

What you need to know about...

Estimative Index plant feeding



John Whelan, of Aquarium Plant Food UK, explains the origins, benefits and daily usage of a technique that changed the face of aquascaping. He answers some of your questions too...

We can only estimate plant feeding as we cannot test for all the varying nutrients in aquaria.

However we can use a formula to calculate the amount needed by basing our levels according to an experiment conducted by EI inventor Tom Barr. His experiment, and the dosage rates he ascertained from it, can be scaled up or down to suit any size tank.

That's the 'Estimative' part of the EI process.

An index is a point of reference we use to guide us in determining the amount of nutrition needed to reproduce his results.

Tom used a set of conditions and plants to test a new formula for growth. His results, for 'maximum growth conditions,' are now used to determine the amount of each macro and micro fertiliser needed for the best results to boost plants.

That's where the 'index' comes in.

We call the technique the Estimative Index because we only work from this position as a starting point.

This is the ratio of nutrients we would use as standard, but because

all tanks are different, any variations will affect the results and are not set in stone.

Typical EI values, as standard, are: nitrate (NO_3) 20ppm (parts per million) per week; potassium (K) 30ppm per week; phosphate (PO_4) 3ppm per week; magnesium (Mg) 10ppm per week and iron (Fe) 0.5ppm per week

■ What do I need to start EI feeding plants?

To start EI, there are three essential parts: macro-nutrients, micro-nutrients and dosing equipment.

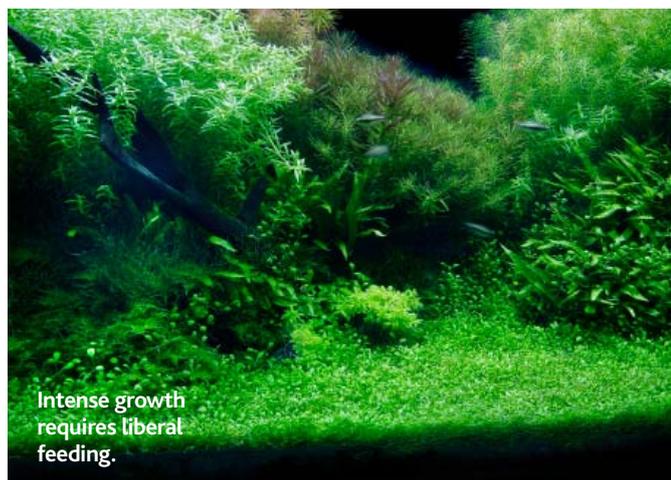
Macro-nutrients are potassium nitrate, potassium phosphate and magnesium sulphate

Micro-nutrients comprise chelated trace elements, made up of copper (Cu), iron (Fe), manganese (Mn), molybdenum (Mo) and zinc (Zn).

Chelation is a way of keeping the micro-nutrients in solution and available to the plants that need them, instead of combining with other chemicals in the tank and becoming unavailable.

The dosing equipment would comprise bottles, measuring spoons and syringes.

Carbon dioxide and EI make great partners.



Intense growth requires liberal feeding.

■ Is it good for all tanks, or is EI unsuitable for some?

EI dosing is best suited for a high-tech, high energy aquaria with CO_2 injection, strong lighting and good flow from the filter.

Plants given a source of CO_2 require more nutrition than tanks that don't have one and this is where EI comes into its own. We can add as much as the plants need and it's easy to increase dosage as plant mass increases with growth.

EI dosing in a low-tech moss tank, for example with no CO_2 and low lighting levels, is still possible with non- CO_2 tanks in general, but the amounts added are a fraction of what's required by gas-injected tanks.

However, other all-in-one plant fertilisers that offer low dosage of nutrients would be better in this kind of situation.

■ Is CO_2 essential when using EI?

It's hugely beneficial that EI dosing is used when using CO_2 at a stable 30ppm through the photoperiod.

As stated, gas-fed plants consume greater nutrition than non-gas injected plants and, without a supplementary food source, plants can soon starve.

However, if you do not have pressurised CO_2 then liquid carbon, such as EasyCarbo, can be used instead, but the level of EI dosing, not the level of concentration, should be cut by 50%.

■ Are there any risks to fish from using it?

No studies reveal any long-term effects. Many in the aquascaping community use this method, and, to my knowledge, none have reported EI-related livestock deaths. As EI aims for nitrate levels of between 20-30ppm and



PFK writer Nathan Hill's own attempts with EI have yielded good results.

