

Biomonapp's Sensing & Monitoring of Plants/Fish & Water Quality for Ag Biotech & Bio Monitoring Environments

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ABSTRACT

Advanced Bioscience Sustainable Solution's biomonapp for bio monitoring environments, especially the aquaponics and hydroponics industry. [4] The app will connect with a sensor or photo spectrometer to show nutrition and crop yield data. We are currently licensing with Biodynamics in Akron to merge a sensor with Biomonapp, and bundle with solar kits, Back to the Roots tanks, and Husky aquatanks. Biomonapp can track and monitor diverse species of plants and fish. The Family Garden in Jamaica will monitor with the app and sensors to show crop and nutritional yield value, and track data in a local zoo. We are consulting with the Lettuce Do Good People who sell lettuce kits. We will conduct a market sampling with 600 clients in the plant and fish industry from IBIS world. Virtual simulations and Pod casts will be developed to teach about the optimal plant and fish variables. The mobile app has a platform for iOS or Android and is published in the Google play store. The company advantage is to provide 24/7 optimized monitoring of plants and fish for crop yield and nutritional value, collect data and send optimized reports via cell phone instantly through e-mail to the client end users.

Key words: biotechnology, agbiotech, bio monitoring, sustainable methods, hydroaquaponics, endemic & keystone species, food security

INTRODUCTION

We are a biotech monitoring company that monitors and tracks biological variables for water and animal species with regards to nutrition & crop yield for plants & fish in all growing systems. We have designed a mobile app for new innovative technologies in the Biotech industry. Our goal is to provide an inexpensive all inclusive monitoring solutions. Our app will include data visualization software that will enhance nutritional value & crop yield. The mobile app has a platform for iOS & or Android for publishing in the app stores & a web portal that can be downloaded from a website. There is a premium version of the app that uses a gps, and the end user can create unlimited variables to track any species data and include pictures and other details. Some unique variables could include endemic species or key stone species related to sensitive species, or to even track food safety.

FIELD OF INVENTION

The present invention generally relates to computer applications in the area of monitoring the quality of water and soil, and bio species, specifically to improve the quality of plants and fish. The mobile App is useful for the agbiotech companies and farmers, hobbyist & academics to grow healthy plants & fish. The app can analyze physiological nutritional changes according to variance in effecting variable factors.

BACKGROUND OF THE SUSTAINABLE FARMING WHAT IS HYDROPONICS?

Almost any plant can grow with hydroponics. The two main types of hydroponics are solution culture and medium culture. Solution culture does not use a solid medium for the roots, just the nutrient solution. The three main types of solution cultures are static solution culture, continuous-flow and aeroponics. The static culture plants are grown in static solutions such as in a mason jar, medium culture method has a solid medium for the roots and is named for the type of medium, such as sand, gravel, or rockwool. There are two main variations for each medium, sub irrigation and top irrigation. For all techniques, most hydroponic reservoirs are now built of plastic, but other materials have been used including concrete, glass, metal, vegetable solids, and wood. The containers should exclude light to prevent algae growth in the nutrient solution. There are also aeroponics systems that use air to optimize successful plant growth. This type of farming can benefit in a drought or major environmental shift that disrupt crop production. It can also aid in preventing toxins from getting to the species. [1]

DISADVANTAGES OF HYDROPONICS

Without soil as a buffer, hydroponic system can lead to plant death. Other disadvantages include pathogen attacks such as damp-off due to wilt caused by the high moisture levels associated with too much watering of soil based plants. Many hydroponic plants use different fertilizers and containment systems. A large amount of energy is required to create the mineral wool and fertilizers and the solutions need to be disposed of.

WHAT IS AQUAPONICS?

Aquaponics is completely sustainable in that the fish feed the plants and the plants feed the fish. It is a self-sustaining method of farming. "Aquaponics is the cultivation of fish and plants together in a constructed, recirculating ecosystem utilizing natural bacterial cycles to convert fish waste to plant nutrients.

