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SABANA project: Demonstrating the application of microalgae in agriculture and aquaculture

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Abstract:

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. The objective is to achieve a zero-waste process at a demonstration scales up to 5 ha sustainable both environmentally and economically.

Market analysis shows as biofertilizers and aquafeed are highly interesting applications of microalgae biomass. However, to be competitive on these fields to produced biomass at cost lower than 1 €/kg is mandatory. Alternatively, high value products as biostimulants, biopesticides and feed additives can be also obtained from microalgae biomass the acceptable production cost being in the order of 10 €/kg. Techno-economic analysis demonstrates that to achieve this production cost the utilization of wastewaters and the optimization of productivity in open reactors is required. Additionally, the downstream processing of the biomass must be simplified and focused to transform the entire biomass into products without releasing wastes.

Strains suitable to be used for these applications have been selected and evaluated. Data shows as the concentration of phytohormones is much higher in green algae, such as Scenedesmus, than in cyanobacteria such as Spirulina among others. Additionally, the phytohormones content was much higher in freshwater strains that in seawater strains. Opposite, seawater strains are richer in polyunsaturated fatty acids highly demanded in aquaculture. Anyway, all the selected strains were capable to growth using wastewaters as only nutrients source. Two different valorization routes are proposed for agriculture and aquaculture products. Regardless of the valorization route, the cell disruption step determines the quality of final products. First products are being obtained and evaluated for both agricultural and aquaculture uses, prior to market evaluation by companies. Thus, SABANA is expected to conclude with real commercial processes demonstrated at commercial level.