

The "Down and Dirty" Guides to Making Biodiesel at Home

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# Building Open Ponds

BY  
David Sieg

Learn How To  
Make...

- Biofuels
- Health Food supplements
- Organic Fertilizer
- Animal Feed



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**SNEAK PREVIEW**

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### About the Authors



**David Sieg**, teacher/consultant/biofuels entrepreneur/writer and author of the 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@making-biodiesel-books.com](mailto:dsieg@making-biodiesel-books.com)

#### Other Books in the "Down and Dirty" Biodiesel Series <sup>TM</sup>:

- [Making Algae Biodiesel at Home](#) <sup>TM</sup> (New 2010 Edition)
- [Making Algae Photo Bioreactors at Home](#) <sup>TM</sup>
- [Growing Algae](#)
- [Building Open Ponds](#)
- [The Encyclopedia of Making Biodiesel at home](#)
- [Biodiesel Recipes](#)
- [Biodiesel Processors](#)
- [Washing and Quality Testing Biodiesel](#)

### **Dedication:**

**To Damien and Lenny. For showing me the way back home.**

### Acknowledgements

I'd like to thank the following people:

My steady, long term, 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. You don't know how much all the comments help create a better source of learning for everyone.

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

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### Introduction

Rising fuel costs. Fuel tax. Pollution. Hot political issues. . . Now more than ever it is time to master alternative fuel sources. Because biofuel is sustainable, you just struck liquid gold. Now you hold the ability to create this fuel for yourself and others; powering your future and making going green a slogan that means more than just words.

And make no mistake this technology is still in its very infancy.

Big oil has yet to fully explore what has been going on in experimental “labs” all over the world. Some investments are being made now but the **mass production technology** is still years away.

Still there are many simple and proven set ups that create this fuel if done by novices.

Over the years experimental enthusiasts have created and actively use biofuels to power just about any kind of engine. Best of all it doesn't take true rocket science to figure out how water, chemical composition due to a breakdown of minerals, plant life and bacteria will create algae that will then give you fuel. What parts that DO require some limited rocket science, we have included in this book.

Fuel from algae is a proven reality – even grown in open ponds. THAT is what this book will show you. Exactly how you can grow your own fuel in an open pond and use it. Imagine never having to buy fuel again. Laughing as you pass the gas station.

Imagine using this technology to help people all over. That is what we hope you will do. Show the world your genius and fuel tomorrow with algae biofuel.

As Humanity struggles to find more and more energy, which exhaust our already depleted natural resources, we have to make smarter choices for the future. In order to co-habitate with the earth and all living things, we will have to become more creative about the natural supply of fuels available to us all.

## Building Open Ponds

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After many long months of research and a great interest in bio-fuel I have put together what I think may be able to help anyone who is reaching out for better ways to explore alternative fuels into our future.

It is imperative that humanity become more environmentally conscious and aware that our earth is going through some not so gentle changes at this time.

This is in part due to mankind's insensitive ways of drilling and exploring the earth. While I do not wish to inject politics into this book, both sides of this debate have constantly caused human suffering; The more liberal side has prevented drilling when necessary, and the use of fossil fuels that are needed now, and the other side that goes to the other extreme causing pollution and excessive contamination of our biosphere.

All of this could END tomorrow if biofuel becomes mainstream.

We as human caretakers of the earth have a responsibility to future generations of children to make better ecologically sound choices and teach them more environmentally and productive ways to produce fuel and energy while still providing for our current energy needs in a way that can respect the earth and people.

This book will of course, focus on Bio-fuel products and the production of algae species that can produce this type of oil product. The above was food for thought – making biofuel is a wonderful thing.

Thank you for your contribution to making the world a better place for us all.

David Sieg  
Des Moines, IA, USA  
August, 2010



### Forward

I'm going to give you a lot of ideas here. Some of them will work for you and some won't. Not every idea is perfect for every person, but you should be able to find techniques and approaches that can significantly boost your knowledge and algae production if you apply them.

That said, no one can promise the result you'll get. I can just tell you what's worked for me and other people and some ideas you might try. I don't know you. I don't know if you'll do the work, or the quality of parts you'll buy, if you have the talent, or the tools, or if there are things I couldn't foresee that might prevent you from making this system work effectively.

