

# Growing Phytoplankton

By Erik Stenn President, AlgaGen LLC

Greetings. I am not sure how many people grow their own Phyto, have ever tried, or are even interested, but this might be useful information to some so I am going to attempt to lay out a basic approach. I have been involved with marine microalgae for 20 years, have cultured it in 1mL to 1 million liter systems and still find it interesting. Often when talking about culturing microalgae the phrase “It is not rocket science.” comes up; I have worked with rocket scientists who could not culture microalgae to save their lives.

## Equipment:

Lighting (4 ft florescent, cool white bulbs)  
Shelving  
Clear containers  
Air pump, gang valve(s)  
Rigid and flex air line  
Chlorine, sodium thiosulfate, Chlorine test kit  
Nutrient solution  
Clean microalgae starter

## Set-up:

There are many variations but my set-up is as follows. The florescent light should be mounted horizontally on the wall and a shelf placed in front. I prefer 4” shelving because this allows one to move a culture either closer or farther away from the light to vary intensity. Select a clear container, I like the Rubbermaid 2L PET clear containers, some people use coke bottles and line them with plastic bags; industry standard are the 5 gallon water carboys. Regardless, a top should be used and if solid, drilled to accept the rigid air rod (the rod should reach the bottom of the container). The hole should be oversized to let air out. Set up the air pump with gang valves and flex line that attaches to the air rod, which gets inserted into the container. Lights can run 24hrs. Temperature should remain constant ...18-25C depending on species.

I always clean new materials with acid to remove any residue...translated, soak in vinegar or a mild muriatic acid solution (10%) then rinse.

## Inoculation:

If you are using natural ocean water it has to be treated with chlorine overnight before use. I would fill each container 75% full, add the bleach and let it sit. The next day de-chlorinate with the sodium thiosulfate, aerate for a few minutes, and test to see if any chlorine remains. This is critical. Over the years I have...hmmm...seen many cultures lost due to the presence of chlorine. If you are using artificial sea water then this may not be necessary.

The water has tested clear of chlorine, the air is on (moderate boil), now add the nutrient media to the containers. There are a number of off-the-shelf media and many of them

vary in quality. We have had good results working with the Fritz product but usually make our own. Let the nutrient mix for a few minutes, turn down the air to a lite bubbling and add the starter culture. Many species of microalgae are initially sensitive to strong light so we recommend backing the cultures away from the light and even turning off one bulb for 1 day. Again this depends on the density of the starter and the amount of algae used to inoculate the container(s). Industry standard inoculation is done by volume in 1:10. If the starter inoc is dark this may be more than sufficient. If it is lite then you may want to add more until you reach a lite tea color. Using a single species starter is important. Many people will try to culture from a blend. In this case the more aggressive species will eventually dominate and overall growth will not reach its full potential. It is very important to obtain a clean, uni-algal starter, this will increase the chances of success substantially.

A note on strains..there are many. Nannochloropsis is a favorite, it is tough and has a fatty acid called EPA. There are other more nutritious species often preferred in aquaculture such as T.iso, Pavlova, Rhodomonas, Chaetoceros, Thalassiosira sp, etc. T.iso for instance has a fatty acid called DHA which is critical for the proper development of many marine organisms. The DHA fatty acid has been correlated with enhanced brain development in human infants and is now an additive to many infant formulas. Regardless, the proper development of many marine organisms relies on a proper ratio of DHA:EPA, where some organisms can synthesize EPA from DHA but not the other way around. Not all phytoplankton are nutritionally equivalent.

### **Harvest:**

Algae like fruit or vegetables have growth cycles and reach points in their growth where they are highest in nutrition. Typically, for microalgae, this is when they are healthiest and growing fast in exponential growth. There are many different species with varying growth cycles but a gross generalization would be to harvest between 3-5 days after inoculation. Again this varies depending on species and environment. Harvesting is simply pouring off 50-75% of the culture and then refilling it with fresh media. If clean technique is used the culture may last months before getting contaminated or crashing.