This is an environmentally friendly, natural food growing method that harnesses the best attributes of aquaculture and hydroponics without the need to discard any water or filtrate or add chemical fertilizers." Aquaponic Gardening Community, November 2010. [2] Aquaponics is completely all natural, you can grow fish, shellfish or seaweed in controlled fresh and marine environments. Aquaponics produces higher productivity than hydroponics. Standing, hugging or walking are forms of mobility are internal energy sinks for terrestrial creatures, but not for fish. A fish is sustainably able to translate the majority of its caloric intake rich in protein and heart-healthy oil which generates more protein with less energy. The tanks for aquaponics vary in size, shape and materials and can range from 3 gallons to 3,000 gallons. They generally have float beds on top for the plants that must coordinate with the pH of the fish chosen. Fish Farming is a 78 billion dollar industry. One can regulate the amount of nutrients, pH, temperature, no weeds, fewer pests, water, and fertilizer, with bending, digging or heavy lifting.

DISADVANTAGES OF AQUAPONIC

The disadvantage of aquaponics is that uneaten food sinks to the bottom of the tanks. Also, if the ammonium gets in excess it can become a problem as it will deplete the oxygen in the tanks within one hour.

WHAT IS AQUACULTURE?

The nutrients of the plants come from the fish. Aquaculture dates back to ancient Chinese in the 5th century BC. They would capture fish and then transfer to artificial tanks to grow. The Romans cultivated oysters and the Egyptians used hieroglyphs to represent fish culturing. The most modern aqua tank occurred in 1733 by a German farmer. Farming pens were created of fresh and salt water. The current technique is known as RAS, recirculating aquaculture systems. Fish can be raised in large densely stocked tanks. Stocking densities can be as high as one pound of fish per gallon of water. [3]

OVER FISHING

Our oceans are the last wild source of food on our planet, and we are quickly emptying them of fish [7]

- 2048 fish species lost from over overfishing
- 70 % of fish species are currently endangered
- The National Center for Ecological Analysis at the University of California states that the ocean will become barren by 2048

- 85-95 % of fish are caught by commercial fishers (aquatic life is accidentally harvested by trawlers)
- We only eat 10% of the fish that is killed (Backyard Aquaponics magazine, 2009) [2]
- We have the capacity to catch 4 times the current supply and long enough hook lines to circle the globe 550 times

ADVANTAGES OF USING SUSTAINABLE METHODS FOR FISH FARMING & AG BIOTECH FARMING

Progress has been rapid, and the results acquired in various countries have proved hydro and aquaponics to be advantageous over conventional methods of agriculture. The most recent agbiotech conference in the fall of 2015 in Wooster, Ohio indicated the practical applications of both hydro and aquaponics. "Given the ecological viability of aquaponics, food would be significantly more just if this unique form of aquaculture (aquaponics) became the future of floating proteins." [11] Hydroponics and aquaponics can be used in places where in-ground agriculture or gardening is not possible. Smart methods for monitoring agriculture aquaculture & hydroponics raising organic vegetables, greens, herbs & fish include;

- No waste or pesticide damage
- No soil needed and water can be reused
- Increases stable crop yields, easier and cheaper to harvest
- Controlled nutrition levels
- No nutrition pollution released
- Pests and diseases are easier to detect than in soil because of containment mobility
- Uses 90% less water
- Provides sustainable solutions for Biotech agriculture

DEFINING CEA/ CONTROLLED ENVIRONMENTAL AGRICULTURE

Some examples of CEA are listed in this section. Hydroponics can be used with a floating raft set up or NFT, dry hard or vertical such as Despommier's skyscraper or bench style, for growing towers, for example the company Juice Plus sells these types of towers. Aquaponics can provide fish and produce. There can be Urban and indoor Agricultural environments. RAS or recirculating aquaponics systems can be inorganic or organic and have many market options that are pesticide free. Aerial environments provide equally distributed amounts of air temperature, relative humidity, oxygen; root temperature & water flow and require no light or physical support. For example some CEA's including, Urban Ag, Gotham Greens grows via roof top and is locally grown, the Plant Factory a small back yard restaurant, Green Sense Farm in Portage, Indiana. The market needs knowledge of consistent and reliable

products such as ECOTU, Bright Box with grow chambers, Urban Farmers NOVA Lignum.

