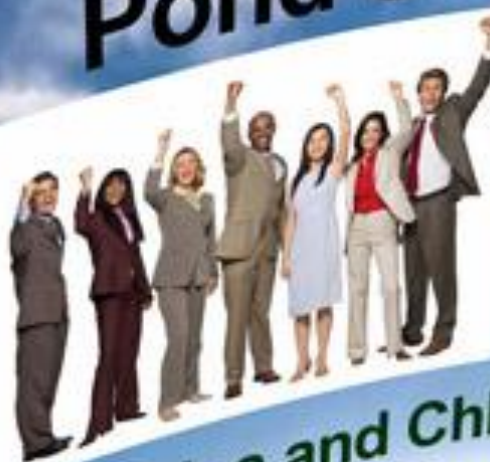


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Eat Right, Live Long

# The Power of Pond Scum



The Prevention  
and Cure of  
Cancer Using

## Spirulina and Chlorella

By David Sieg

BY DAVID SIEG

Spirulina and Chlorella

## **The Disclaimers, Legal Stuff and Butt-Covering Section:**

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## About the Authors



**David Sieg**, and Tram Nguyen are teachers, writers, consultants and information entrepreneurs specializing in publishing hard to find, usable information on a variety of subjects. They are the writers and author of the hugely popular Series “Down and Dirty Guides to...” Covering all aspects of biodiesel, biofuels, and alternative energy. He is also the Managing Director of International Biofuel Solutions, LTD. Thailand and President of Information Specialists, Corp., USA He lives in Des Moines, Iowa USA with his wife, Tram and Son, Lennon.

These guides were written with the intent of providing “Down and Dirty” realistic, no BS, info on all aspects of the algae process. If you liked this EBook, we’d like to hear about it.

If you didn’t like it, **WE’D REALLY LIKE TO HEAR ABOUT IT.** Your comments will help make future editions of this eBook even better. Don’t hesitate to sound off.

Send all comments, complaints, criticisms, and compliments to [dsieg@spirulina-benefits.com](mailto:dsieg@spirulina-benefits.com)

### Other Books by This Author:

- [Making Algae Biodiesel at Home](#)™ (New 2010 Edition coming Dec. 2009)
- [Making Algae Photo Bioreactors at Home](#)™
- [The Encyclopedia of Making Biodiesel at home](#)
- [Biodiesel Recipes](#)
- [Biodiesel Processors](#)
- [Washing and Quality Testing Biodiesel](#)

## **Dedication:**

**To Damien. Thanks for showing me the way back home.**

## **Acknowledgements**

I'd like to thank the following people:

Howard Bankston for an outside opinion on the manuscript I wouldn't have gotten otherwise.  
Thanks as always.

Mike Adams and his book "Superfoods for Optimum Health: Chlorella and Spirulina" (<http://www.truthpublishing.com>)

Robert Henrikson, and his book "Earthfood Spirulina" (<http://www.spirulinasource.com>)

Donald R. Yance and his book "Herbal Medicine, Healing & Cancer"

Paul Pitchford and his book "Healing With Whole Foods"

Earl Mindell and his book "Vitamin Bible"

My steady, long term, (and new) customers. As always, I greatly appreciate your encouragement and comments. Every single email I try to answer personally. (The exception is people with an ax to grind) And I get a lot of email. I enjoy hearing from all of you. Please keep the comments coming. ([dsieg@spirulina-benefits.com](mailto:dsieg@spirulina-benefits.com)) You don't know how much all the comments help create a better source of learning for everyone.

Lastly, my wife Tram and my son Lennon. As I've said before, a simple thank you seems so inadequate.

## Introduction

People start talking about algae and bioreactors and one of two things happen...either their eyes glaze over with boredom or they look at you like you've been spending WAY too much time alone.

This is a shame because algae, specifically Spirulina and chlorella, have the potential of changing the world as we know it. The list of abilities that this single celled organism has shown is truly incredible. For example...

- Health food supplements
- Biofuels
- Organic fertilizer
- Amino acid feed
- Bio cosmetics
- Bio plastics
- Nutraceuticals

That's just a taste of what these Spirulina and chlorella really have to offer. These foods are so packed with healing properties that if pharmaceutical companies could patent them and sell them as drugs, they would cost \$100 a gram and be front page news all over the world. Their ability to halt cancers would be heralded as a "medical breakthrough" and doctors everywhere would be urged to prescribe these substances to every one of their patients. It would be nothing less than a blockbuster, multi billion dollar pharmaceutical achievement.

But it isn't a drug, it isn't manufactured in a drug lab, and it doesn't cost \$100 a gram. In fact, it costs around 11 cents a gram from the sources I mention in this report, and nature makes it for free.

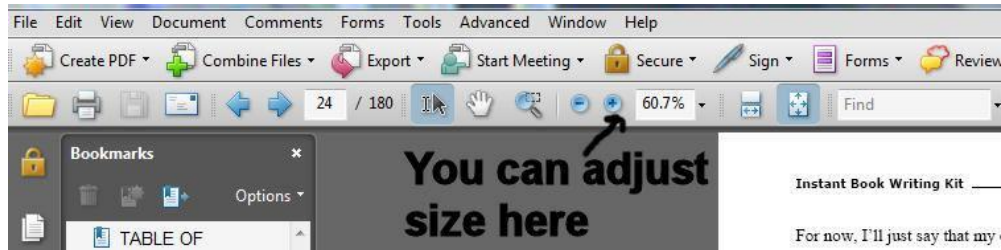
Since it can be made for free, and since it is so cheap to make, you won't find drug companies rushing to endorse this, doctors won't be lining up to extol the virtues of Spirulina and chlorella. In fact, with very little capital, enough algae foodstuffs could be made to eradicate hunger world-wide.

It is my humble hope that I can do what I can to promote this lowly organism for the good of the planet.