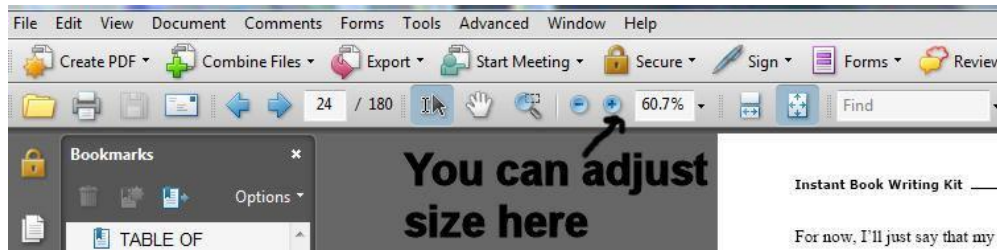
I **can** guarantee that if you don't put the ideas to use, it won't do you any good at all.

The purpose of this book is to make open ponds available to anyone, anywhere. How you implement and use them is entirely at your own risk. I'm not a doctor, lawyer, psychiatrist or Indian chief, so nothing in this book should be construed as professional advice in any of those fields.

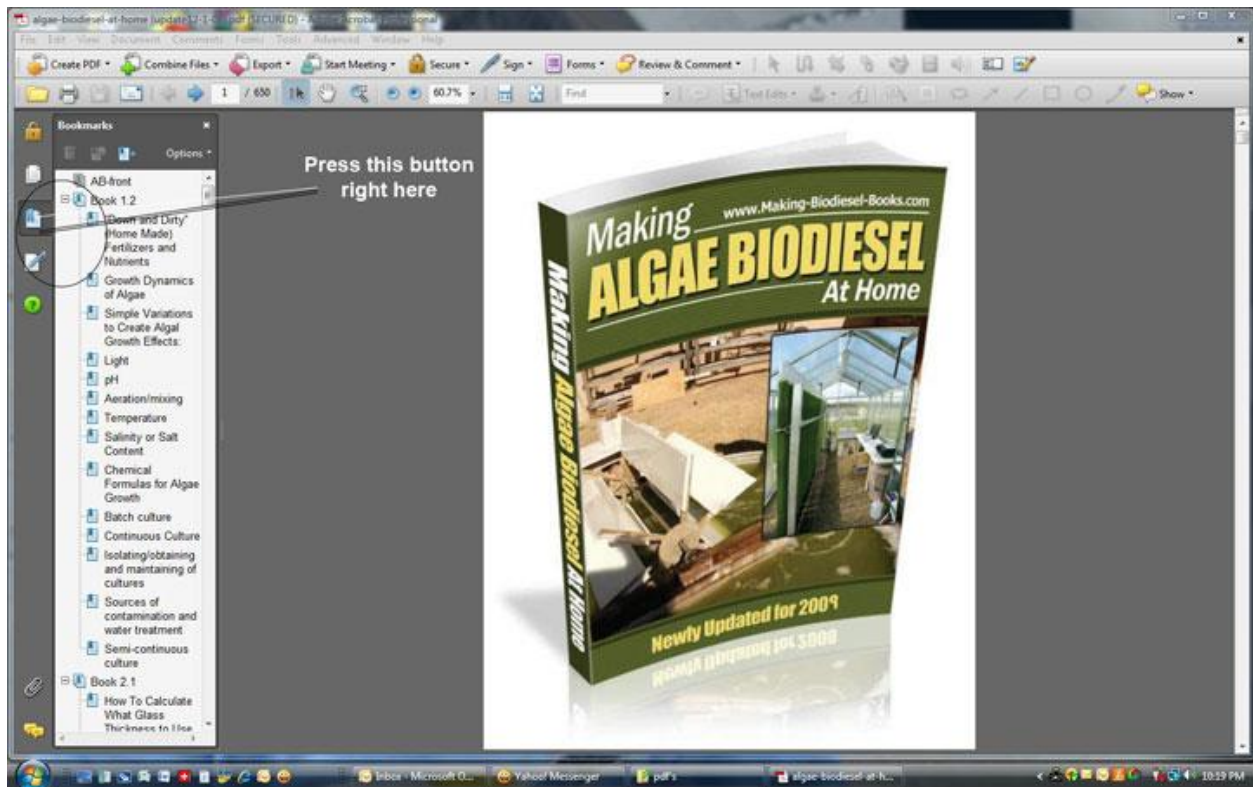
# Building Open Ponds

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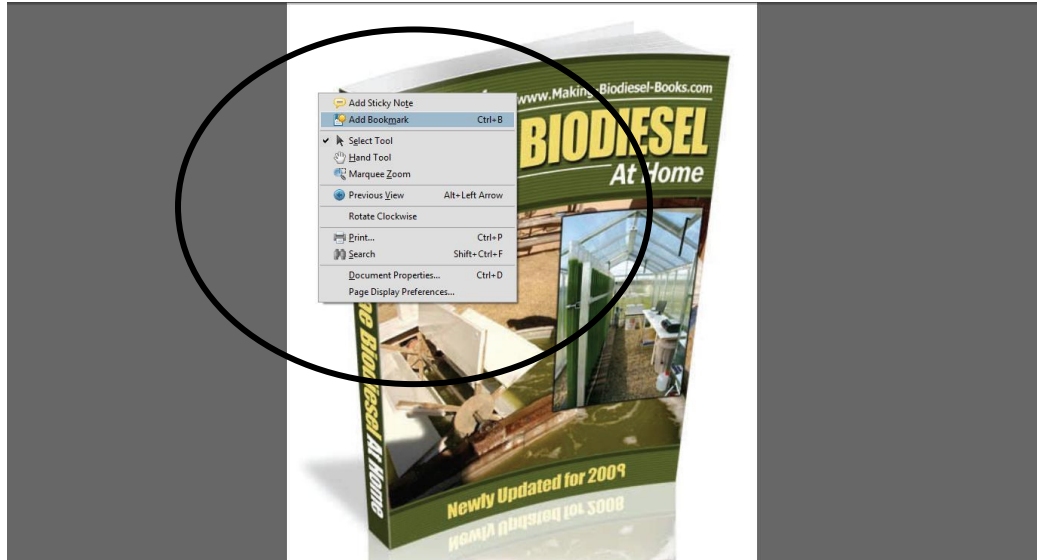