SUMMARY OF CHALLENGES ACCORDING TO THE INTERNATIONAL UNION OF CONSERVATION OF NATURE

Seventy five percent of genetic diversity of agricultural crops has been lost. Seventy five percent of the world’s fisheries are fully over exploited. Seventy percent of the world’s known species risk extinction if global temps rise by more than 3.5 degrees Celsius. One third of reef-building corals around the world are threatened with extinction. One billion people are without proper water or sanitation. We need to educate people about energy, water availability, quality and re-use, and about plant nutrition. [10] We need to create a conceptual mighty mood where the market develops a mood for social development and the need for CEA to make cities have a green sustainable value that transmits to social communities. Our main source of energy by the year 2025 will be solar. Developments all over the world use urban farming to feed the world and provide the optimal use of energy.

COMPANY AIMS & EUROPEAN COMMISSION CONNECTION

Our company provides more connectivity and innovative integrated solutions, and software as a service new business model. Close to market and close to you with technological innovation efficient in water savings, no contamination of ground water, products that are traceable and healthy proving no pesticides or herbicide. We want to help prevent damage, helping to produce quality food for your own use and better quality of your products. The app can help to maximize production and optimize quality and sustainability.

Illustration 1. (Variables)



Illustration 2. (Company website)

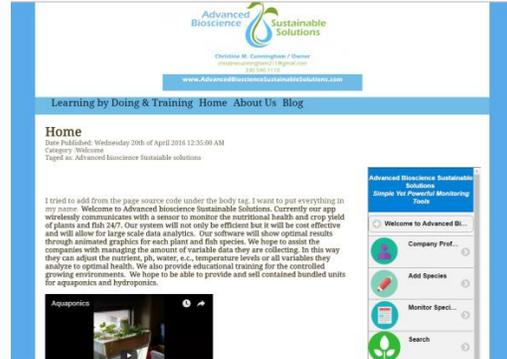


Illustration 3. (Setting up tracking)



Illustration 4. (Monitoring)



Illustration 5. (The app icon)



MARKET CAMPAIGN

A marketing campaign will be set up to sell the service client by client. The Ag biotech farmers surveyed want to be able to show nutritional value and increase crop yield for the plants & fish to stay competitive. Our company advantage is to provide monitoring of the species of plants & fish for crop yield and healthy nutritional value options. The app will collect data & report optimized data via cell phone & instantly through e-mail to the client end users. We now have licensing agreements and pay structure for the different market segments. Our detailed pricing structure is \$5.00/month for the basic subscription, \$10/month for the Premium and \$20.00 for the Pro unless bundled with tanks or kits. The e-commerce store is at shop.biomonapp.com. We are bundling with related aqua and solar products, such as with Aquasprouts and Brio tanks. We are planning partnered events and sending out a mass e-mail list. We also have a commercial and a Facebook account at Advanced Bioscience Sustainable Solutions LLC. & brochures. We also will have partnered events.

MONITORING

We provide 24/7 monitoring using the web based app. The app currently can collect data for variables related to bio monitoring of any species and improve productivity. Those who are growing plants and fish in any growing system can collect and track and optimize the daily monitoring. The current variables include ph., temperature, E.C., ppm, and water level, gps location, a picture and comments. We are currently suggesting the use of Hanna sensors and Spectrovis spectrometer with the Husky Aqua tanks and Back to the Roots tanks and Lettuce Do Good People kits owed by Katie Phibbs.

