of water saturated with Co2 is "pushed" by the flow to the **right** side of the aquarium.

Think of Co2 as a consumable, limited resource (i.e. we only have X amount in the aquarium, and won't have more than X unless we add more).

As X (water saturated with the appropriate amount of Co2) is moved by the flow from left to right, the resource is being consumed. So we have X - consumption.

Visualize the flow of a nano lily pipe modeled like the Mini P-1 and the regular P-2. It creates a jet stream that hits the opposite pane of glass.

You can follow the flow circulation by looking at how a lily pipe moves water, but if you don't have one, you can look at the picture below and picture this: out of the lily pipe water follows this path: it goes straight across (left to right), and when it hits the right pane, the water flow goes in two directions: down towards the substrate (so the water flow goes down along the right side) and then diagonally dispersed evenly across the whole right panel.

Now, as water is traveling, Co2 is being consumed by the plants, this means that the **areas of greatest flow receive the most Co2**. So, Remember, X is a consumable resource and if we say that all plants across the front (concentrated flow, 1 flow stream) is being -1 Co2, and the right panel, (being -5 Co2 spread across 5 flow streams), by the time the Co2 has gone across the right panel we have:

X-6 = Co2 left available in the water column

Which means that, if our total value of X is 10 (these numbers are random for visuals), then X-6 = 4, and we have 4 Co2 left. That means that 4 Co2 is being swept away for the entire remainder of the aquarium, the back panel and the left panel.

Now, over time we have Co2 that escapes the pattern and builds up to saturate the **total water volume** with Co2. Which means that over time we have a build up of say, **.5** Co2 after displacement (loss of Co2) of 1 (again, these numbers don't mean anything except as a visual aid).

The important thing to know that, then due to where the flow is going the highest volume of Co2 in the water is against the opposite panel of the Co2 diffuser.

This means that plants on the **opposite side** of the Co2 Diffuser grow faster, greener and healthier because they receive the greatest volume of water saturated with Co2.

There are two methods of getting adequate Co2 into an aquarium:

1. Flood the aquarium with Co2.

This is not advised since too much Co2 leads to oxygen shortage which harms fish, inverts etc and harms the beneficial bacteria. Good for a short term solution, but long time you compromise yourself by cutting yourself off at the ankles. (Fish actually contribute greatly to the health of a planted tank via waste, etc they are a huge part of the cycle).

2. Manipulate the positioning of the diffuser.

The best method: physical manipulation in response to how plants are growing by being able to switch the positioning of the diffuser and "target" areas for growth. In larger tanks, this usually translates to having two diffusers, one on each side of the aquarium (typical of 4ft - 6 ft aquariums)

Reactor vs. Diffuser

I will always argue against a reactor since you need to compensate with extra Co2 and you're limited to only option #1. You're more or less fixed on where you're going to put

your co2 to plants, the same phenomena occurs as with a diffuser with flow.

"But, I could just move the filter couldn't I?"

Yes, you could, but you wouldn't be able to manipulate flow AND diffuser positioning for the BEST results dependent on your plants.

A third solution is to put the highest demanding plants on the opposite side of the diffuser (in my case, the most riccia and HC is on the right), and the ones that have the least demands (mosses, etc) on the left, (maybe now my layout will inspire an "ah-ha" moment, for being both aesthetic and practical). This is best used in Nano aquaria where their small size lends themselves well to this design.

Trimming Carpet Plants

Trimming the ole' carpet

Once you've gotten a carpet up and running and to that picture perfect moment, it's gone in a flash. Why? Because your plants are growing! So in the long term, proper trimming techniques are the most important.

Each Plant has Different Trimming Requirements and Growth Rates

An important step in mastering mixed carpets is knowing how each individual plant responds to trimming, how quickly it grows and in what pattern it grows in.

So what you want to do is master at least one plant at a time and it's trimming technique, and as a result here is an older video I took trimming eleocharis acicularis to keep it: short, dense, and growing viral.

Trimming Eleocharis Acicularis

The proper tools: for trimming a carpet you want a pair of curved scissors to enable you to cut evenly across a wide surface. For this purpose, my favorite all around tool is the Wave Scissors type - as it allows to bend around rocks and hard to reach places due to it's shape. Aside from that, the good turn around is the Curved Type scissor which allows the same function across more open fields. This is the type I've used so far in the Mini M for the trimming of dead plants.