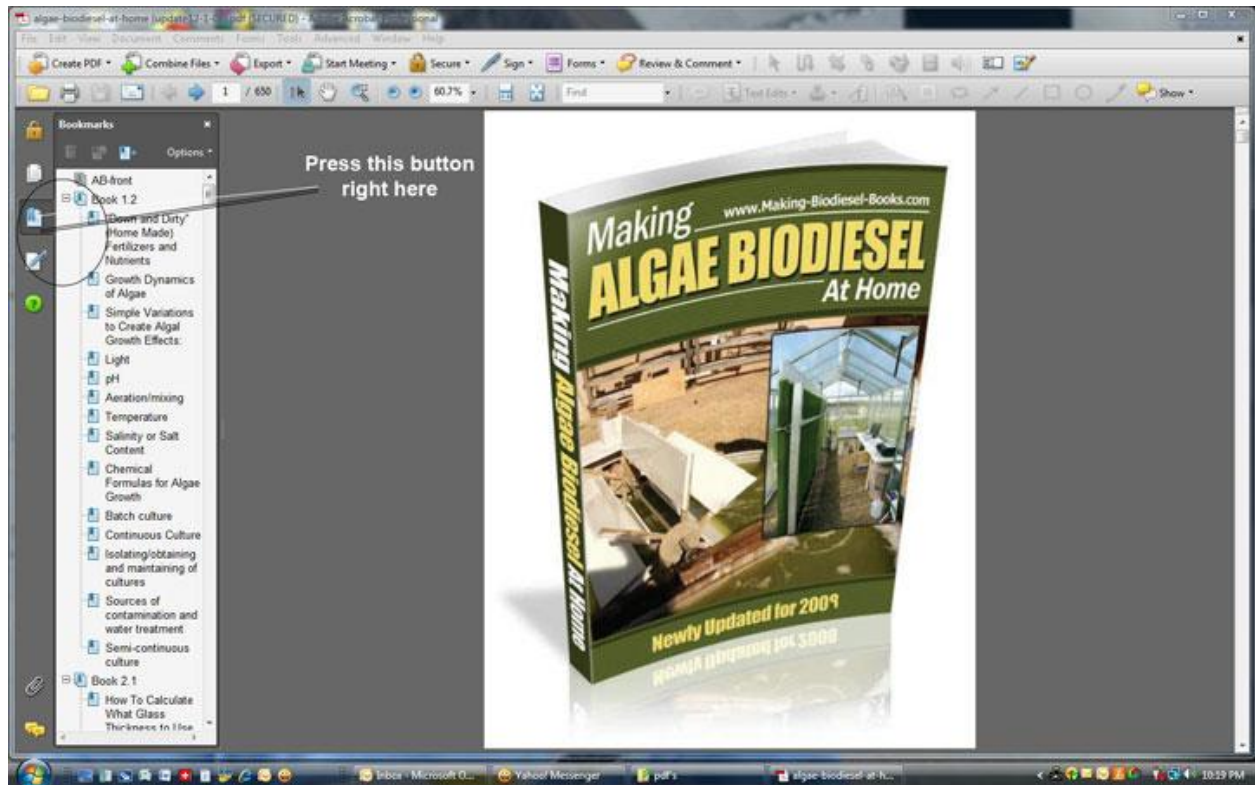
David Sieg  
17 February, 2010  
Des Moines, Iowa, USA

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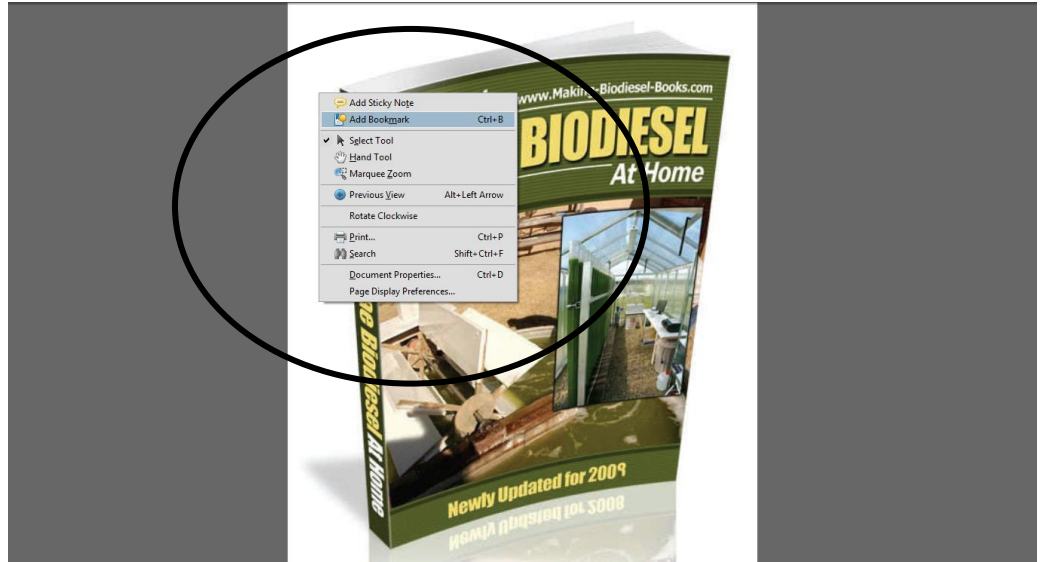
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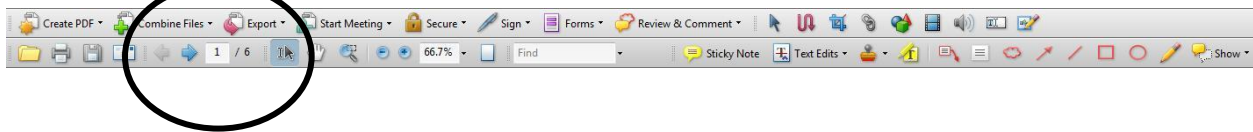
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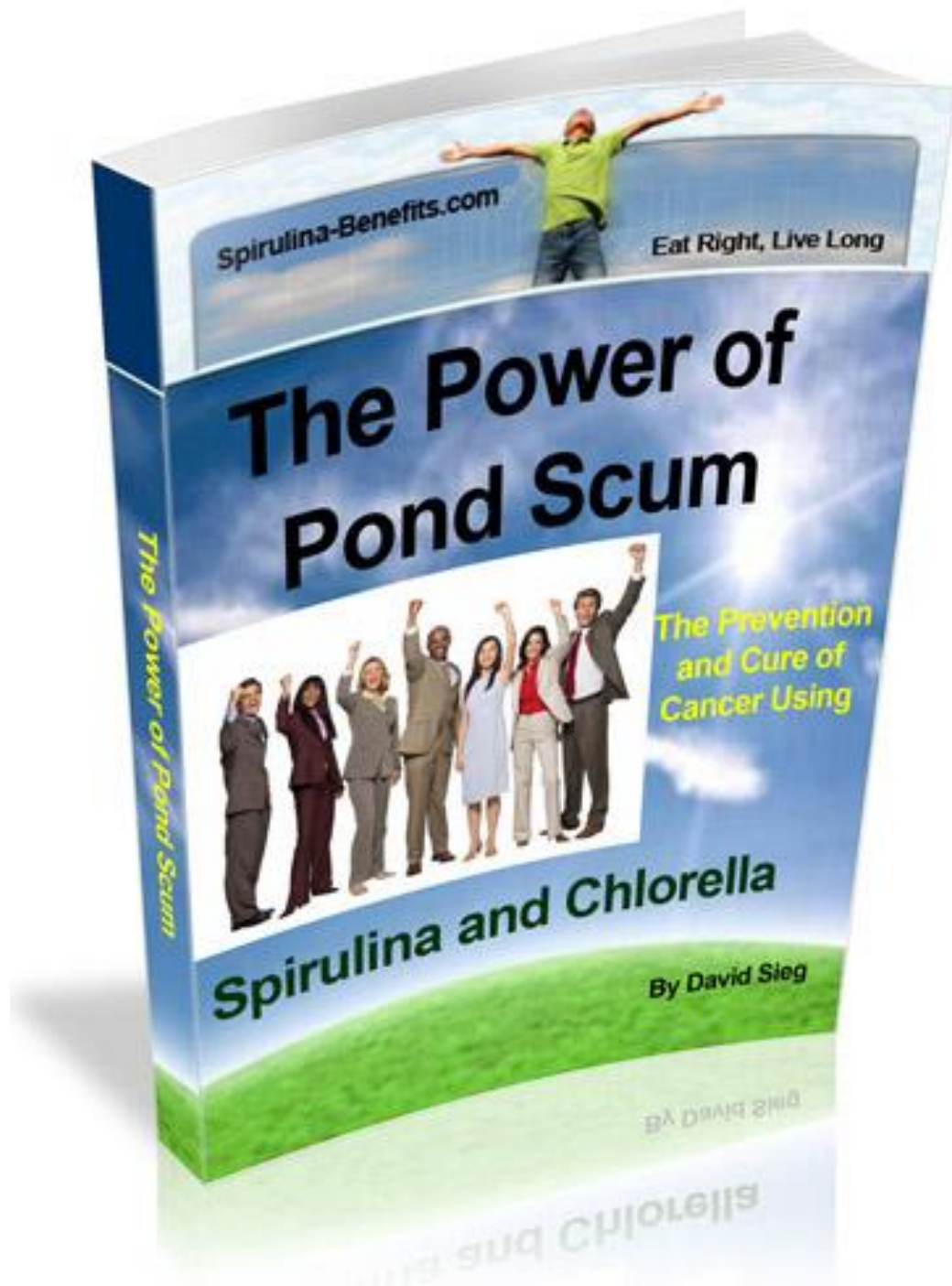