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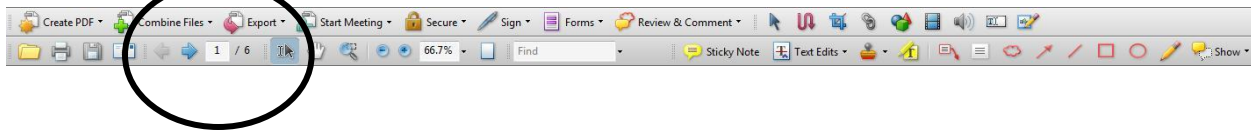
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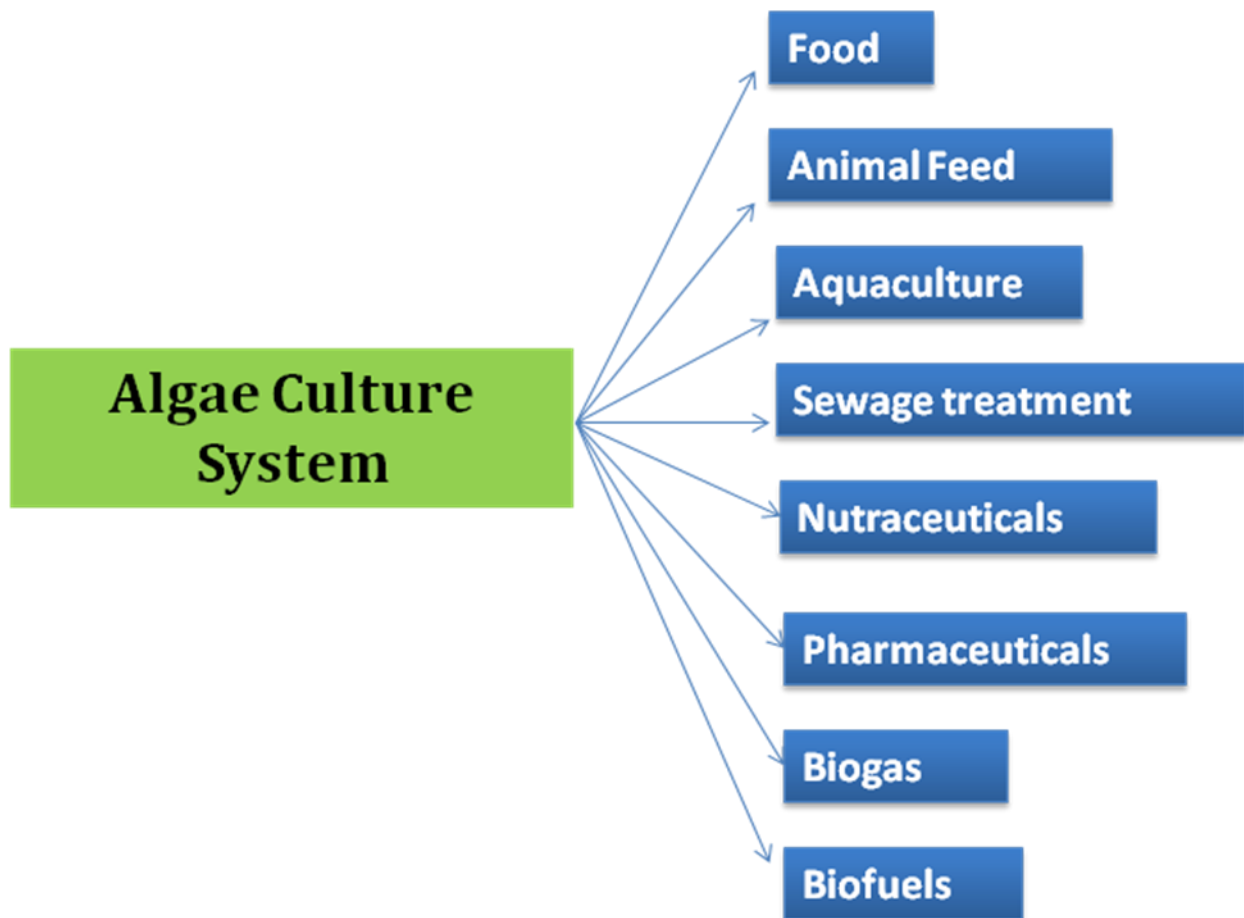
# Book One