Technique: trim evenly as close to the root as possible with eleocharis acicularis. This will prompt fresh green growth that will appear as if it were 'sparkling,' (old leaves tend to be dark green, you always want to shoot for that "sparkling" green). If you have it, dose Green Gain to aid in the regrowth phase and help prevent algae.

End of Week 3 - Week 1, 2, 3 Comparison Overview

End of Week 3 update:

So, yesterday (April 6) was the end of the third week.

I did the full water change:

As well as removed via trimming any remaining dead growth. As you can see in the tank there's virtually 100% good, green, healthy growth going on everywhere.

Upon filling I added my ratio of Seachem Equilibrium + Penac W for water hardness on the RODI water. Now that I'm switching to once a week water changes + top offs, I can stabilize the system easily with these buffers in place.

Clear water 20 minutes later

Did I mention how much I love E. Tennellus? I'm incredibly happy to see this runner because now I can continue to propagate the plant. The runner will be cut as soon as it starts to "bloom," since I can't really have another tennellus plant that far front.

Let's do some comparison:

Day 1 (planted) :

End of Week 1:

End of Week 2:

The bucket shot during week 1:

The bucket shot during week 2:

End of Week 3:

Week three bucket shot:

Side note:

It's taken me years now to arrive at the success formula to get that to grow like that, 100% of the time without exception.

This is the formula I now try to spread to everyone I can.

Beforehand, maybe 1 in 4 layouts would grow to maturity the way they were originally envisioned. Now that success ratio is 4 for 4.

Some Mistakes I may have made:

1. I believe I may have trimmed the Riccia too early - it appears to be doing some pretty weird things in terms of growth. Lots of splitting and rather than being straight up, it has bend and curves to it.

Either way, I'm on a quest to obtain Riccia from Japan, this type grows profoundly differently than the type we have in America

2. Adding the Microsword originally was a mistake. One of the reasons for that is it meant I had 6 plant varieties, instead of 5. Always stick to odd numbers.

3. I dosed Penac W directly, rather than pre-mixing it in a small cup, so I got some Penac white powder stuck in the substrate on the front glass. A noob mistake that I had already learned once and promptly ignored.

The routine now is 2 squirts Brighty K, 1 Squirt Green Brighty Step 1, 1 squirt Green Brighty Special Lights, 6 drops Green Bacter after water change.

Once a week water changes now.

The Method - Principle One

Malthusian ***Organisms***

Since I've got some time in my schedule right now, I figure this is a good time to go in depth a little into the Principles of The Method.

Let's start at Principle One. *All organisms are Malthusian in nature.* They will grow and invade to the very limits their environment will permit them.

Unlocking the understanding to this method is key for your success.

What is Malthusian? Malthusian means that a population will expand to the very limits that it's environment will allow it.

Let's dial back the clock to a high school biology experiment (you probably came across this during the section on genetics due to their fast rate of duplication) for illustration:

Fruit Fly eggs are placed in a vial with about half the container filled with food.

The initial eggs will hatch in the land of plenty and immediately begin to reproduce in their new environment.

Each female will choose a mate, lay eggs and the second generation is born. Then the second generation will repeat the pattern and produce the third generation, (likely with mixing of generations, but let's keep it simple) and so on and so forth.

Now, as generations are produced, the food supply begins to go from bountiful to steadily declining as the higher and higher rate of population begins to inhabit the same space and same declining food source.
There are a few distinct points here in population relative to resources (food), space is nearly irrelevant:

1. Too Much Food, Too Few Flies

2. Food Source Availability = Fruit Fly Population (balanced, sustainable as long as the rate of death = rate of birth *and* the supply of food is maintained at this same level).

3. Too Little Food, Too Many Flies = the population begins massive die off, food source begins a rapid decline.

4. No Food, Too many flies = the food resource has been rapidly depleted, leaving an over abundance of flies, which now feast on their dead brethren to attempt to live.

5. The ecosystem has collapsed and all of the fruit flies are dead. Apocalypse.

What this means is, organisms will continue their bid for survival as long as possible, using up as much resource as possible, and can only sustain their growth to the extent to which available resources (food, nutrients, etc) equals sustainable population.Let's apply this to the planted aquarium:

Micro-organisms: Micro organisms will grow, such as those bacteria necessary for the Nitrogen Cycle, to the extent to which Ammonia is available, then Nitrite, and so on.

