OPORTUNITY FOR ALGAE BIOMASS IN COMMERCIAL CROP PRODUCTION

FACILITATING THE SHIFT TO SUSTAINABLE AGRICULTURE
COMMERCIAL CROP PRODUCTION IS SHIFTING RAPIDLY TO SUSTAINABLE PRACTICES

• Soil Health is the key to Sustainability
• Biological Fertility Practices are key to Soil Health
• Algae Biomass is an ideal component for Biological Fertilizers
UNDERSTANDING CROP FERTILITY

SYNTHETIC FERTILIZERS
Feed Crop Only – Soil is generally Inert

• Agricultural Runoff a Major Problem
• New Regulations are Monitoring Nitrogen and Phosphate Runoff
• Industry trying to Adapt to Regulatory Environment:
  • Time Release Formulations
  • Precision Application and Timing

NATURAL NUTRIENT CYCLING
Inoculate & Feed – Soil and Plants Together

• Promotes the Microbial Biomass
• Eliminates Nutrient Runoff
  • Biologic Glues – Aggregate Soils
  • Greater Moisture Holding Capacity
• Carbon Sequestration
  • Agriculture can Rebalance the CO₂ in the atmosphere Faster and Cheaper
Sustainable Shift (Blended)

Synthetic Fertilizers

Nutrient Cycling

UNDERSTANDING CROP FERTILITY TREND TOWARDS SUSTAINABILITY

Synthetic Fertilizers expected to grow to US$185 billion until 2019
REBALANCING THE CO$_2$ IN OUR ATMOSPHERE, A MAJOR OPPORTUNITY FOR CROP PRODUCERS

Utilizing sustainable practices including nutrient cycling, Crop Producers can economically sequester CO$_2$ back into soils. The ability to accurately measure soil carbon and create incentives for growers to adopt sustainable practices is growing in awareness and practice.

Carbon sequestration on farmland, rangeland, and forests is likely to be a major driver of sustainable practices resulting in the reduction of synthetic fertilizers and the increased use of biological fertilizers that include algae biomass as a major ingredient.

**Carbon increases two ways:**

1. Liquid Carbon Pathway: Continuously growing crops – cash crop and cover crops
2. Increased Organic Matter in the Soil: Crop residue or added biomass
WHY ALGAE BIOMASS?

- **Nutritional Value:**
  - A complete amino acid profile - feeds plants and microbial biomass.
  - Positive antioxidant effects
  - Approximately **250 grams per acre per crop cycle** optimizes microbial interactions in biostimulant formulas – based on field trials.
  - **1 kg per acre per crop cycle** optimum in biofertilizer formulas

- **Electrogenetic:**
  - Electron transfer powers the microbial world. Small volume applications dramatically increases soil metabolism.

- **Mineralization:**
  - A natural chelator of minerals for microbial and plant uptake.
PLANT BASED BIOFERTILIZER TO OPTIMIZE NATURAL NUTRIENT CYCLING

Phyco BioSciences has developed Phyco Cyanoblend™, a blend of cyanobacteria, algae, and plant proteins that promote rapid microbial growth in the soil, and optimized plant nutrient uptake in cool temperatures.

Phyco Cyanoblend™ is used in fertility and soil inoculant formulations. Product is applied to crops in the irrigation water, or drench and foliar methods.

2015 – Lettuce Trials in Salinas, CA
18% yield increase, cartons/acre

Used by growers as a replacement for fish emulsion fertilizer.
- 100% Plant Based
- Unlimited Supply
- No Stink
PHYCO CYANOBLEND™ LICENSED TO BEEM BIOLOGICS, INC.

Beem Biologics, Inc. is a developer and manufacturer of biological compounds for the Crop Protection Industry based in Woodland, CA with manufacturing in Maricopa, AZ.

Beem Biologics manufactures ISO NPK™ which includes Phyco Cyanoblend™ in the formulation to broaden the amino acid profile and overall performance.
**ISO NPK™ INCLUDES PHYCO CYANOBLEND™**

ISO NPK™ is the first registered product of Beem Biologics, Inc. that uses Phyco Cyanoblend™ for agricultural, hydroponic, turf, and forestry applications. ISO NPK™ is being marketed by Beem Biologics in a biofertilizer formulation.

A unique formulation of ISO NPK™ has recently been licensed to a top 10 Crop Protection Industry firm with worldwide distribution. Large volume commercial sales are planned for 2018 for registered PGR/biostimulant and bioinsecticide formulations upon EPA approval.

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**Almond Trial, 2016**
LARGE MARKET OPPORTUNITY

Worldwide Crop Production, according to FAO:
> approximately 2.4 billion acres are farmed worldwide
> approximately 1.4 billion acres intensely farmed

US Only, according to USDA:
> United States has 960 million acres of cropland
> approximately 450 million acres intensely farmed.

Cotton Trial, 2015
Wheat Trial, 2015
Wine Grapes Trial, 2016
MARKET DEMAND FOR ALGAE BIOMASS

Projected 2018 – 2020 Demand: 5 million treated acres
   a. 5 million acres @ 1 kg per acre = 5,000 metric tons annually
   b. $20/acre* X 5 million acres = $100 million Value

Projected 2028 - 2030 Demand: 50 million treated acres
   a. 50 million acres @ 1 kg per acre = 50,000 metric tons annually
   b. $20/acre* X 50 million acres = $1 billion Value

Potential Demand: Carbon Sequestration: 200 million treated acres
   a. 200 million acres @ 1 kg per acre = 200,000 metric tons annually
   b. $20/acre* x 200 million acres = $4 billion Value

• Assumes $20/kg for algae biomass

NOTE: Projected Demand is not to be relied upon, but used for market perspective only.
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Facilitating the Shift to Sustainable Agriculture

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