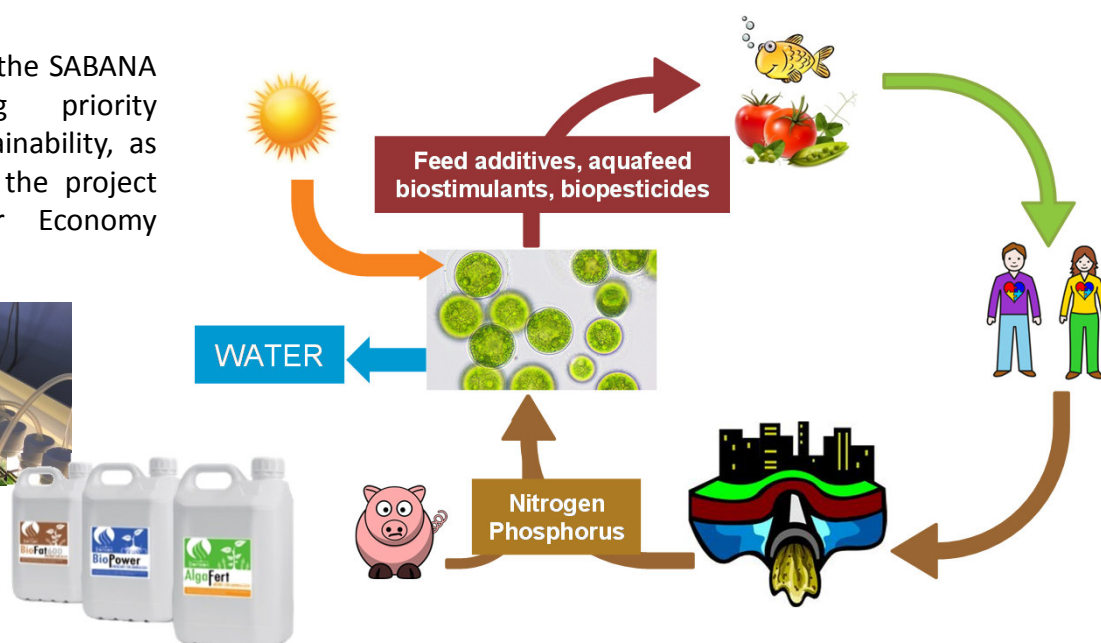
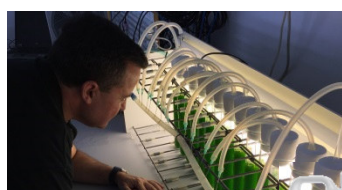


1st e-bulletin of SABANA PROJECT

Description of the project

Welcome to the 1st e-bulletin of SABANA. This project was submitted to the European Union's Horizon 2020 Research and Innovation program, under the topic H2020-BG-2016-2017 Blue Growth: Demonstrating an ocean of opportunities. As Innovation Action, it received funding from the under the Grant Agreement No. 727874 and started on December 1st of 2016. During four years, research and innovation activities will be performed to achieve the final goal: to build and operate a demonstration facility for producing biofertilizers/biopesticides and aquafeed at 5 ha scale.

Overall concept of the SABANA Project, showing priority products and sustainability, as well as the fit of the project into the Circular Economy concept.



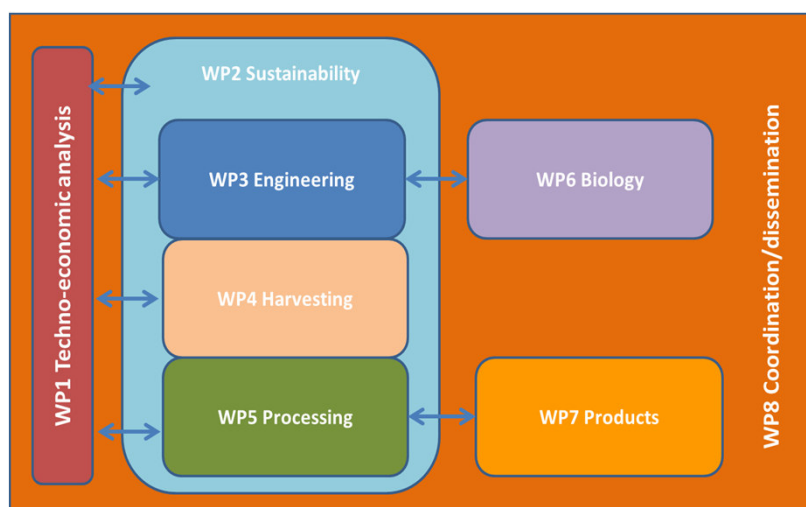
Major objectives of SABANA project include:

- **Large scale production:** To develop robust and scalable technology for microalgae production (including harvesting and processing), in continuous mode all year round, at minimum cost. Economic analysis must be used in decision making.
- **Sustainable production:** To integrate the treatment of wastes and increase the sustainability of the entire process. Life Cycle Analysis determines what is possible or not..
- **Markets/commercialization:** Only products now requested by markets and legally accepted are considered. Business plan is the driver of the project.

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Partners

The project is led by the University of Almeria but major actors are the companies involved into the project (FCC Aqualia, GEA Westfalia, A.I.A. S.p.A., Biorizon Biotech) in addition to high reputation research centers at EU level (Karlsruhe Institute of Technology, Mikrobiologický Ústav, Università Degli Studi Di Milano, Univ. Las Palmas de Gran Canaria, Szechenyi Istvan University, Consorzio Italiano Biogas e Gassificazione). In addition to 11 partners from 5 EU countries, Fundación Cajamar and IFAPA also collaborate in this project.



Work packages:

The work plan is divided in eight work packages combining scientific/technical research and innovation with market development and techno-economic and sustainability analysis.



Main tasks:

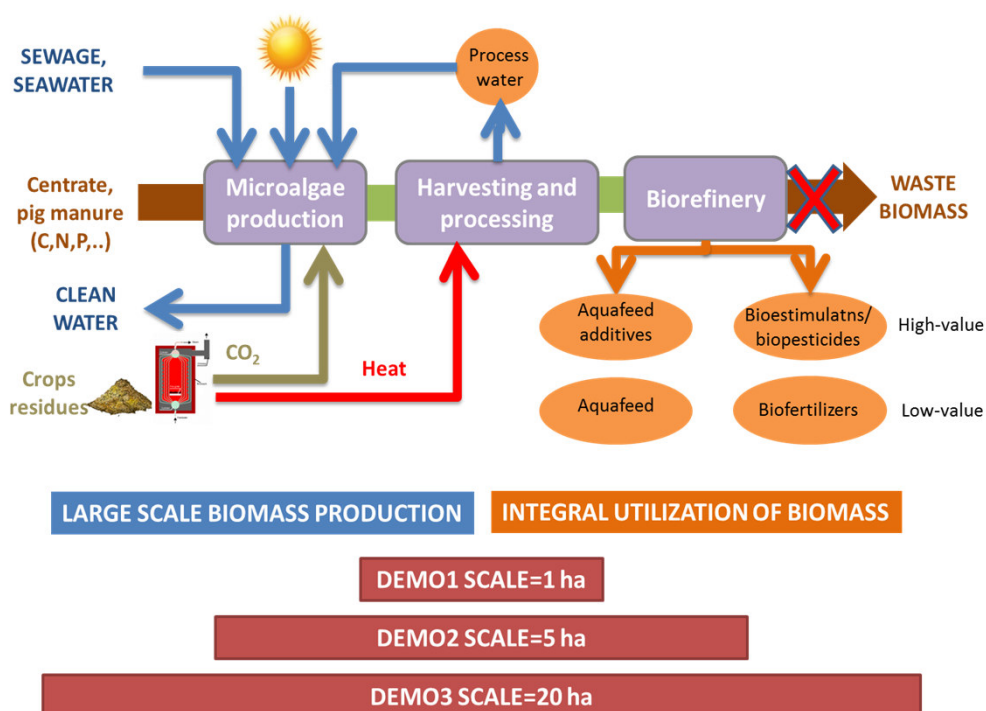
- Techno-economic analysis of developed production systems
- Sustainability analysis of proposed production schemes
- Enhancement of biological control of microalgae based systems
- Improvement of large-scale microalgae production technology
- Development of integral utilization of biomass processes
- Scale-up and demonstration of the developed technology
- Development of new products/applications based on microalgae
- To establish a Training Center for teaching and collaboration with other institutions
- Collaboration with other EU projects, companies, associations, etc.
- Creation of a Data Center for online availability of real data to associate entities.