SSM TEXT SOLUTION OR E-MAIL REPORT

We will provide a custom report via text message or e-mail option that will optimize solutions that will tell you if you are out of range while caring for the species in your system. For example if the ph is too high or low you will get a text message to get the system within optimal range for efficiency and quality. We can also suggest nutritional data via the use of different sensors for example a spectrophotometer. When using this type of sensor it will show the absorption of nutrients for micro plants and larger harvests. There will be a bundle with tanks such as Back to the Roots 3 gallon tanks, Husky Aqua tanks

from 50 gallons to 3000 gallons, and vertical greenhouse Towers are from Juice Plus. We hope to be able to add a biochemical sensor and a spectrophotometer.

THE CONVENIENCE AND SUSTAINABILITY OF BIOMONAPP.COM

The app will optimize & increase quality of plant & fish yields and reduce error or misconception about plants and fish growth. The app will provide data analytics for growers progress and provide nutritional values to analyze physiological nutritional changes according to variance in effecting variable factors. We want to be able to bundle with tanks, towers, & seeds. The web portal will collect real time data and extend to social media so that users can network with hydroponic & aquarium groups to share information and compare results. This will be useful for the farmers, hobbyist & academics & retailers growing healthy plants & fish.

RECOGNITION

The first grant received was a NSF- I Corps Sites \$2500.00 grant from the University of Akron. The project also was presented at the Penn State Global Committee Poster Session in Atlanta, Georgia 2013. The published paper about the company was presented at the ICETI 2015 Conference Presentation in Orlando, March 12th and published in the Journal of Systematics & Cybernetics. We are considering repositioning the NSF-\$50,000 grant. The European Commission is asking for a partnership with the Horizons 20/20 grant, the Regional Studies has grants and the Youngstown State Small Business Incubator can help with the market segments and WE grants. We have had help from the Youngstown State Small Business Development center and the Youngstown Neighborhood Development Company. We will also be working with ETI technical college and Chatham University as we add sensors and build more of the e-commerce store.

DISCUSSION & PLANS FOR THE FUTURE

Our sales & growth is predicted by the number of end users & clients and those that download Biomonapp. One of our clients Biodynamics in the hydroponics industry recently purchased 500 apps to bundle with their solar kits. [5] We will link a solar sensor to that solar kit. The Lettuce Do Good People are an educational group with lettuce kits who can also bundle the app. We will market to the hobbyists, academics and schools using podcasts showing how to use the app and sensors with tanks. We will also be going to each client to help them get started monitoring and making sure they have the right sensors. We will then have to connect the app to the selected sensors. At some time in the future we will be order the spectrometers and one of the portable husky aqua tanks. We want to eventually bundle with the tanks and towers. We hope to reconnect with the Family Garden in Jamaica and have a fund raiser so that they can use the app and the sensors and possibly to introduce aqua tanks with their current gardens and teach about the monitoring and nutrition in gardens and their community zoo. We also will be putting the Back to the Roots and Husky tanks in schools to demo with an app and a chosen sensor.

SUGGESTIONS FOR AIMING TOWARDS SUSTAINABLE SOLUTIONS (REFLECTIONS FROM THE 2015 WOOSTER AGBIOTECH CONFERENCE)

There were about 30 professionals in attendance at the AgBiotech investment conference hosted by Sue Raftery and AGrown; their comments are in the appendix of this paper. It seemed as though a lot of attendees speculated about CEA. A lot of professionals thought needing to focus on serving size logistics for communities and schools to provide quality food. There was a lot of discussion about each type of CEA and RAS, from how to build them, how they function, and about the current looming food crisis and food security issues. Professionals from investment banks, Ohio State Agriculture, GE lighting, Urban and rural farming, NASA, Aeroponics, Crop King, individuals from Silicon Valley, and entrepreneurs were in attendance. Advanced Bioscience Sustainable Solutions will help to close the gaps on food security and monitoring, species decline, and provide healthy efficient solutions for growing nutritious food in a way that doesn't cost the environment.

