

## Too Little Phosphate

**It's possible to have insufficient amounts in the tank water for plants, but very unlikely.**

*By Karen Randall*

Q. I am having some problems with my aquatic plants that I can't figure out, but wonder if it has something to do with a lack of phosphorus. They are in a 32-gallon aquarium I set up seven weeks ago. Three aquatic plants — *Eusteralis stellata*, *Rotala wallichii* and *Ludwigia arcuata* — are not growing well. The newer leaves are coming in increasingly smaller, and the tops of the stems are dying.

I had this problem before with the *Eusteralis* in another aquarium, with the new stems growing from the sides of the dying tops. Some leaf edges roll up into the leaf, and in extreme cases they create a tube out of the entire leaf. The *Ludwigia arcuata* has twisted smaller leaves on the top. The other aquatic plants in the aquarium are growing without problems — *E. schlueteri*, *Didiplis diandra*, *Rotala macrandra*, *Glossostigma*, *Echinodorus tenellus*, *Limnophila aquatica*, *Lilaeopsis* (New Zealand grass), *Micranthemum micranthemoides*, *M. umbrosum*, *Nesaea* sp., *N. crassicaulis*, *Ammannia senegalensis*, hairgrass and *Barclaya longifolia*.

There is sufficient carbon dioxide, good light, a reasonable fish load and I feed modestly. The substrate has very little peat, and I add Tetra cryptotabs, NPK fertilizer (just a bit) and Ferrotabs. Water changes are done every four or five days — 5 to 15 percent — with Tropica Master Grow or Duplplant 24. The temperature is always 75 degrees Fahrenheit, pH is 7.0, KH is 10, GH is 12 and nitrate is about 10 parts per million or less. The aquarium lights are on for 13 hours a day, with a 1½-hour interruption at midday.

As a result of the problems noted above, I have used several other fertilizers, which has brought improvement (especially to the *Eusteralis*), but not a complete cure. What could be wrong?

The authors of one aquatic plant book noted that when the phosphate level went from 0.7 to 0.1 the leaves wrapped as mine are doing. Perhaps, despite the 20 freshwater fish in the planted aquarium, the phosphate, ammonium, calcium and so on are now minimal.

A. I would be extremely surprised if your problem is a macronutrient (NPK) deficiency, for a couple of reasons. First, aquatic plants are very good at scavenging even minute quantities of these minerals from the environment, and with freshwater fish in the planted aquarium that are being fed regularly, there is usually plenty of nitrogen (N) and phosphorus (P) available. Under certain circumstances, an aquarium can become potassium (K) deficient if you are depending only on fish wastes for aquatic plant nutrition. But most good aquatic plant fertilizers contain potassium for exactly this reason. The products you are using should supply this mineral adequately.

The clue that makes me most sure that phosphate deficiency is not the problem here is that with this nutrient you should see problems first in older foliage rather than the growth shoots. This sounds very similar to a problem I had earlier this year. I was pretty sure in my case that it was not a deficiency I was seeing, but a toxicity problem. I had set the planted aquarium up with quite a rich soil-based substrate. Some of the plants, *Echinodorus* spp. in particular, did very well right from the beginning. The stem plants took a serious hit. It took several months, some big water changes and a long session of gravel vacuuming large sections of the substrate (concentrating on the areas around the aquatic plants most affected) before things turned around.

This is one of the things that makes tracking down specific problems so difficult. Sometimes we are seeing deficiencies, sometimes we are seeing toxicity, and, sometimes, an overabundance of one mineral can block the uptake of others.

Troubleshooting problems like this can be trying. If some of the plants are showing good, normal growth (as most of yours seem to be), I suspect it is not a nutrient deficiency, but some specific conditions that bother one (or a few) particular species. We sometimes forget that our goal in a planted aquarium is usually to maintain conditions that will support as many species as possible. The fact is, however, that all species of plants do not have exactly the same requirements. We have to accept that we will not always be able to grow every type of aquatic plant in the same planted aquarium, just as we choose fish for a community aquarium based on similar environmental requirements.

If you really want to grow the aquatic plants you are having trouble with, I would isolate them in another aquarium and work on providing for just their needs. When you have learned what — with your specific

water conditions — you need to do to grow those species, you can plan a plant community around them. In all probability, though, you will find that there are other species that will not thrive under this new set of conditions.