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Objectives

SABANA aims at developing a large-scale integrated microalgae-based biorefinery for the production of biostimulants, biopesticides and feed additives, in addition to biofertilizers and aquafeed, using only marine water and nutrients from wastewaters (sewage, centrate and pig manure). The objective is to demonstrate the technical, environmental and social feasibility of producing valuable products for agriculture and aquaculture by using only marine water and wastewater as nutrients source.

Flow diagram of SABANA project indicating the raw materials, products and processes to be considered in addition to the scale of the project



Kick off meeting

Kick-off meeting was held at the University of Almeria on December 1st/2nd, 2017. During these days the partners review the work plan and developed working sessions for each one of the major tasks to be performed. It was an exciting event also used to disseminate the start of the project for the society.



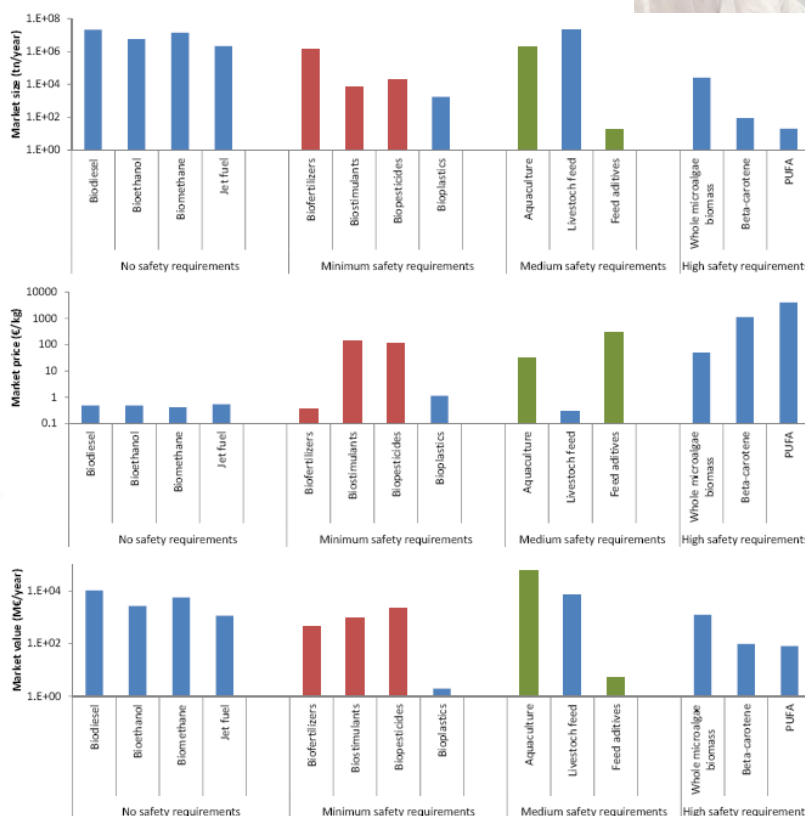
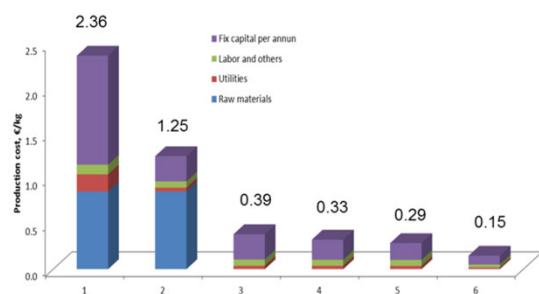
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WP1 Techno-economic analysis

Techno-economic analysis performed allows to identify biofertilizers/biostimulants for agriculture and aquafeed for aquaculture as most interesting products to be produced from microalgae biomass, especially when combining with wastewater treatment. The utilization of wastes (wastewater and manure) is the best strategy to reduce the production cost to achieve commercial processes.