This also applies to other beneficial bacteria which feed on other by-processes of plant and animal waste products, so on and so forth.

Bacteria act as the purifying agent for the aquarium, it is their primary role to take toxic substances and turn them into live-able waste (of bacteria) products, which are then fed on by other bacteria or plants, etc.

When Bacteria rapidly expand to the maximum limits of the environment, they take up all of the excess available, and will grow to approximately that level.

So an aquarium with aqua soil leaching ammonia, will have an inherently higher level of nitrogen cycle bacteria than another aquarium without aqua soil.

Algae: Algae tend to grow most prolifically in the presence of Ammonium in the water (which is a reason to want to cycle your aquarium as quickly as humanly possible), they also occur when imbalances occur.

For example, BBA will appear when there is a lack of Co2 and an abundance of other nutrients, which the plants cannot grow to support without the proper level of Co2. (Principle #2 is the Law of Minimums, so if there is a lack of Co2 and an abundance of fertilizers, it paves the way for nuisances like BBA, because all available Co2 is used, and there is an excess of other nutrients which are not being used by plants or micro-organisms).

Why Principle #1 is important to algae growth

Algae is like the fruit fly. They are relatively simple organisms and occupy a space on the evolutionary tree somewhere between super-simple micro-organisms and complex plants.

Algae also replicates quickly, invasively, and aggressively.

A small amount of algae on day one, if left alone, could be a massive outbreak by day 3.

Immediate action is required to eliminate these pests before they become huge problems.

This is huge, because **The number one reason why people give up, is because of too much algae**.

Plants as the example:

The best plants for aquascaping tend to be aquatic weeds. These guys can be pretty invasive and they will strive to cover as much ground, as quickly as possible over all the other competition.

A plant will grow and grow and grow and grow until it cannot grow anymore, even past the point of "healthy" growth, it'll continue to live on with half-dead growth going forward.

Let's evaluate Hair Grass:

spreads via runners and heavy root systems which expand out in straight lines across the substrate. The runners pop up as many hair grass nodes as possible and just keep going before filling in totally.

Hair grasses' strategy for choking out other plants is to have a root system so thick that nothing else can really compete on a root-level for nutrient uptake.

Let's evaluate Glossostigma

Glosso takes a similar approach, it will go up, of course, but it also tries to cover as much ground as possible via runners that go straight out from it's nodes.

Glosso's invasive strategy is to just cover real estate as quickly as possible, and will do so even if it's growing in relatively thinly across the substrate. It'll then double back and start filling in from other runners going in opposite directions. Glosso mainly tries to uptake Co2 and "block" other plants via lots of thin growth in real estate.

Hemianthus Callicthroides:

HC on the other hand, grows in "zig-zags," it too, tries to cover as much real estate as possible, as quickly as possible, but rather than go wide and thin as quickly as possible, it "mounds" in one spot as quickly as possible while sending out runners that expand the territory inch by inch, which then mound and repeat the pattern.

HC will completely block the growth of other plants by simply making an impenetrable mound fortress. As an experiment, try placing a few sprigs of hair grass in the middle of a mound of HC, and another sprig away from the mound.

The hairgrass away from the mound will spread quickly, while the hairgrass in the mound will slowly die or just stay steady with it's few nodes.

Marsilea Minuta

Marsilea is probably the most vulnerable carpet out of the ones listed here.

It will grow out in really really really straight lines across the substrate, unlike glosso it doesn't have a huge tendency to eventually double back. So it just keeps going straight out in one direction. This is a plant that when you start with this and another type you need to just plant a ratio of like 10 to 1 marsilea to other.

Riccia

Riccia doesn't spread by roots - so it's strategy for take over is to completely and utterly grow as quickly as humanly possible and 'detach,' and populate as many other areas in the aquarium as possible.

It's strategy for winning the nutrient war is pure volume intake of nutrients and, when floating, to block out the light resources of the other plants.

Consequently, because it has no roots, other plants, which grow in with Riccia have a much better chance of survival and rapid growth than others.

These are just a few examples of the Malthusian nature of all of the organisms in the planted aquarium.

Just a quick picture update today. The aquarium is much closer to balance now and I'm at two squirts green brighty step one and special lights, 3 brighty k.

Not much work to do anymore, will prune some Friday on the first water change of the week.