## About Algae and Open Ponds



### **What are some of the things we can do with algae?**

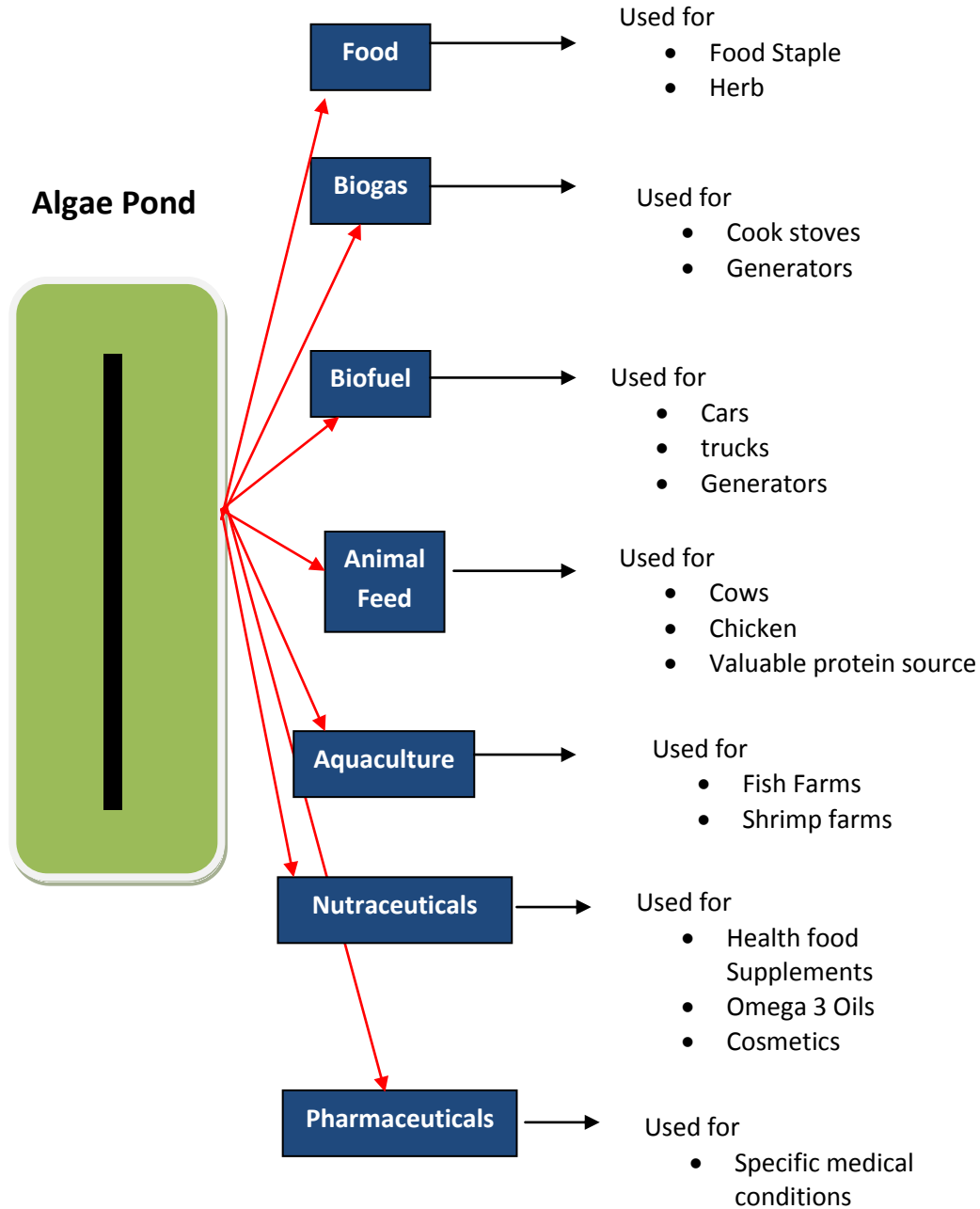
In the last couple of years and the current interest in biofuels, algae have burst onto the world stage. Indeed, some are even starting to call 2010 the "Algae Revolution." With good reason, few organisms on earth offer as much potential, or have the ability to radically change our lives as we know it. Few even speculate, that all life on earth as we know it, originated from this one celled organism. What is evident is that the next few years algae stand to revolutionize the way we do just about everything. Here are just a few of the ways in which alga is going to change the way we look at things.