PHOTOGRAPHY: NEIL HEPWORTH

phosphate of 1-2ppm, there's very little risk to your fish.

■ **Can EI foods promote algae?**

This is a misconception. Poor application of CO₂ is the prime culprit, followed closely by insufficient amount of nutrients, rather than a surplus.

Poor plant health promotes algae and lack of nutrition promotes poor plant health. It's an easily fixed vicious circle.

■ **Is EI feeding complete for all plants, or might some need anything else?**

Plants need clean water, free of the organic wastes they produce as a direct result of their increased growth rates.

If using RO water you need a carbonate source added too, enough to maintain a KH of at least 2-4°, KH, and enough calcium

and magnesium to have a GH of at least 3-4° DH. EI itself does not contain these elements but they are easily replaced in RO with re-mineral powders.

■ **Can I dose macro and micro mixes on the same day?**

No, the iron (Fe) in the chelated trace and the phosphate in potassium phosphate (KH₂PO₄) tend to react with each other, especially at higher pH levels.

This can render these ingredients unavailable to the plants as they combine to form iron phosphate.

There are arguments for and against EI methods, and some keepers will still prefer weekly dosage chemicals over the daily regime. Results can be slower, but easier for the aquascaper who doesn't have time to spare on frequent tweaks.



■ Why do I need to perform a weekly 50% water change?

As a plant's growth rate increases it also produces more organic waste and a large water change will help remove and dilute the most of it. In turn, this will also reduce the risk of any algae blooms forming.

■ Can I dry dose the EI fertiliser?

Absolutely — and if you have a very large tank, directly dosing teaspoons of dry salts daily can be easier than making a solution.

There are plenty of calculators available online to help you fine tune the amounts and most shops selling EI fertilisers can also help in this respect.

■ I already have nitrates and phosphates in my water, so can I still dose EI?

Yes, because of the need for nutrient levels to be non-limiting it doesn't matter what the initial levels of nutrients might be.

We know that by adding the correct level of EI nutrients we will have enough for our needs and it doesn't matter if we have an excess.

■ I use UV and carbon in my filter, so can I still dose EI?

There's no evidence that either UV or carbon will interfere with the fertiliser. Even if they take some out of the water column, we are dosing to an excess, so there should be no issues.

■ When making EI, should my teaspoons be heaped or level?

It doesn't make that much difference, as long as you fill to the same measurement each time you make them up.

■ How does EI compare to traditional liquid foods for ongoing costs and how much EI will one kit produce?

Using EI salts is very cost effective. A 500ml bottle of EI fertiliser, once made up, costs around £1.20.

Compared to more than £10 for a 500ml bottle of a pre-made liquid fertiliser, yearly savings are enormous. Our own kit provides enough dry salt to make up some 16 bottles before replacements are needed.

Some parts of the kit last longer than others. Magnesium sulphate will make 16 500ml bottles where there are enough chelated trace elements to make 45 500ml bottles over the same period. In many cases, one kit will easily last one year.



Riccia loves a high nutrient aquarium.

Step-by-step guide to making your own EI mix

1 Measure out four teaspoons of potassium nitrate, one teaspoon of potassium phosphate, and six teaspoons of magnesium sulphate.

Add these to your 'macro' dosing bottle, avoiding spillage.

If you have a funnel it will prove useful with this task.

2 Add 500ml of water to the bottle and using it boiled and cooled will kill any bacteria, avoiding mould blooms.

However, don't be tempted to

use freshly boiled or still hot water as this will adversely affect the results.

3 Shake well and leave overnight to make sure all the salts have fully dissolved. You may need to shake the bottle a couple of times over this period to avoid settlement.

4 Measure out one teaspoon of chelated trace elements and add these to a separate 'micro' dosing bottle. Do not mix

the macro and micro-nutrients in the same bottle.

5 Add 500ml of water to the bottle, using it boiled and cooled. It's worth marking the two bottles at this point so that you know which is which.

6 Shake well and leave overnight to make sure all the salts have fully dissolved. Note that the trace elements are slightly discolouring in the bottle. This is normal.



An EI kit.

Dosing EI

Offer the macronutrients three times a week at a rate of 10ml per 50L/11 gal of aquarium water.

Dose the micronutrients three times a week — also at 10ml per 50L/11 gal of aquarium water.

Don't dose the different bottles on the same day, as this can lead to some ingredients locking up. Offer micro one day and macro the next.

Perform a 50% water change on the tank each week during the dosing.