The Method - Principle Two

The Law of Minimums

All Organisms in the aquarium operate by the laws of minimums

In other words:

Bacteria will only grow to the available 1.) space 2.) food source 3.) molecules (oxygen, etc) necessary for survival.

Plants will only grow to the available 1.) space 2.) nutrients (N,P,K, micro nutrients) 3.) Carbon 4.) Light

Shrimp & Fish will only populate and survive to the available 1.) space 2.) food source 3.) molecules (oxygen, etc) necessary for survival

In order for all organisms to grow healthy and steadily, all of the proper elements must be in place for them to thrive.

So, let's take for example, bacteria:

If you have 1 unit of space, 0 food and 1 oxygen, then 0 bacteria are going to grow.

For plants, if you have 1 Nitrogen, 1 Phosphorus 1 Potassium, 1 of each Micro Nutrient, but 0 carbon, you're going to have 0 growth.

So on and so forth.

Now, these formulations aren't even like this. The reality is you might need 4 Potassium, 4 Carbon, 2 Micro, 3 Phosphorus and 2 Nitrogen and that = one unit of growth.

But for simplification, let's assume the 1 ratio.

Where does Algae Come into Play?

Algae comes into play when there is an excess of one unit, and a lack of another, or in other words, when there is inconsistency.

The most notable time table for the appearance of algae is an excess of NH4 (ammonium). This coincides with the initial setup of the aquarium when:

The Bacteria filter is not yet established.

The plants are adjusting to their new environment and are not uptaking as much

ammonium/ammonia as they will otherwise (a nitrogen source).

Understanding those few sentences, means you understand why initially we do so many water changes for success, and why later you don't have to do nearly as much.

More application, Bacteria:

Bacteria will grow to the extent to which **oxygen** (for most beneficial bacteria types, we're speaking in broad strokes here), and **food source** (nitrogen, acids, ammonia, nitrite, etcs, some beneficial bacteria even eat carbon sources) are available.

The most overlooked portion of that, is two fold: space and food for non-nitrogen fixing bacteria.

First, space:

You want to invest as much as humanly possible in highly porous material for microscopic surface area for bacteria to infest. This is why eventually in the filter we switch to 100% Bio Rio and why we use power sand. This means we have one biological filter in the filter where water flows through and one at the root system of the plants (helping the plants synergistically).

This also acts as a back-up system in case one biological filter fails for one reason or another.

Redundancy = Stability = Less / No Algae

Two: Food

Most people focus exclusively on nitrifying bacteria. This is for good enough reason, as these bacteria are the most readily "seen," as for their effects. Not having them = fish death.

However, there are hundreds of different bacterium which perform hundreds of different tasks. These bacteria inhabit bio media, roots, plant leaves, live within plants, within fish, they're literally **everywhere!** The health of these bacterium, is directly proportionate to the health of your ecosystem!

This is why the successful aquascaper will focus on making sure they have as bountiful a food supply as the plants themselves.

In General, Bacteria are: water purifiers, filters, and organisms which convert toxic or negative elements into positive, useful elements for plants and fish.

I'll repeat, when there is an excess of one resource and a lack of another, this creates imbalance as the organisms only grow to the extent of the lowest common denominator. This means your aquarium is out of balance.

Excess = Out of Balance = Algae, which are **Malthusian** organisms, **opportunistic bastards** and will take advantage of this gap and spread quickly and virally when given an opportunity.

Balance = Health = Growth = Stability = Low Maintenance

The most vulnerable time for our aquarium is on set up. This is when things are getting adjusted, established and gearing up. Doing water changes more frequently up front, saves you from disaster.

The difference between disaster and success at the end of the first month is understanding Principles 1 & 2 and acting accordingly.

If you're unsuccessful after the first month, you'll spend the next six months playing catch up.

I didn't do a water change this weekend since I forgot to bring home RODI water and refuse to contaminate with tap.

In short this is an excuse, don't do this.

But the tank will be just fine until Monday, the tank id more or less in stability now and there's only easy algae present. If I get lucky, fish will be added this week.

I did, however trim the riccia down to keep it in check with the rest of the scape as well as a few non-perfect blades of tennellus and it's runners.