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You can also jump to any page, easily and quickly by typing the page number in right here:



This is a very quick overview of some of the features of Adobe reader. There are many more and you can find out many more by reading the "help" section on the top tool bar.





## Where It All Begins...

There is no question Chlorella and Spirulina are truly the most incredible food sources on the planet. In this special report, I'm going to show you the very real health benefits and cancer fighting abilities of these two foods, and you'll see why growing your own algae is like having a mini-health factory.

Many people have heard of chlorella and Spirulina, but they don't really know the details of why these are truly the best food sources on the planet. For example, did you know that ...

- Ounce per ounce, Spirulina contains twelve times the digestible protein of beef?
- That both chlorella and Spirulina can actually reverse cancer in the human body?
- Or were you aware that both of these super foods have been clinically shown to demonstrate preventive as well as curative properties when it comes to all sorts of cancers?

Keep reading, and I'll tell you all about it.

By the way, my name is David Sieg, I'm not a doctor, nor do I have a long string of letters after my name. Nothing I say should be considered medical advice. I research and report on topics that help improve the lives of people everywhere. If you want to know more about me, simply Google my name. I'm easy to find. :) Most of the time I report on alternative energy. Which is what led me to algae and chlorella and Spirulina.

### **The Incredible Health Benefits of Chlorella & Spirulina**

What can these two algae really do for your health? They offer a stunning array of health benefits. Chlorella and Spirulina have been shown to be effective in treating and even reversing the following conditions:

- Cancers (all types)
- Obesity
- Diabetes
- Hypoglycemia
- Arthritis
- Depression
- Severe liver damage and liver disorders
- Intestinal ulcers
- Hemorrhoids
- Asthma
- High blood pressure
- Constipation
- Bleeding gums
- Infections

- Inflammation of joints and tissues
- Body odor / breath odor
- Various degenerative diseases
- Essential fatty acid deficiencies
- Mineral deficiencies  
(magnesium is a common deficiency)

### Both Chlorella and Spirulina are particularly useful for:

- People with poor digestion and assimilation (these micro-algae are easy to digest and absorb)
- Individuals who eat large portions of meat and/or animal protein (the micro-algae protein, in contrast, is easier to digest and offers a far healthier balance of minerals)
- People who eat a lot of refined and/or processed foods.
- People who take prescription drugs (Spirulina protects the kidneys and liver)
- People who are overweight or obese
- People who engage in physical exercise and/or strength training
- People with low energy levels (feeling depleted, exhausted, etc.)
- People with poor vitality and anemia

### In fact, both Chlorella and Spirulina have been described as “the perfect food:”

#### Chlorella:

*Chlorella has been touted as the perfect whole food. Aside from being a complete protein and containing all the B vitamins, vitamin C, vitamin E, and the major minerals (with zinc and iron in amounts large enough to be considered supplementary), it has been found to improve the immune system, improve digestion, detoxify the body, accelerate healing, protect against radiation, aid in the prevention of degenerative diseases, help in treatment of Candida albicans, relieve arthritis pain and, because of its nutritional content, aid in the success of numerous weight loss programs.*

**- Earl Mindell's Vitamin Bible**

#### Spirulina:

*Spirulina's predigested protein provides building material soon after ingestion, without the energy-draining side effects of meat protein; its mucopolysaccharides relax and strengthen connective tissue while reducing the possibility of inflammation; its simple carbohydrates yield immediate yet sustained energy; its GLA fatty acids improve hormonal balance; and its protein-bonded vitamins and minerals, as found in all whole foods, assimilate better than the synthetic variety. Spirulina can generally be considered an appropriate food for those who exercise vigorously, as evidenced by the many world-class athletes who use it.*

**- Healing With Whole Foods by Paul Pitchford**

## Chlorella & Spirulina for Preventing & Reversing Cancer

*Some micro-algae have very favorable nutritional profiles for cancer and immune therapies. Spirulina, chlorella, and wild blue-green provide cellular protection with exceptional amounts of beta carotene (provitamin A) and chlorophyll. Chlorella, the algae to emphasize in those with the greatest deficiency, stimulates immunity in the treatment of all degenerative diseases by means of the "Chlorella Growth Factor" (CGF). Spirulina is rich in phycocyanin, a pigment with anti-cancer properties. Spirulina is also the highest plant source of gamma-linolenic acid (GLA), a fatty acid which strengthens immunity and inhibits excessive cell division.*

### - Healing With Whole Foods by Paul Pitchford

As you can see from the quote above, the anti-cancer properties of both chlorella and Spirulina are rather remarkable. Of the few key phytochemicals that have been identified in these micro algae, their known anti-cancer properties are nothing less than incredible. And yet these foods probably work on many levels to combat cancer, going far beyond the handful of phytochemicals that have been identified. Remember: chlorella and Spirulina contain hundreds or thousands of phytochemicals, and very few of those have been identified or clinically tested.

Overall, however, micro-algae have been subjected to a fair amount of anti-cancer testing. The results of those tests have earned chlorella a rather impressive mention in the book **Herbal Medicine, Healing & Cancer** by Donald R. Yancey:

Chlorella is a one-cell blue-green alga that is highly nutritive as a food and also stimulates the immune system. It increases macrophage activity and has shown antitumor effects. Chlorellan is a substance found in chlorella that stimulates interferon production. There are several papers on the prevention and/or inhibition of cancer using chlorella as well as documentation of its DNA repair mechanism. Of all the super green foods, chlorella is the one that impresses me the most.

Chlorella's anti-cancer reputation is well earned, and long known. Dozens of studies have shown it to exhibit anti-cancer effects. At risk of wearing out this metaphor, I have to say once again that if the pharmaceutical companies had a name-brand drug that demonstrated the same effects as chlorella, it would be heralded as a "cure for cancer" and would undoubtedly receive an endless parade of positive press on all the news networks. When it comes to cancer, chlorella is truly that good.