## Building Open Ponds

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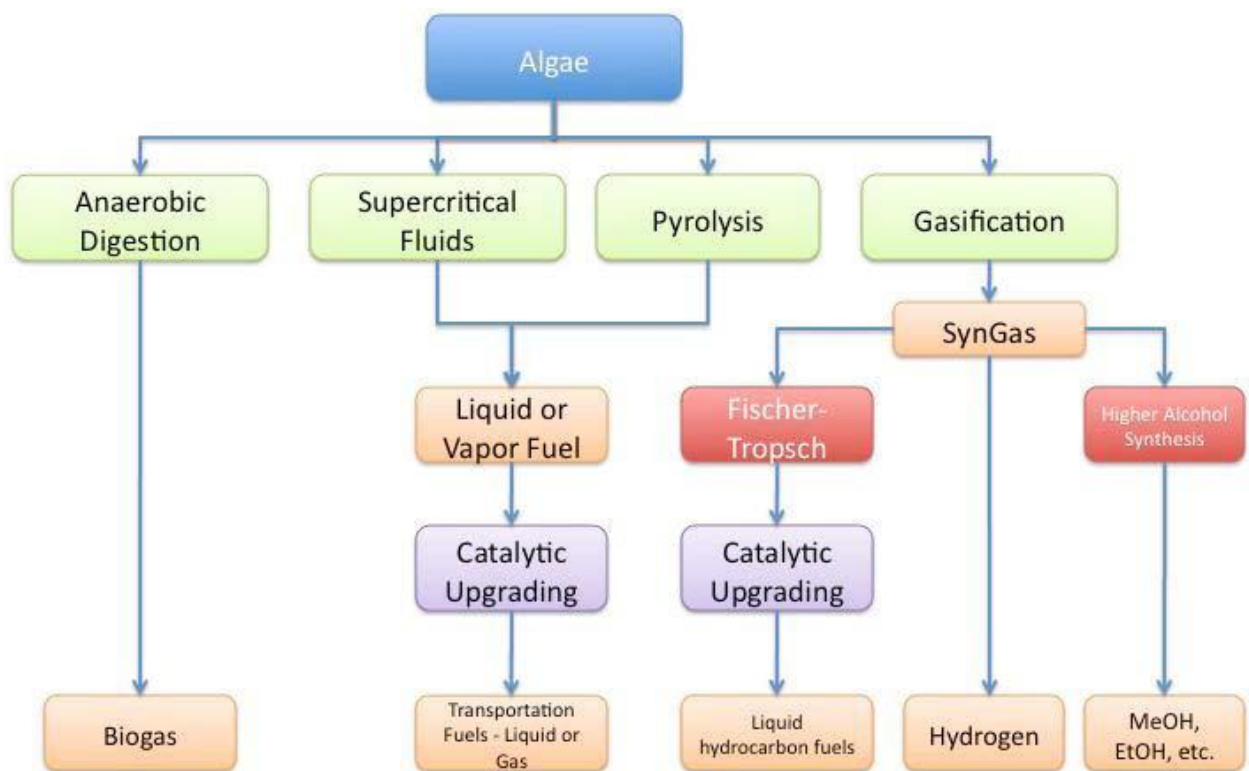


## Building Open Ponds

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**Just in looking at algae from a biofuels perspective, from an open pond system, we can make...**

- Biogas (Methane...to run generators, cook stoves, lighting, etc.)
- Biodiesel (To run transportation vehicles)
- BioJet fuel
- BioGasoline (To run transportation vehicles)
- Bioethanol (To run transportation vehicles)
- Hydrogen
- Methanol (To use in biodiesel process)
- Biochemicals
- Bioplastics



### **For Bio-fertilizers:**

Biofertilizers are defined as biologically active products or microbial inoculants of bacteria, algae and fungi (separately or in combination), which may help biological nitrogen fixation for the benefit of plants.

Biofertilizers also include organic fertilizers (manure, etc.), which are rendered in an available form due to the interaction of micro-organisms or due to their association with plants. Biofertilizers thus include the following:

- Cyanobacteria are generally used and with an emphasis on the blue/green algae's namely *Spirulina* and *Chlorella* can be used.

The need for the use of biofertilizers has arisen, primarily for two reasons.

- 1.) Increase in the use of fertilizers leads to increased crop productivity,
- 2.) Increased usage of chemical fertilizer leads to damage in soil texture and raises other environmental problems.

Therefore, the use of biofertilizers is both economical and environment friendly. The pragmatic approach will be to develop the integrated nutrient supply system involving a combination of the use of chemical fertilizers and biofertilizers.

**Algal Fertilizers** - Blue green algae (BGA) and *Azolla* constitute a system, which is the main source of algal biofertilizer in south and Southeast Asia, particularly for lowland paddy. BGA inoculation (without *Awl/a*) with composite cultures of algal genera *Anabaena*, *Nostoc*, *Plectonema*, *Aulosira*, *Oscillatoria*, *Tolypothrix*, etc. have been found to be more effective than single cultures.

Production and multiplication of BGA cultures is done at centers. Application of dried blue green algae flakes at the rate of 10 kg. /ha is recommended ten days after transplantation.

- Besides being a source of  $N_2$ , BGA provides for the following other advantages:
- Algal biomass accumulates as organic matter; growth. promoting substances are produced, which stimulate growth
- It provides partial tolerance to pesticides and fungicides;
- It also helps in reclamation of saline and alkaline soils.

## Building Open Ponds

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### For health food supplements:

- Spirulina and chlorella are the usual algae of choice for food supplements. Both are grown commercially all over the world and sold in health food stores in pill, powder, and capsule forms.