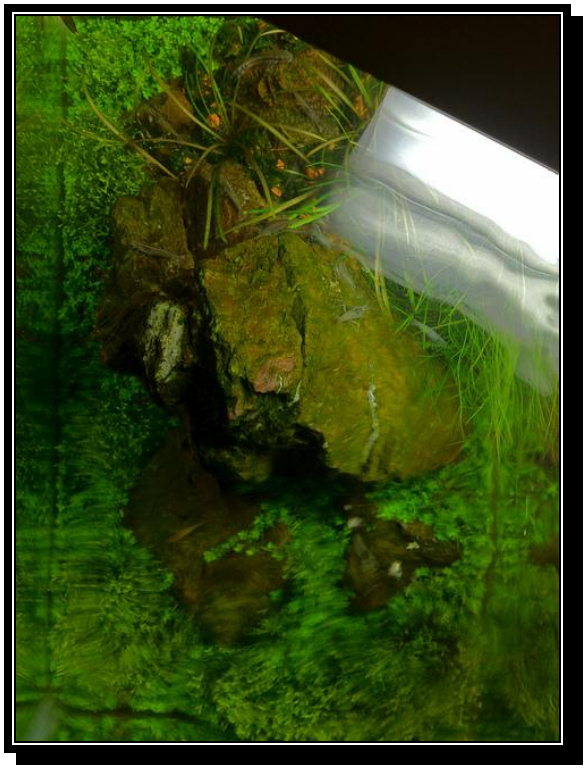
Also, added two more tiny stones of riccia to round out a few spots that need more texture.

Week 4 is over! Just need the miss to catch up and the vision is getting closer to the final picture.

You can judge the remarkable difference by comparing to the last photo set what a little maintenance will do:

Just some more photos of the tank, I wish there was something more exciting to report. Some kind of algae to fight back or some element out of whack.

Birds eye views:



Classic angle:

Fun close up:

The Method - Principle Three

Principle Three: Everything is Cyclical

Everything is cyclical. In the planted aquarium, little goes to waste. As molecules, nutrients and even 'toxins,' enter the environment, these elements are converted by the various bacteria, plants and animals into usable material.

Two Easy Examples:

1.) Toxic (to animals) ammonia is taken in by bacteria, which then convert the toxic ammonia into slightly less toxic Nitrite. Then another type of bacteria converts this Nitrite into Nitrate, which is safe for animals. Another avenue is the plants themselves uptake this ammonia and use it for growth - as a nitrogen source. The plants 'filter' out this toxic environment and make it live-able to animals.

This very process makes life possible in the aquarium. Without the nitrifying bacteria, animal life cannot live long term. The animals will literally kill themselves as when they intake food they produce ammonia.

2.) Plant cells absorb Co2 and through photosynthesis produce oxygen. This oxygen is then usable by bacteria and animals to breath. Through Cellular Respiration at night, plants take in oxygen and produce Co2. Additional oxygen at night, which can enter the system either through surface disruption (lifted lily pipe) or air stone, is greatly beneficial to the growth and wellness of plants.

Source(s) of:

Ammonia: decomposing organic matter (soil, fish waste, rotting leaves, etc)

Oxygen & Co2: absorbed into water via contact/mixing with air, cellular respiration (co2 producing, oxygen intake) of plants, fish, etc. Oxygen through Photosynthesis (co2 intake) and surface disruption.

Oxygen used by: bacteria, fish, plants, shrimp, etc.
Co2 used by: plants primarily

Light energy, nutrients, gasses (co2, oxygen), trace minerals, molecules (ammonia, etc) are all taken in by plants. It's best to imagine plants as a factory which takes in these raw materials, and then out puts a product: in this case, more plant matter, which is an embodiment of energy in the aquarium. It's stored energy that's used to 1.) Grow more plants, 2.) filter more water and remove toxins, making the environment more suitable for life.

Bacteria, in basic terms, convert an even more -raw- source of energy: normally unusable elements like Ammonia, or Nitrites, etc to perform still even more layers of filtering power to the ecosystem. Other types of bacteria even break down waste components (soil sediments, solid wastes, etc) and "purify" these elements out of the system. In modern day sewage treatment plants - one stage of turning raw sewage into useable, clean water, is a bacterial filter which literally moves the sewage up and down until it breaks down.

Fish take in food, remove pests (such as various water insects / pests that eat plants), and by processing these elements into waste, the plants and bacteria then feed off them as a source of phosphorus, this is a vital component of aquarium balance!