## More Studies Showing How Chlorella Prevents & Reverses Cancer

There have been dozens of animal studies on chlorella and chlorella extracts involving immune response to cancer. One such study involved mice given chlorella prior to transplantation of

mammary carcinoma. The results were a **70 percent sixty-day survival of the chlorella group versus no survival** in the control group. Mice in the control group were also transplanted with tumors but did not receive chlorella.

In 1990, a study on chlorella was performed at the Medical College of Virginia. Fifteen glioblastoma patients were administered 20 grams of powdered chlorella and 150 ml of liquid chlorella, in some cases combined with standard chemotherapy and/or radiation therapy. There was a **significant increase in health and immune status immediately**, and a striking **40 percent two-year survival rate** was reflected in follow-up studies. This is **extremely rare** for this type of tumor, which normally might yield a **10 percent survival rate** after two years.

There are other beneficial algae, such as Spirulina, a blue-green alga, and other super green foods, but I believe **chlorella is the best**, particularly **for people with cancer** and/or a weak constitution.

Note that in one of the studies mentioned above, chlorella was used together with chemotherapy and radiation therapy and still managed to achieve stunning improvements in the survival rates of cancer patients who would have normally died within two years. And note that the patients were administered a mere 20 grams of chlorella, which is a small dose. I eat half that much chlorella every day, so in a week's time, I'm eating perhaps 70 grams of chlorella, or more than three times the dose received by these cancer patients.

With this, I think you can begin to see the anti-cancer healing power of chlorella. Its results can only be described as stunning:

*Chlorella helps protect the body in its fight against both **viruses and cancer**. A series of studies during the 1980s showed that **tumor growth** in mice could be **reduced or stopped** by injecting a water solution of chlorella around the neoplastic growth. Even tumor regrowth was cut down significantly. In another study by the same researchers, **tumor cells were killed completely** by the chlorella injection. The researchers then began to give chlorella in oral form, and the antitumor effect was still significant.*

**- Herbal Medicine, Healing & Cancer by Donald R. Yance**

I'm not sure if you share the same excitement about chlorella that I do, but if you take a closer look at the study mentioned above, it basically reveals a potential cure for cancer. Simply inject chlorella into the tumors, and they are "killed completely." The study, entitled, "Augmentation of Antitumor Resistance by a Strain of Unicellular Green Algae, Chlorella Vulgaris," was published in 1984 in **Cancer Immunology and Immunotherapy**.

## **Yet More Clinical Evidence That Chlorella Fights Cancer**

Yet the anti-cancer properties of chlorella are hard to argue with. There have been a number of studies demonstrating similar anti-cancer properties for chlorella:

*A study on chlorella published in Japan in 1992 showed that chlorella has **impressive effects on blood chemistry**. It increased red blood cells, white blood cells, platelets, and albumin. The ability of chlorella to increase albumin is vitally important because so many people with cancer have a decreased level of albumin. This decreased level correlates with a poor prognosis; **chlorella is a truly important supplement** for anyone whose albumin level is low.*

**- Herbal Medicine, Healing & Cancer by Donald R. Yance**

The healing properties of these micro-algae are, of course, only available from the whole food, not isolated or extracted chemicals:

*Animal studies have shown that mixed carotenoids, such as Spirulina and Dunaliella species of algae, have **significantly greater tumor-killing ability** than beta-carotene alone. No antioxidant vitamin or flavonoid should be taken alone.*

**- Health And Nutrition Secrets by Russell Blaylock, M.D.**

One of those anti-cancer phytochemicals has been mentioned: **phycocyanin**. This phytochemical found in Spirulina is what gives it a dark blue / green hue. It also probably contributes to the unique taste of Spirulina, which some people find somewhat pleasant, or at least tolerable.

This phycocyanin has been shown to be effective against liver cancer as well:

*Spirulina contains concentrations of nutrients unlike any other single grain, herb, or plant. It contains gamma-linolenic acid (GLA), linoleic and arachidonic acids, vitamin B12 (needed, especially by vegetarians, for healthy red blood cells), iron, a high level of protein (60 to 70 percent), essential amino acids, the nucleic acids RNA and DNA, chlorophyll, and phycocyanin, a blue pigment that is found only in blue-green algae and that has increased the survival rate of mice with liver cancer in laboratory experiments.*

**- A-to-Z Guide To Supplements by James F. Balch, M.D.**

In all, the anti-cancer properties of both chlorella and Spirulina make these absolutely necessary dietary supplements for anyone battling cancer or who may be at risk for cancer. And if you eat processed foods or follow the standard American diet, you are definitely “at risk” for cancer, since so many of the foods that make up the American diet are, themselves, promoters of cancer.

Every doctor should be aware of the anti-cancer properties of chlorella and Spirulina, and these should be “prescribed” as both cancer prevention foods and cancer therapy for patients currently battling the disease. In my opinion, any person suffering from cancer should immediately begin introducing both chlorella and Spirulina into their diets, even if they choose to undergo “Western” anti-cancer procedures like chemotherapy and radiation.

Furthermore, any person who knows someone with cancer has, I believe, a social responsibility to at least make them aware of this information so that they can make their own informed decisions about how to reverse their cancer, if they so desire.

Chlorella is one of those things that falls into the “can’t hurt” category when it comes to battling cancer. No matter what form of therapy you choose to undergo -- radiation, chemotherapy, surgery, or something more holistic -- chlorella can only improve your results. If it were me, I would absolutely not undergo any radical therapy like radiation or chemotherapy. I would ingest large doses of chlorella at every meal and pursue other anti-cancer strategies that have been proven far more effective, such as taking graviola tincture, eating apricot kernels, consuming large quantities of raw broccoli sprouts, eating as much garlic as I could stand, and so on. There are many natural therapies that reverse cancer.

We have way too much cancer in the world, and the answer to many cancers is available right now in the form of these remarkable water plants. It is time that we put nature’s gift to work in healing diseases like cancer that are ravaging our population.

### **So why doesn’t the medical establishment recognize Spirulina and Chlorella?**

What I’ve shown above is the tip of the medical iceberg. With a finding this incredible, you would think that every doctor, medical researcher, and government health official would be intent on learning how to apply this knowledge to healing cancers all around the world. Chlorella is dirt-cheap from a medical point of view, and by simply injecting it into breast cancer tumors, those tumors are killed. But therein lies the problem: chlorella is dirt cheap! There’s no real money in chlorella injections, regardless of how well they work!

Sad, isn’t it?



**Here's how to fight back!**

### **Building a Low-Cost Kitchen Spirulina or Chlorella Factory!**

What follows is a “down and dirty” low cost algal bioreactor to get you started. Nothing fancy here, and it doesn't need to be. It will however get you used to working with bioreactors and the parts necessary.

You use the incubators to start your algal cultures. Think of it like Sour Dough Bread Starter...you always start, and leave some behind to start the next batch. This way you can buy an algal culture and make unlimited number of batches from the same starter culture.