Market price and size of different microalgae-based products

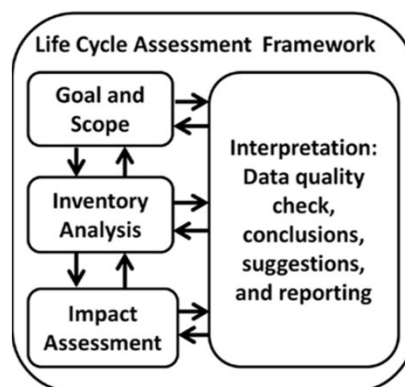


Influence of production technology/raw materials into the microalgae production cost.

WP2 Sustainability

The objective of this task is to identify potential social, environmental, health, safety and economic impacts throughout the production process developed.

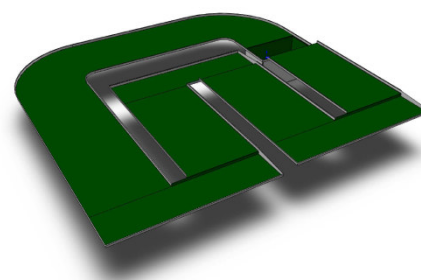
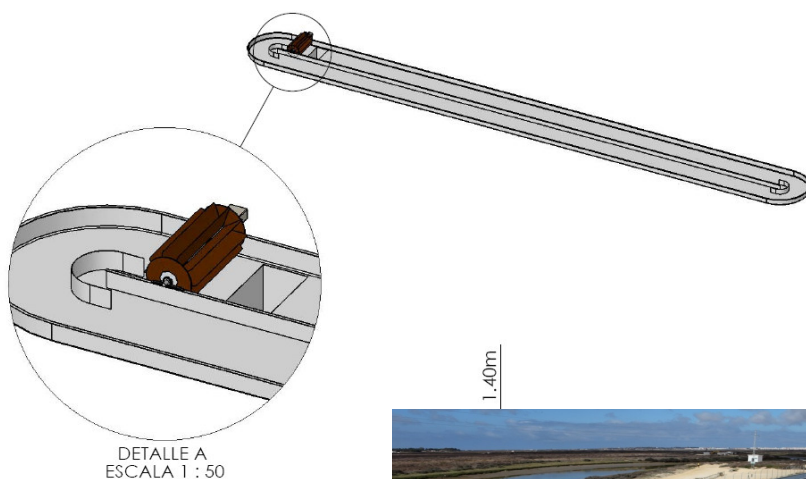
Where relevant mitigation measures will be developed and – if possible within the framework of this project- implemented, based on available best practices, exploiting the data and experience gained during the project in consultation with all partners involved in the production pathway.



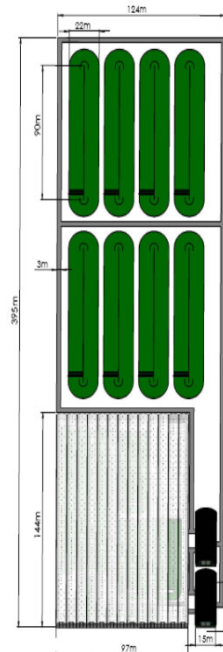
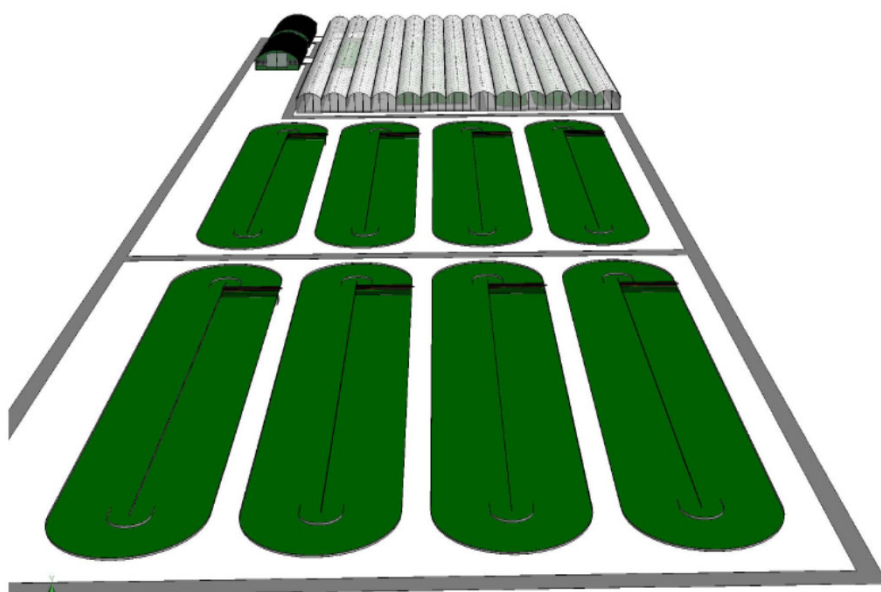
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WP3 Engineering