Shrimp such as Amano's, and fish such as otocinclus cats also eliminate "pest" algae

which infest plants and "choke out" their growth through invasion of the system. They act as a barometer of control over algae to keep it in check, which keeps the system healthy by way of keeping the plants healthy. Amano shrimp especially, also act as "filters," by removing and eating dead animals, which as they decompose after death release ammonia into the system. Then these algae eating, animal decomposing critters digest and produce waste, they provide a source of food for the plants.

Algae is the result of imbalance. Algae is nature's control factor for uptaking left over elements that go unused by other organisms.

Refer to Principle #2 Law of Minimums and Principle #1, Malthusian Organisms.

See, because plants, bacteria, fish etc only intake the exact amount of nutrients, light, co2, etc components which they need to grow to the least common denominator (example 2 light, 1 co2 2 Micro nutrient, 2 macro nutrient, = growth only to one).

In the last example, we would have 1 left over light, 1 left over micro nutrient, 1 left over macro nutrient. This leads to excess in the system.

This excess has to be **taken in** by something. Algae is what results. They use all the left-overs and infest the system based on 'whats left over.'

They're kind of like pigeons or rats in NYC, which thrive on the left-over food and trash of human occupation on Manhatten.

This is why, in the popular E.I. Method, the simplest technique is to over dose everything as much as possible, and use **Co2 as the barometer for growth**. In that dosing method, the underlying philosophy is that it's simpler to control only one element: Co2, than it is to precisely balance all the other elements.

A more advanced approach is to incrementally bump up each individual factor based on feel and observation; which requires a bit of experience with knowing how things grow and knowing when to up things at what time as it's not approximate.

This is also why when you overfeed the fish, algae appears.

You must feed enough to have happy and healthy fish, but not so much that there's excess and left over, which will contribute to algae.

Conclusion:

You should be seeing patterns here now: behavior of organisms and growth with Principles #1 and #2, and the nature of the ecosystem (Principle 3, cyclical) and how this puzzle fits together.

In theory it would be possible to make something self sustaining, but not to the scale in which even the largest aquariums are, primarily because of Principle 4, as well as to grow plants to the extent to which we want them to be grown (and not just scraggly things growing randomly), we have to supplement with nutrients (which are not naturally available in the environment, except with what aqua soil and root tabs provides) and Co2 (which would require much more ground water and surface exposure to air to get suitable levels in the aquarium to grow like we do as quickly as we do).

Self-sustainability 100% is not possible. We must renew water, nutrients, etc. over time. Now, we can, however, get very close to self-sustainability by applying these principles and giving a little extra work up front to **achieve balance.** Once balance is achieved, you are at about 80% self-sustainability.

Week 4/5 Celebration Video Coverage! The Beauty of Riccia Fluitans!

I have a treat for you guys today. To celebrate Week 4, I took some video from the phone for you to enjoy the layout a little more real than just photographic.

There's even a better step you can take to really enjoy the progress this tank has made along with me; if I could, I'd love to invite you into my home to enjoy it for yourself. Unless you're in the Houston area, the best I can do is share video and photographs with you.

Week One - Initial Set Up Week One - Close Ups Week Four - The Full Tank Video

Because the pictures are hard to see the true beauty of Riccia Fluitans, I wanted to make a close up video of a piece of what is seen in person,

This Video Shows the Beauty of Riccia Fluitans

I'd like to encourage everyone to give that plant a try!

And for some photos:

What I'd like you to notice here is that there is no surface film since the last water change. This is a sign of the aquarium leveling out and progressing into balance.

You'll remember that the progress of this tank has had surface film form the very next day after water changes during this establishment period. To the point where a paper towel was deployed to remove the film!

Now a point has been reached where this film is not occuring, and is a sign that everything is going well - no decomposing, excellent oxygen / co2 exchange and healthy organisms.

This layout is at a point of absolute enjoyment: the kind where you sit back and relax and know everything is going right. The maculatus are super reddening up off of AP-1 Gold, and have already recognized me as the feeder.

Death Record: 0
BPS: 1.5
Fertilizers: Step 1 x2 & Lights x1 + brighty k x4

Having a layout put together like this one where all the elements are healthy like this makes all the learning pain and suffering worth it.

On that end, this may be my last photo of the tank as I believe i may throw my hat into the International Aquatic Plant Layout Contest. 40 days left for this layout to mature for competition.

Final Photo

Plantednanotanks.com gives much thanks to Frank Wazeter for his generous contribution to the hobby. Hope you enjoyed reading this eBook. The original post can be viewed HERE.