Here is what you'll need:

Part	# of Units	Price	Get From	Part number
Clamp Light	1	\$5.47	Home depot	232005
75 watt Bulb	1	\$6.97	Home Depot	227432
Air Stone	1	\$0.49	Pet Smart	73725702185
XP30 Air Pump	1	\$9.99	Pet Smart	73725702295
1/4 " inch air hose	10' foot	\$2.47	Home Depot	
2-way gang valve	1	\$4.99	PetCo	258105
Check valve	1	\$2.29	Pet Smart	73725702175
2 liter bottle	1	Free	Anywhere	
		<b>\$32.67</b>		

**Detailed Parts list.**

(1) Clamp light



(1) Plant light bulb



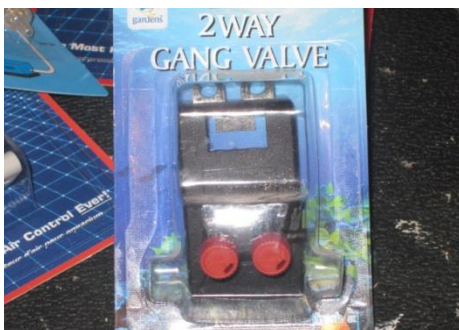
(1) Air Stone



(1) Non-filtered check valve



(1) 2-way gang valve



(1) XP30 air pump



(1) package ¼" inch air tubing



(1) Juice bottle

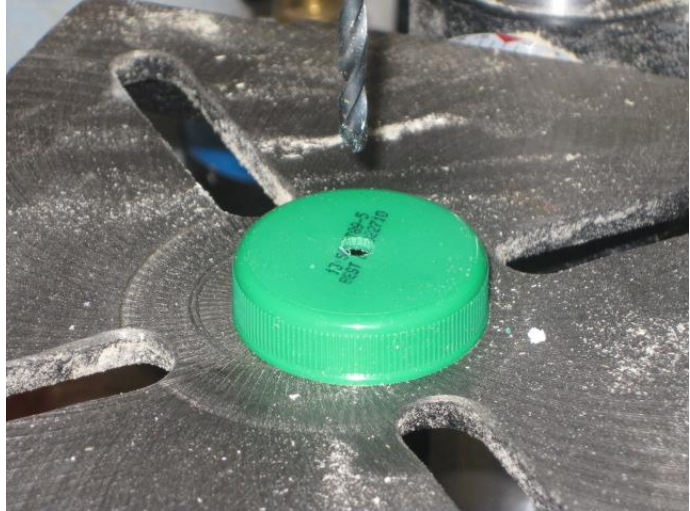




## Here is what you're going to do

### Fabrication:

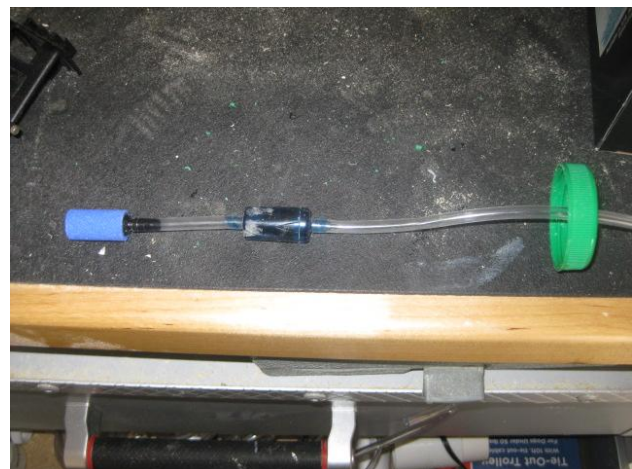
- 1.) Drill a small (1/4" inch) hole in the top of whatever container you choose. I use juice bottles. But any 1 liter, clear, plastic bottle will do.



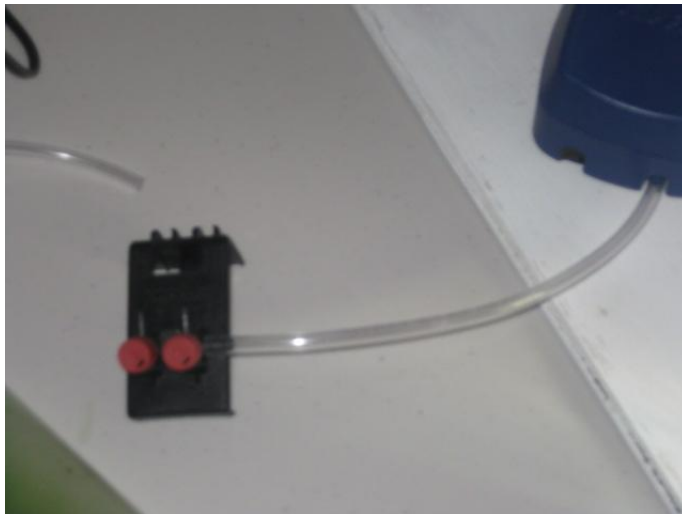
- 2.) Thread the plastic tubing through the hole in the cap.

Add the check valve to the end as shown.

- 3.) Cut a small piece of air line (1 inch) and attach one end to the air stone and the other to the check valve. Set aside.



- 4.) Cut an 8 inch piece of air line tubing and attach to air pump port.



- 5.) Attach the other end to your gang valve.

- 6.) Now take the first assembly (cap and air stone) and attach to the gang valve, and put air stone in water bottle.





- 7.) Take the light bulb and screw it into your clamp light.

Plug in your light and air pump.

This quick, easy incubator is now ready for your algal culture.

Be sure to wash and sterilize everything before adding the algae.



## Where to Buy Algal Strains Inexpensively

(**Author's note:** I have no affiliation with the company below. I don't make any money from endorsing them, nor receive any compensation if you decide to buy from them.)

One of the best places I've found is the [Ecogenics Research Center](http://www.ecogenicsresearchcenter.org/index.htm)

(<http://www.ecogenicsresearchcenter.org/index.htm>)

Most strains are \$30 + Shipping, payable by PayPal. Marc Cardoso, the owner is also available for advice and to answer questions.

From their website:

### Company Profile

The Ecogenics Research Center for the study of alternative solutions, a **non-profit** organization dedicated to addressing problems facing societies and citizens in the United States and beyond. A **non-profit** organization, Ecogenics Research Center supports itself primarily through the sale of its products.

Chartered as an educational and scientific organization, Ecogenics is currently working on: **closed-loop systems** that incorporating technologies including: hydroponic (organically certified) crops, Spirulina algae, and Tilapia fish.

"Ecogenics has extensive experience developing and producing . . . biofuels and marketing closed-loop biosphere systems" ([Motor Trend](#), January, 2006)

**Marc Cardoso**, Chief Executive Officer

- \* Constructed the first federally recognized farm-scale alcohol fuel plant in the U.S.
- \* Holds 11 U. S. patents for products currently being used both in the U. S. and abroad
- \* Organized the Tennessee Gasohol Commission
- \* Established the National Renewable Fuels Coalition
- \* Consults, facilitates, and educates organizations on resource recovery

### Contact Information

However, if you do need further assistance, please use the following contact information for sales and customer support.

