A Brief History of *Spirulina*

Spirulina **grew wild in the great soda lakes of Central Mexico and was prized by the ancient Aztecs. It was collected from surface water with fine-meshed nets and dried into cakes. The explorer, Cortes, noted in 1519 that it was traded as a commodity in the street markets like cheese. Today,** ***Spirulina*** **still grows wild and is harvested from Lake Texcoco.**

Lake Chad, Africa

Lake Chad and surrounding lakes Bodou and Rombou in Africa have sustained dense populations of *Spirulina* algae for centuries. The local Kanembu people harvest *Spirulina* with baskets and sun dry them into cakes called 'dihe'.

Today, it is still collected and consumed as a main source of protein and is used in about 70% of their meals.

Natural System of Lake Chad

Renowned *Spirulina* researcher, Claude Zarrouk, analyzed the waters of Lake Chad for his doctoral thesis. He discovered that maximum growth was achieved when salinity was highest and further found the lake contained the following levels of nutrients:

Sodium= 9.64 g/L	**Chloride= 1 g/L**
Potassium= 0.54 g/L	**Sulfate=2.98 g/L**
Nitrate= 120 mg/L	**Phosphate= 64 mg/L**
Bicarbonate= 11 g/L	**Carbonate=5 g/L**

pH=9.5

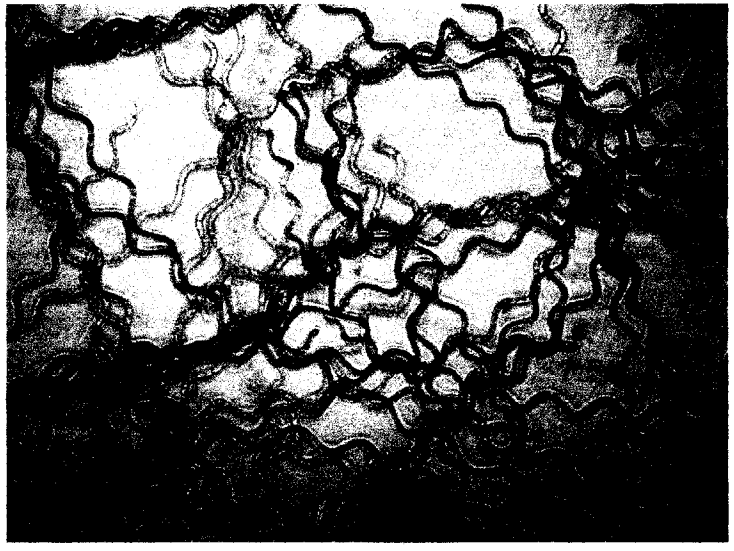
(Contribution to the Study of a Cyanophyte. Influence of Diverse Physical and Chemical Factors on the Growth and Photosynthesis of *Spirulina maxima.* Doctoral Thesis, University of Paris, 6 December, 1966.)

Spirulina Production Mimics Nature

Commercial *Spirulina* production mimics that of nature. However, cultures are grown in ponds with impermeable liners such that no nutrients can leach into the soil or groundwater. Independent testing of groundwater wells is performed to confirm absence of runoff.

US production alone is 800-1000 metric tons/yr, representing approximately $15 million in revenues.

Nutrients Used for Organic *Spirulina* Production Replicates Nature



Cyanotech has produced certified organic *Spirulina* for over 6 years. Nutrients include:

- **Mined Chilean sodium nitrate**
- **Organic phosphate source, ie mined rock phosphate**
- **Salts to sustain culture salinity**
- **Carbon dioxide via sodium bicarbonate**

Soil Management Practices

<u>WE AGREE with the organic philosophy:</u> Soil and groundwater management practices should prevent pollution by nitrates, phosphates and salts.

•Spirulina production DOES NOT contribute to soil and groundwater pollution. Crops are grown within lined and impermeable ponds. The production system is 'closed' with no runoff. All media is recycled back into the culture system.

•Nitrate, phosphate, and bicarbonate replicate the natural system and are the most efficiently used forms of nitrogen, phosphorous and carbon dioxide.

The Final Rule Does Not Accommodate Microalgae Aquaculture

- **In the pre-proposal it states that 'the proposed regulations are intended to be flexible enough to accommodate the wide range of operations and products grown in every region of the United States'**
- **However, production of organic *Spirulina* is no longer possible under the Final Rule. Chilean nitrate is restricted to no more than 20% of the crops total nitrogen requirement. Bicarbonate and other minerals of high solubility and salinity are either restricted, not on the National List, or not allowable.**
- **Our certifying agent asserts that we must conform to the Final rule immediately.**

Immediate Actions are Needed for for the Industry

Foremost, the National Organic Program must recognize that:

- **Microalgae crops produced using these pond systems are distinctly different and incompatible with the regulations for land crops.**

- **Microalgae crop production must urgently be accommodated into future revisions. However, it does not fit with the new aquaculture regulations being considered for fish and other animal seafood.**

Spirulina Microalgae: A Unique Organic Crop Production System