Biological Time Machine

NORTHWEST, FL, USA, July 14, 2014 /EINPresswire.com/ -- Algae and bacteria are the oldest and fastest growing organisms on our planet. A single algae cell can reproduce itself multiple times in one day. Is this fast enough to produce sustainable biofuels in the USA? Emphatically “No”, according to a recent National Alliance for Advanced Biofuels and Bio-products (NAABB) presentation. (1)

At the 2013 Algae Biomass Summit in Orlando, John Ericsson, CEO of AlgaStar Inc., presented a session titled: Increasing Algal Biomass Production Using Electromagnetic Bio-Stimulation. Ericsson reported that the AlgaStar research team used biological stimulation to achieve a 300% increase in algae growth rate over normal conditions. Research recently initiated for AlgaStar (2) at Los Alamos National Laboratory (3) through the New Mexico Small Business Assistance (NMSBA) Program has begun to map the conditions under which biostimulation enhances growth rate and metabolism for several biological cultures with electro-magnetic field (EMF) energy similar to the Earth's magnetic fields existing millions of years ago.

Biological stimulation research began in the 1920s, re-emerged in the 1950s with the space race, and continues today. Music and wine grapes provide an interesting parallel track. If music makes better wine, might sound waves, electronic waves or microwaves similarly stimulate algae?

Music and Wine Grapes

Wine grape growers in Italy, South Africa, France, Washington and California play classical music (4)to the vineyards to enhance growth rates and sugar production. The music equipment company Bose(5) has sponsored music and wine research by providing their excellent speakers for placement in wine vineyards. The effect of sound on plants depends on frequency, intensity and exposure. In 2001, researchers (6) found that low-frequency sound does not change cell structure but does activate enzymes, increases cell-membrane fluidity, and promotes DNA replication and cell cycling.

Algae Biostimulation

Biological stimulation from electromagnetic fields and/or microwaves offer a novel technology that can substantially accelerate algae growth for biofuels and valuable chemicals compared with only natural sunlight. Laboratory tests at AlgaStar Inc., and research collaborators at the University of Western Ontario (7), have proven the biostimulation concept, but considerably

more research is needed. Additional research efforts with Los Alamos National Laboratory are now enabled through the NMSBA Program for AlgaStar's Biostim Inc. subsidiary. AlgaStar's grant applications and research-sponsored funding efforts hope to extend the Los Alamos research, and include the BioDesign Institute at ASU (8), the world-class AzCATI Test Bed at ASU (9), University of Western Ontario (10) and other corporate sponsors.

The AlgaStar algae production and biostimulation system integrates two types of electromagnetic energy. The first is a millitesla magnetic energy generator, and the second a millimeter microwave generator that radiates spontaneous growth energy into large volumes of algae biomass. The research teams have demonstrated that electromagnetic energy waves can provide an increase in algae biomass and its corresponding lipid oil production by up to 300%.

AlgaStar's USA patented 4500-gallon SolarMagnatron™, biomass production system uses an Automated Biosystem Controller (ABC), which optimizes biomass production. The ABC can control the biostimulation EMF frequency and amplitude to optimize the enclosed algae growth system and substantially reduce the risk of bio-culture crash. The ABC controls light, temperature, pH, nutrients and delivery of carbon dioxide to achieve optimal productivity. The ABC will allow the grower to harvest on precisely the schedule that maximizes growth, such as 1% of the biomass every 15 minutes, or 50% once a day. The ABC transforms the SolarMagnatron ™ system into an adaptable microcrop platform that can mimic ideal growing conditions for many algae species, as well as other microorganisms.

The SolarMagnatron system design allows continuous growth during daylight hours by maximizing the use of natural sunlight, and is constructed primarily of low-cost fiberglass, acrylic glass and flat glass/metal frame reactors. During the non-daylight hours, special domed acrylic lenses and flat-panel glass reactors containing high-efficiency fluorescent and LED lights produce artificial sunlight at specific wavelengths, and EMF power levels that help optimize 24/7 algae biomass production. Gravity flow and an air-lift-circulation system churns the energy-rich biomass for continuously moving 4500 gallons per unit through the biostimulation system thus requiring very little energy.

AlgaStar's SolarMagnatron production platform is economically built, ecologically sensitive and sustainable as it minimizes water consumption and evaporation. Production of oils, protein and carbohydrates per kilogram require less than 10% of the water consumed by field crops. Production of specialty products such as Omega 3 oil requires less than 1% of the water consumed by field crops. The system reduces costs further by allowing growers to use non-potable water such as brine, brackish, waste or ocean. An integrated UV and Ozone unit sanitizes incoming air & water, as well as recycled water after biomass harvest. In this enclosed, controlled system, genetically modified organisms can be grown with minimal risk to the natural environment.

Path Forward

AlgaStar's SolarMagnatron closed biosystem with electromagnetic field (EMF) stimulation methods have the potential to offer substantial value to the algae biofuel and other microcrop industries, like brewing and drug production, for turbocharging microorganism production. Future research extensions and validations are proposed by AlgaStar with Los Alamos National Laboratory, the BioDesign Institute at ASU, the AzCATI Test Bed at ASU, University of Western Ontario that hopefully will provide a fascinating examination and analysis leading to commercialization of many EMF biostimulation applications.

AlgaStar's EMF biostimulation technologies under development offer the promise of higher productivity for algae and other valuable microorganisms. The current research path could lead to opportunities for significantly enhancing commercial production of algae as needed by the NAABB for bio-fuels and other microorganisms for producing many valuable biochemicals used for nutraceutical (Omega 3 oil), pharmaceutical (antibiotics), food, and ethanol/alcohol products.

(1) http://www.energy.gov/eere/bioenergy/downloads/national-alliance-advanced-biofuels-and-bioproducts-synopsis-naabb
(2) http://www.algastar.com
(3) http://www.lanl.gov/science-innovation/capabilities/bioscience-biosecurity-health/bioenergy/index.php
(4) https://grapecollective.com/articles/does-playing-classical-music-to-vines-make-for-better-wine
(5) http://www.bose.com/
(6) http://www.musicforyourplants.com/
(7) http://www.uwo.ca/
(8) http://www.biodesign.asu.edu/
(9) http://www.azcati.com/
(10) http://www.uwo.ca/

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