**Telephone**

865-428-0314

**FAX**

865-908-0023

**Postal address**

115 West Loop Road Sevierville, TN 37862

**Electronic mail**

General Information:

Sales: [ecogenics3@aol.com](mailto:ecogenics3@aol.com)

Customer Support: [ecogenics3@aol.com](mailto:ecogenics3@aol.com)

Webmaster: [ecogenics\\_org@yahoo.com](mailto:ecogenics_org@yahoo.com)

## **Growing the Algae**

### **You'll need:**

- Algae incubator you built in the last step.
- An algae culture of your choice. (Spirulina or chlorella)
- "Vigoro" Liquid plant food. You can find this at most home improvement stores. You want a nutrient base with "10-10-10" You can also use "Miracle-Gro" plant food but I find this is better. (Vigoro)

### **What you're going to do:**

#### **First...**

Sterilize everything. This is to insure there are no bacteria to contaminate your culture from the very beginning. If you overlook this step, chances are your culture will crash.

#### **Next...**

- Fill the two-liter soda bottles nearly to the top with either distilled water (for fresh water algae) or saltwater (for ocean algae)
- Add five drops of nutrient (Viagro)

#### **OK, the big day has arrived...**

The algae samples arrive in the mail. They'll usually be in small plastic tubes.

Simply mix them according to directions.

In a perfect world, or if you had a laboratory, your algae culture should be incubated at 19 degrees Celsius (about 66 degrees Fahrenheit), but truthfully, I think most people could get away with just letting them sit at room temperature. (I do)

- Avoid putting them in direct sunlight, (Too hot)
- Instead you can try putting the flasks in front of a bright fluorescent lamp for 18 hours a day.
- A standard bulb of at least 2,500 lumens works fine, but some people recommend "grow-lights," which produce more realistic blue photons used in photosynthesis.

Once you get everything going, you should keep aerating (bubbling) the water on a constant basis. Give it a week or so, (sometimes longer) and your container should be dark green with

algae.

Add some (5-10 drops) of nutrient every day.

Once it reaches this stage the algae is mature and can be harvested. Now, be careful here, a cellular explosion can occur (exponential phase) and crash the entire culture, so don't wait too long.

- Extract 10 milliliters of the mature algae and start a new batch. If you do this, you'll never need to purchase another starter culture.

Once you have enough in your starter cultures you can start scaling up in size, as well as harvesting your culture for ingestion.

Yeah, that's about all there is to it.

Of course, if you'd like to learn more about it you can.

If I receive enough interest in this report, I'll create an eBook. So if you like it, let me know! ([dsieg@spirulina-benefits.com](mailto:dsieg@spirulina-benefits.com))

There is also a membership site at [www.spirulina-benefits.com](http://www.spirulina-benefits.com) you can be a part of. For a small monthly fee you can be kept up to date on cutting edge of algae research including...

- Home built bioreactors
- The best methods of promoting maximum algae growth in bioreactors
- Discount and free eBooks on algae
- Algae recipes for good health
- Algae health products
- And much more.

## Spirulina and Chlorella Recipes

There are a number of Spirulina recipes to make your Spirulina nutrition more enjoyable. To give you an idea, here are some recipes that you can try for yourself:

***Spirulina Smoothie.*** Add in half a cup of yogurt, a cup of soy milk or fruit juice (apple, pineapple and orange are highly recommended), fruit (peach, papaya, mango or berries) into a teaspoon of spirulina powder and blend them together.

***Spirulina with fruit juice.*** Mix a teaspoon of spirulina powder with fruit juice with a blender of mixer.

***Spirulina salsa.*** You simply add in a teaspoon of spirulina powder into a bowl of salsa. It actually enhances the taste of your salsa and makes the color and texture more interesting.

***Guacamole.*** You can mix 2 mashed avocados, cayenne, fresh lime, 2 medium tomatoes, 2 cloves of crushed garlic and salt to taste into a teaspoon of spirulina. Cream Dip. Four teaspoons of sour cream, lemon juice, 3 teaspoons of soy sauce and 1 teaspoon of spirulina mixed together makes a delicious cream dip.

***Pesto pasta sauce.*** You can add a little kick to your pesto with 2 teaspoons of spirulina. Tofu salad. Any kind of raw vegetables will taste good in a tofu salad. Add in a heaped teaspoon of spirulina into 8 ounces of firm tofu, bell pepper, tomatoes, pepper or salad sauce and toss together.

***Superfood Dip*** 12 soaked almonds (soak overnight, drain & rinse), 2 tsp. Spirulina powder, 1 cup chopped parsley, 6 cloves garlic, 3 spring onions, chopped, 1 tbs. ginger, 1 tbs. lecithin, 1 lemon juiced, 3 tbs. tamari soy sauce, 4 tbs. brewers yeast, Enough water to cover

Whiz all ingredients in the blender. Chill before serving. Goes well with celery & carrot sticks or healthy chips.

***Chlorella Pesto:*** 1 bunch fresh basil, 1 tablespoon chlorella, ¼ - ½ head of garlic (or more if you're feeling brave!), ¼ cup of olive oil, ½ cup of parmesan cheese, ¼ cup of pine nuts, 1 tablespoon lemon juice, 1 lb pasta

Put the Chlorella, basil, garlic and olive oil in a blender and puree. Lightly toast the pine nuts in olive oil. Add cheese, lemon juice and pine nuts to the puree. Stir into hot pasta, curl up on the sofa and let your taste buds ride the green waves!



**Green Miso Soup:** ½ cup of shiitake sliced mushrooms, 1 teaspoon of dashi (Japanese fish stock), 150g of cubed tofu, 2 tablespoons of miso, 1 tablespoon of Yaeyama Chlorella, 1 handful of hijiki seaweed

Boil a kettle and fill a small pan with 500cc of the hot water. Thinly slice your shiitake mushrooms. By now your water will have cooled slightly in the pan - add the miso. Add the tofu, and hijiki seaweed. Leave on the lowest heat for 5 minutes - taking care never to allow the water to boil. Just before serving stir in two teaspoons of Yaeyama Chlorella

# Making Algae Photo Bioreactors at Home

## PBR Diary

Strain: <b>Chlorella Min.</b>	Date Started: <b>7/17/09</b>
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Date	Growth	Nutrients/Notes	Photos
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**7/17/09**

- Clear water on left for color comparison
- Salt water solution
- F/2 nutrients
- Weak bubbling
- 70° degrees
- 12 hour light/dark

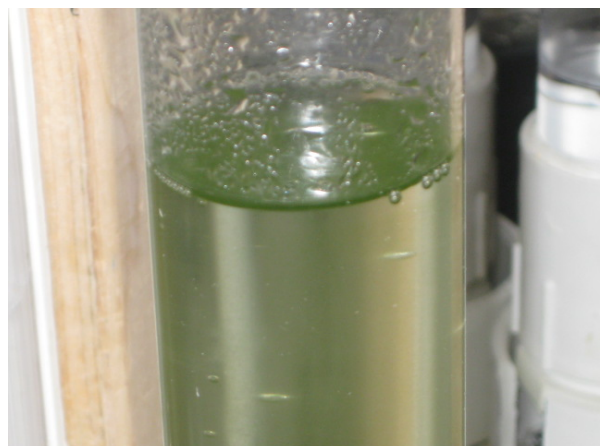


**7/17/09**

No Change

**7/19/09**

- Slight greening.
- Growth ring visible.