GLOBAL SUSTAINABLE BUSINESS DEVELOPMENT

Advanced Bioscience Sustainable Solutions recently presented at the GSBED conference in New Jersey in the summer of 2016. There were many attendees from around the world providing suggestions to work towards Global Sustainable Business Economic development. We have been on a few conference calls with GreenBiz as well. While there has been a lot of speculation in the areas of infrastructure, product knowledge, and goals for saving energy across corporate entities and academics; there also needs to be continued sustainable support & solutions provided to maximize efforts for sustainable growth in regards to stewardship of the products and energy needed at our current rate of consumptions. Suggestions were made from the Vice President of sustainable initiatives from a pharmaceutical industry that lends towards healthier food for people with type 2 diabetes, and symbols that help people understand CEA. Other initiatives were provided from the Vice President of the World's 1st sustainable hospital that happens to be in New Jersey. There were also suggestions for creating safer water in Brazil and a piloted project taking place there. Professionals representing sustainable students and those involved in creating sustainable buildings talked about using proper sustainable building standards; such international green construction codes and sustainable business practices.

CONCLUSION

There has been much speculation about how to solve global sustainable problems and there are many companies providing practical services that aim in the direction of a green economy. However, practical applications in the real world need to work. People need to understand the need for CEA and RAS and the concepts behind those terms as far as what sustainability and AgBiotech actually means. There are many new companies springing up providing new products and they are generating revenue between 500k and 2.5 million. Biomonapp needs to discover more about what each market segment needs so that we can continue to provide innovative timely sustainable support,

monitoring, training & solutions. We hope to be able to expand the sale and bundling of the app to hardware and kits nationally and internationally as well as provide opportunities for food security, nutrition and safety. We also hope to be able to create books for different age school children on how to be sustainable with regards to CEA and RAS and the use of Biomonapp, biomimicry, biodiversity and conservation efforts. We want to be able to use the app to collect species data related to endemic and keystone species in various locations in regards to biodiversity to teach about conservation. We hope to also provide a small guide book for that by the summer of 2017.

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THERE HAS BEEN A LOT OF TRACTION FROM INDUSTRY ACADEMIA AND PROFESSIONALS (SEE APPENDIX FOR DETAILS)

APPENDIX

Mary Grace of Apreva a teacher & designer of horticulture with a M.S. in Business administration states that the more damage we make to the environment the more the waste. There

is a sum of 350 billion a year in food waste. She suggests quite a challenge to move towards local production.

Dr. Gene Giacomelli an Ag & bio systems engineering and director of controlled environment center in Arizona suggests raising the bar to Southern Europeans & utilizing resources more efficiently. He says that we are at an opportune time to be interested in high value food to reduce the challenge that will occur for no reason. We need to understand the problems with funding and community based projects. We have industrial food factories. Americans consume 32 times more than a Kenyan and there are 2.4 billion people in Africa. We need to diversify and infiltrate virtual integration of food processing, redefine food production systems, and be able to diagnose the indoor and outdoor health of food. We need to monitor the systems to maintain productivity. Renovated buildings provide Ag based information science. There is a lunar greenhouse in Arizona. We need to think about quality of food for life. One cannot think well, sleep well if you don't eat well. We need to think of tracking systems. Aeroponics stacks plants vertically and the greenhouse tomatoes exceed 60% with less waste. Field production is only 2% and 10% in feeding. June 2nd is the longest solar day. We need to look at field phonemics. Greenhouse any day has precision.

Gaetano Verdoliva CEO Aeroponica - 1st generation of farmers and puts farmers in the 1st place. They stack crops vertically in trays which diversify the crops in the trays and their production of tomatoes alone exceeds 60 %. He discussed that they have been in research for 25 years. The show room greenhouse works with productivity careful of disease prevention and spends time knowing the energy per crop production, using efficient energy productive systems preventing disease and time automated monitoring. There are 3 acres with 500 square meters of greenhouse in Cremona, Northern Italy, and 5,500 square meters in Tuscany.

Bibianna Heymann from the Vermont Business Ed. Center - discussed how to how to be a family grown business in Vermont.

Meiny Prins CEO Priva Holland houses 2,000 greenhouses and sends 20-25% of time on product development. "Drippers" bring water in Dutch greenhouse technology; in soft fruit stress the plant out in order to produce more fruit, to increase use 30% water and fertilizer efficiency, which increases 20% of quality production and crop yield. She says we need to investigate change.