The basic engineering of the 1 ha facility is finished, the detail engineering of this scale being in progress to start to build the first research/innovation area. Optimized raceway reactors and thin-layer cascades will be evaluated.



Schemes of some of the reactors to be evaluated in SABANA project at the 1 ha facility. At this scale reactors up to 1.000 m² will be evaluated.



Schemes of some of the reactors to be evaluated in SABANA project at the 5 ha facility. At this scale reactors up to 5.000 m² will be evaluated.

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WP6 Biology

The SABANA project is based on the marine microalgae strains of the Spanish Bank of Algae (BEA) and the freshwater microalgae strains of the Mosonmagyaróvár Algal Culture Collection (MACC). Similar criteria are considered in both cases to select the most promising strains for the project purposes, like fast and homogenous growth and either plant growth promoting or antimicrobial activity, which are detected with preliminary bioassays before the start of the project. Specific marine strains are selected from the BEA for aquaculture purposes.



In the MACC (left) 970 freshwater microalgae strains are maintained and are cultivated in an algal culture apparatus (right) installed in a temperature controlled room.

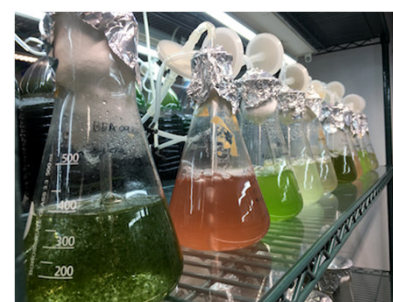
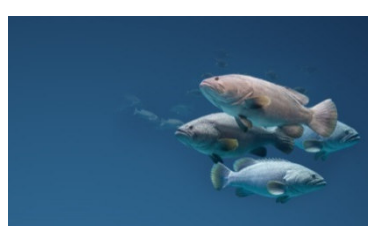


In case of freshwater microalgae fast growing *Scenedesmus* (10), *Chlorella* (10) and *Chlamydomonium* (1) green microalgae strains are selected for detection of their plant biostimulating effect with bioassays. Cyanobacterial strains, like *Anabaena* (5), *Nostoc* (5), *Tolypothrix* (2) and *Calothrix* (3) are involved into the bioassays for antimicrobial activity against plant pathogens



Similar to what it is described for MACC, at BEA, 1600 cyanobacteria and microalgae strains from different environmental conditions, bioprospected at the macaronesian region, are maintained and evaluated for biotechnological purposes.

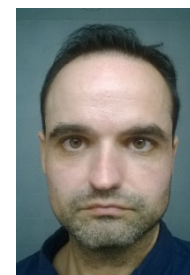
Regarding aquaculture possibilities, different strains are being grown with the main objective of obtaining possible candidates as a dietary protein ingredient for fishmeal and as a source of HUFA for fish oil replacement. Compared to standard strains such as *Tetraselmis*, *Isochrysis*, *Chlorella* or *Nannochloropsis* some other marine strains (*Chaetoceros*, *Odontella*, *Rhodomonas*, *Nannochloris* or *Picochlorum*) will be produced for comparison



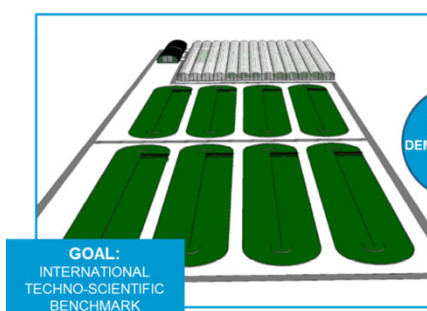
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WP8 Dissemination

SABANA project will disseminate the most relevant achievements using different tools/systems, including web page, social media networks, newsletter among others..