Blue green algae are one of the most nutritional foods you can have. It has been touted as a super food. It is organic, easily digested and full of antioxidants. It is extremely rich in minerals and has a higher concentration of beta-carotene than broccoli.

- Blue green algae also contain about 60 to 70% of vegetable protein, and provide all the essential amino acids. All these benefits without the risk of consuming meat, which is high in cholesterol and is difficult to digest.
- A rich source of calcium, iron, vitamin B12, enzymes and antioxidants make the blue green algae an ideal food for both adults and children. Even pets can benefit greatly from this nutrient-packed food.
- Being highly concentrated in so many nutrients, blue green algae offer numerous benefits to our well-being.

We will take a look at the top ten health benefits of blue green algae:

### Top 10 Health Benefits of Blue Green Algae

- **Anti-Aging:** Loaded with more essential nutrients and iron than most foods that we consume, blue green algae are perfect as an anti-aging food. Its high concentration of antioxidants means our bodies can combat more free radicals and toxics.
- **Relief from headaches aches and pain:** our immune systems are strengthened.
- **Energy Booster** – has rejuvenating effects
- **Better Digestion** – it coats the stomach lining and is packed with enzymes that help to improve digestion.
- **Sleep better** – it is detoxifying, resulting in better rest.
- **Lose weight** – Less food cravings, a more balanced appetite.
- **Greater concentration and focus** – increase in energy and clarity of mind
- **Strengthen the hair, skin and nails** – high in protein which is the main building block for healthy hair, skin and nails
- **Less anxiety** – it has beneficial effects on our brain development and can help us cope with stress better.

## Building Open Ponds

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- **Improves memory** – as it has effects on our brain development, regular consumption of blue green algae has also shown to have an impact on our memory.

### **For Animal Feeds:**

Many studies have been done using

- Chlorella
- Spirulina
- Scenedesmus
- Oocystis

These species being used as a replacement for land based protein supplements in animal feed. Most studies showed a significant weight gains for all animals involved.

### **For Cosmetics:**

In cosmetics, algae are used as thickening agents, water-binding agents, and antioxidants. But some algae are also potential skin irritants. For example, the phycocyanin found in blue-green algae has been suspected of allergenicity or causing dermatitis on the basis of patch tests (Source: *Current Issues in Molecular Biology*, January 2002, pages 1–11).

Other forms of algae, such as Irish moss and carrageenan, contain proteins, vitamin A, sugar, starch, vitamin B1, iron, sodium, phosphorus, magnesium, copper, and calcium. For the most part, algae, in their many forms, are probably less of a risk and more of a help to skin when used as antioxidants.

Names of the algae typically found in cosmetics include *Ulva lactuca*, *Ascophyllum*, *Laminaria longicruris*, *Laminaria saccharine*, *Laminaria digitata*, *Alaria esculenta*, various *Porphyra* species, *Chondrus crispus*, and *Mastocarpus stellatus*.

### Summary

So what does this mean to you?

It means that with an open pond, and using selected strains of algae, (Chlorella for example) you could grow algae for fuel, (Chlorella has a 44% lipid (oil) content) then use the left over by-product (biomass) for either human consumption, or organic fertilizer. It could also be used for animal feed as well.

Imagine the impact this could have on your life if you owned a greenhouse, or were a farmer, or rancher...

Imagine simply having an open pond in your property capable of producing fuel and as a food source and/or health supplement...

It could help you...

- Lose weight
- Relieve pain
- Boost your energy
- Sleep better
- Greater concentration and focus
- Better digestion
- Improve your memory
- Strengthen your hair, skin, and nails

You could then use the left over biomass as

- Biofuel
- Biodiesel
- Animal feed
- Organic fertilizer
- Raising fish
- Cosmetics

And more



## Building Open Ponds

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The top three uses anyone can use an open pond to grow algae and gain by are...

- Natural health foods supplement giving you better health and overall well-being.
- Organic Fertilizer in your garden thereby giving your family healthy, organic vegetables and saving money on related food costs.
- Biofuels for power generation and transportation.

Not bad, uh?