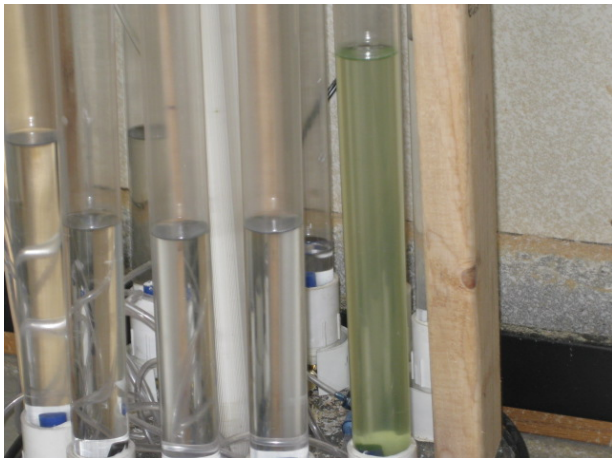
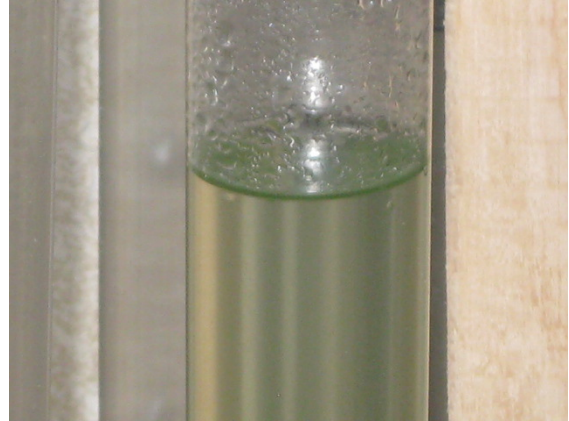


# Making Algae Photo Bioreactors at Home

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**7/20/09**

- Greening more pronounced.
- Growth ring clearly visible.
- Added another 200ml. Nutrient solution.



**7/21/09**

- Growth continues.
- Solid green ring visible at top of tube.
- Increase bubbling.

**7/22/09**

- No growth visible.
- Decrease bubbling.
- Add 2 drops Miracle-Gro

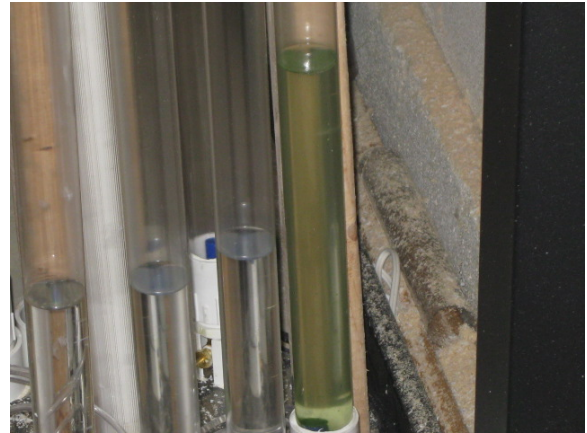


# Making Algae Photo Bioreactors at Home

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**7/23/09**

- Little change. Slightly darker.



**7/26/09 (1 week)**

- Change evident.
- Algae build-up on sides.
- Added 6 drops "Miracle Gro" and 200ml distilled water.
- Started 2<sup>nd</sup>. Tube.

**7/31/09**

- Greening continues
- Added 5 drops "Miracle gro"
- Build up on tubes more dense.



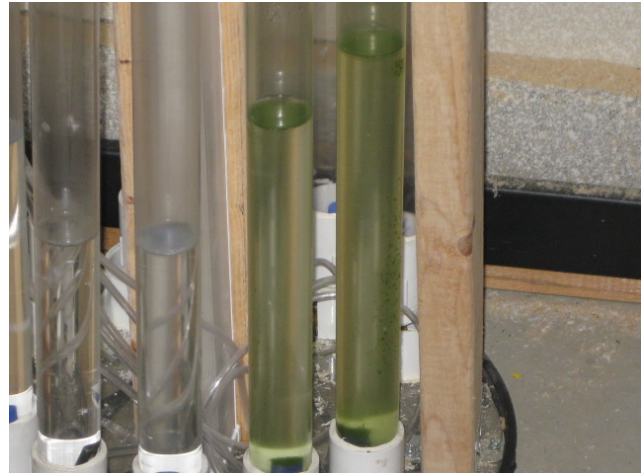


# Making Algae Photo Bioreactors at Home

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**8/7/09**

- Both tubes medium green.
- Added 5 drops "miracle gro"



**8/09/09**

- Growth continues.
- Added 200ml. to tube #2
- Added 10 drops of "Vigaro" (10-10-10 fertilizer solution + Distilled water)

**8/12/09**

- Growth Continues.
- Added 10 drops Vigaro to each tube.

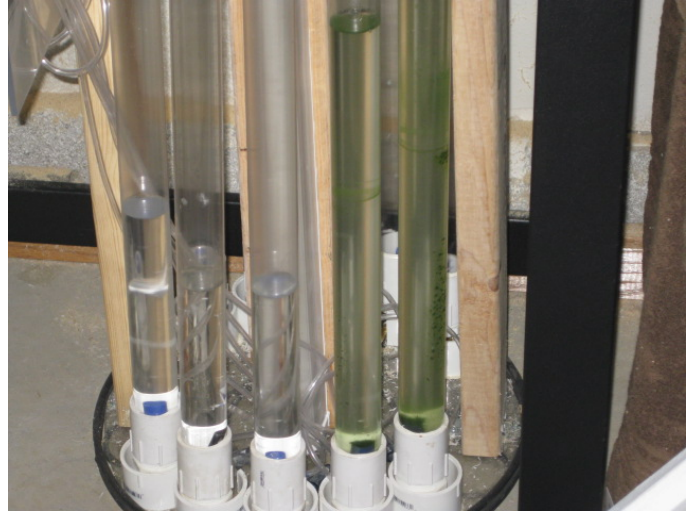


# Making Algae Photo Bioreactors at Home

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**8/15/09**

- Growth Continues.
- Added 10 drops Vigaro to each tube.
- Tube #1 algae growth starting to "clump" to sides of tube.



**8/18/09**

- Growth continues.
- Clumping clearly visible on tube 1.
- Algae starting to "free float"
- Heavy growth on bottom of tube and air stones.

**8/20/09**

- Growth continues.
- Third cell filled using fresh (distilled) water.
- F/2 nutrients
- Vigaro solution.