GOAL:
INTERNATIONAL
TRAINING
BENCHMARK



Next training courses related with SABANA project includes:

Undergraduate and Postgraduate course

Fundamentals of Microalgae Bioprocesses

Course Dates: July 3 - 27, 2017 (4 weeks), 80 hours. Organizers: Marine Microalgae Biotechnology Group of University of Almería. Chemical Engineering (University of Almería). Course leader: Emilio Molina Grima

AIM OF THE COURSE
The aim of the course is to provide the basic knowledge, needed skills, analytical and instrumental procedures to grow microalgae, characterize the biomass, and conceptualize microalgae processes. The major objective is to explain in clear and simple manner:
1. The needed knowledge and skills for culturing microalgae and cyanobacteria.
2. The fundamentals for designing, setting up, operation and control of photobioreactors (PBRs).
3. The essentials of fluid-dynamics and mass transfer within the PBRs.
4. The major unit operations for harvesting and processing the biomass.
5. The basic principles of techno-economics assessment of microalgae bioprocesses.

COURSE CONTENTS
- Biology and basic principles of microalgae cultures
- Fundamentals of microalgae Photobioreactors (PBRs) design
- Harvesting and processing of microalgae biomass
- Commercial application of microalgae and techno-economic assessment of microalgae processes

PARTICIPANTS
The summer course packages include accommodation and meals, local transport voucher, cultural tours and trips, among other services (see the attached document). The workload of the course is 80 hours and they can be recognized by up to 11 ECTS credits at the home university. Please notice that our summer courses are addressed both to Undergraduate and Postgraduate students. <http://www.uca.es/UAL/ingles/undergraduate/postgraduate/summercourses/summercourses.htm>

COURSE LECTURES & ORGANIZERS
Course lectures (40 hours), short lab and pilot plant practical (20 hours), digital sustainability assessment of the case study proposed in module 4 (5 hours) and visit of the Cajamar Foundation-UAL facilities (5 hours)
Marine Microalgae Biotechnology Group of University of Almería
Prof. Emilio Molina Grima (Course leader), Prof. Francisco García Camacho, Prof. Alfonso Robles Medina, Prof. Francisco Gálvez Acuña Fernández, Prof. José María Fernández Sevilla among others researchers.
Organic and organometallic chemistry Group of University of Almería
Prof. Fernando López Ortiz
Aquaculture and water ecology Group of University of Almería
Prof. Francisco Javier Alonso López
Development of microalgal techniques for improvement of soil of agricultural interest of University of Almería
Prof. Francisco Suárez Estrella
Aqualia, Fran Rogalla (i+d Leader)
Biorizon, Joaquin Pizarro Diezga (i+d Leader)

PROGRAM COSTS
- Standard registration: 1,800 EUR
- Without accommodation: 700 EUR
- Early bird registration: 5.5% discount (1,700 EUR) for courses booked before March 30, 2017.
- Possibility of payment in installments (900 EUR x 2)

REGISTRATION AND INFORMATION
Application deadline:
- Early bird registration (5.5% discount): March 30, 2017
- Standard registration: May 20, 2017

CONTACT
Should you need further information, please do not hesitate to contact us.
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MICROALGAE AND SEAWEED PRODUCTS IN PLANT/SOIL-SYSTEMS

26-27 June 2017
Mosonmagyaróvár – Hungary

1st Announcement

Organisers

Department of Plant Sciences
Faculty of Agricultural & Food Sciences
Széchenyi István University
Mosonmagyaróvár - Hungary

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