Christine M. Cunningham Integrated Bio scientist and owner of Advanced Bioscience Sustainable Solutions took notes and discussed logistics of locations and serving sizes for food delivery. Monitoring for all species involved with aqua and hydroponics. She also discussed the fact there is less waste with aquaponic systems and the need to provide quality and nutritional data to customers.

Dr. Sue Raftery owner of AGROWN, looking at commercial scale controlled greenhouses and how to have a trained

workforce and CEA applied on-line industry food Nexus research center to be built in Vermont. She coordinated the 1st AgTech Investing Conference in Wooster, 2015.

Dave Bishop- regional sales manager for Conley's greenhouse manufacturing company horticulture market based out of California discussed that water consumption is less sales in California sales up over 40%. The niche has changed over the past 5 years and wanted to know how we keep up with production. He said that there is a disconnect in the food industry as to how to we put this all together small growers and hydroponics green houses. He discussed success rates and how to market it. Silicon Valley's drought farms consume 80% of the water that people use in California. California's drought is Asia's nightmare. The Arizona greenhouse uses 96% less water.

Anthony Totta - Founder chief Executive Officer & Produce his focus is on fresh foods and supply chain. He talked of how 500 tomato plants selling points and hands on retail, produce, and consult anting. He talked of the producer side of the industry. His passion pain point proper custodial the intended product ends up in consumers hands a common theme throughout career. He is passionate about children or when consumer doesn't feel the same about the product.

Col. Mark Mykieby (USMC Ret) Founding Co-Director Strategic Innovation Lab - developmental stealthiest food top drivers. The land of opportunity instead of the land of risk which is a huge global issue around food developing a grant strategy for sustainable agriculture. He stated that food security is national security. He said we need to be producers not creating waste.

Shareesh - GE with grow lights - what type of product do we put to market? How can GE be a potential investor? Her concern was also food that is wasted and how to get produce out more efficiently.

John Juhasz - Systems Engineer and NASA consultant - electrical engineering professor and power system development and how to improve that Energy tech conference to include energy systems that is extremely fragile. He suggested using NASA glen agency for power systems, fuel cells and management technology that we develop for more efficiency in robust water, food and energy systems that help the market segment application.

Dr. Michelle Jones - Ohio State University - Professor and DC Kiplinger Foundation Chair in the Dept. of Horticulture and Crop Science - horticulture extensions - talked about growers throughout Ohio - potted plants harvests Ag viable opportunities and encourage kids to be interested in entomology at Ohio State University. She provided challenges exciting ideas about entomologies to keep plants clean from pests and to be proactive to train for jobs.

Paul Brentliger - President of Crop King - facilitator to the industry and growers in all 50 states. His after sales support

success rate is that 75 to 80 percent of growers are still successful.

Phil Reitz- Investment banking - connector of capital he is a confluence of many trends. He stated that consumers want great food and that 40% of fresh produce is wasted of which twenty five pounds per person for greens. Moving from ideological great food security an economic proposition to attract capital to show you can make money and make it profitable.

Rebecca Harper of the Family Garden is registered with the rada and won an idb ideas competition in June of 2012. The competition provided a grant to help local farmers and schools in the community build hydroponic farms. The build included 12,000 sq. ft. facility in the Jacks Hill community with a central packaging house. She and her family built a team that works to produce quality food for Jamaica and for the Caribbean export. The farm grows cooking herbs, lettuce and other unique vegetables using hydroponic farming. They currently provide basil, cilantro, arugula, mojito mint, parsley, garlic chives, sage, lettuce mix, kale, rainbow Swiss chard, cherry and grape tomatoes. The sell to 12 supermarkets and 5 bulk wholesaler. She is interested in tracking data with the app to educate the employees and community about nutrition and food security. She also manages a local zoo and wants to use the app to track species in the zoo to optimize the health of the food they eat and their daily routines.