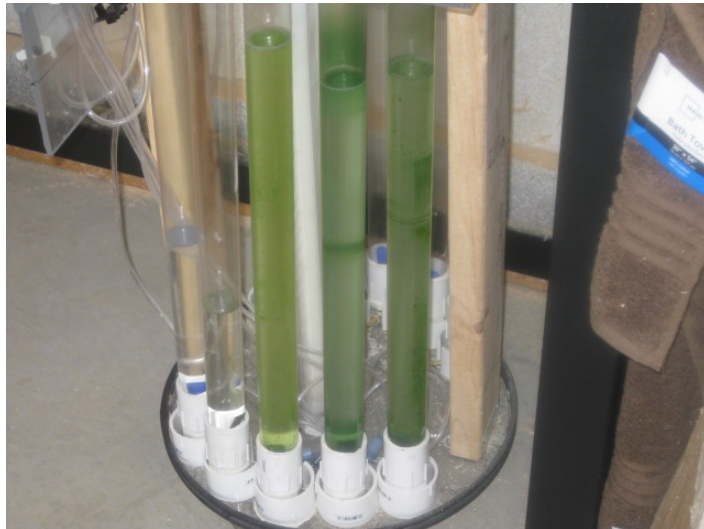
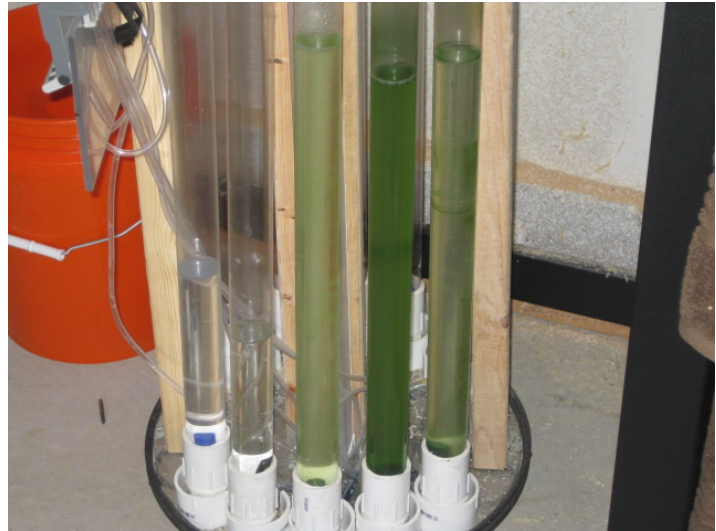


# Making Algae Photo Bioreactors at Home

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**8/31/09**

- Tube #2 dark green.
- More prolonged periods of dark. (24 hours)
- Added more Vigaro Solution.



**9/4/09**

- Tube 3 greening. (This strain will grow in salt/fresh water.
- Heavy growth rings visible on tube #2 and #3

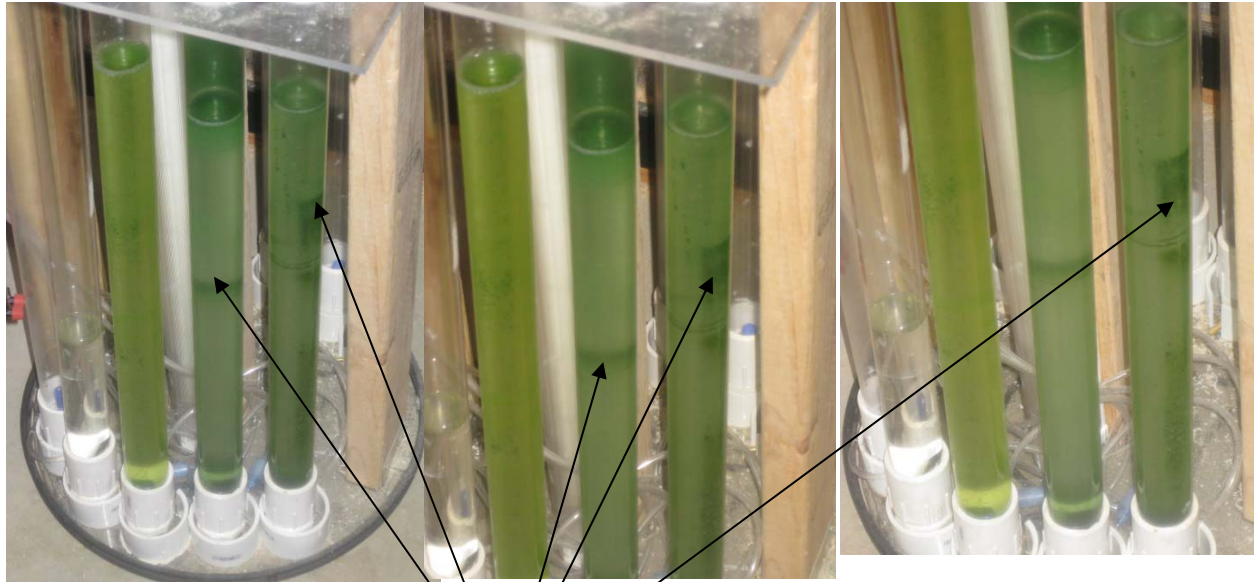
**9/06/09**

- Ready to be transferred to bigger PBR.



## Making Algae Photo Bioreactors at Home

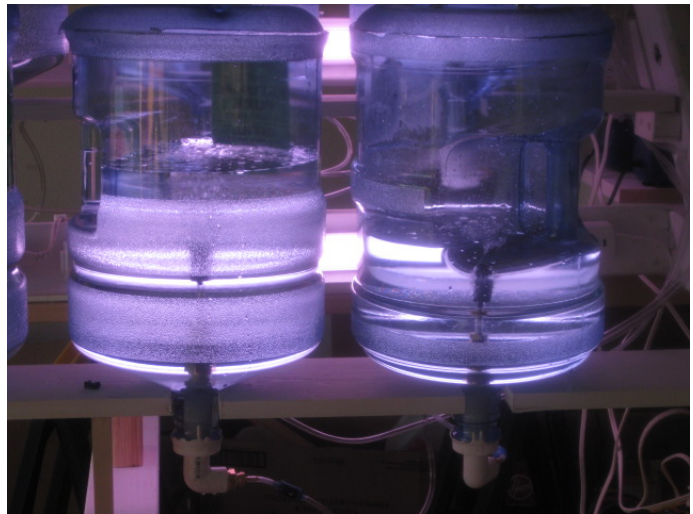
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Notice dark rings of growth

## Making Algae Photo Bioreactors at Home

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Test bioreactor results: Chlorella Min.

- Salt water solution (Instant Ocean)
- PH 7.5-8.5
- Vigaro Plant food (10-10-10)
- 9 hour light cycle



# Making Algae Photo Bioreactors at Home

Strain: **Chlorella Min.**

Date Started: **9/7/09**

**9/07/09**

- Tank on right (fresh water)
- Tank on left (Salt water) already starting to green.
- Transferred to larger PBR. Nutrient same as before. Automatic light 8-9 hour light cycle. Also set in sunlight.



**9/16/09**

- Heavy growth in both tanks. Dark green in fresh water (right) tank. Algae clearly visible on walls and sides. Algae "free floating" in salt water (left) tank

**9/22/09—DISASTER!**

- Salt water alga died. Too much salt. (This is real life, folks)
- Fresh water growth normal.
- Start starter culture from fresh water alga.



**9/27/09**

**Harvest fresh water tank. (See harvesting section in eBook)**