

# MARIGREEN

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- Extracting biostimulants
- Effect of biostimulants on biological systems
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*Valorization of BlueBio mass for promoting plant growth!*

## Chemical and biological profile

### Blue Bio mass bioactive compounds

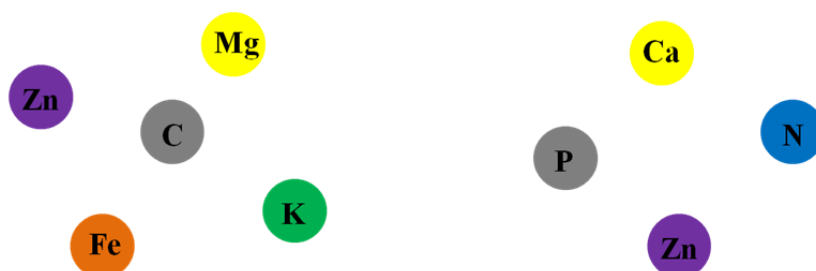
Biostimulants, as compounds promoting plant resistance or decreasing abiotic stress, have been increasingly gaining attention worldwide. In that respect, fish processing waste and seaweed products merit potential applications as plant fertilizers and biostimulants. Therefore, it is important to gain knowledge on how to screen for and extract biostimulants from marine product waste using green technologies (**Fig. 1**) or conventional methods used for post processing. Photosynthetic elements, micronutrients, essential metal ions and organic compounds of biological activity have been determined in seaweed products, with the most important ones being shown in **Fig. 2**. Specifically, comparing the same amount of seaweed type and fish residue samples shows that the important photosynthetic nutrients N and P are found in higher amounts in fish residues, whereas that of K appears in seaweed. Furthermore, heavy metals like Arsenic (As), Nickel (Ni), Molybdenum (Pb), and Cadmium (Cd) have been determined at



**Fig. 1: Green extractions**

### Seaweed

### Fish residue

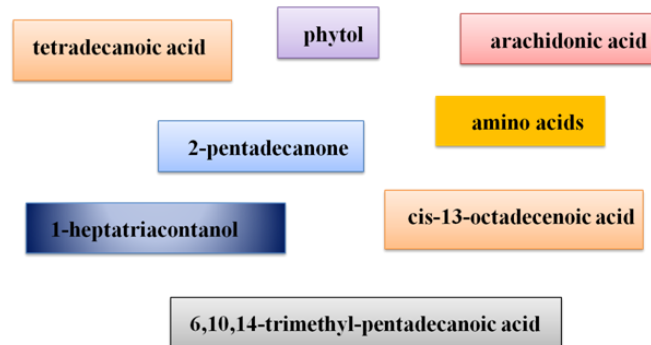


**Fig. 2: Screening of BlueBio samples**

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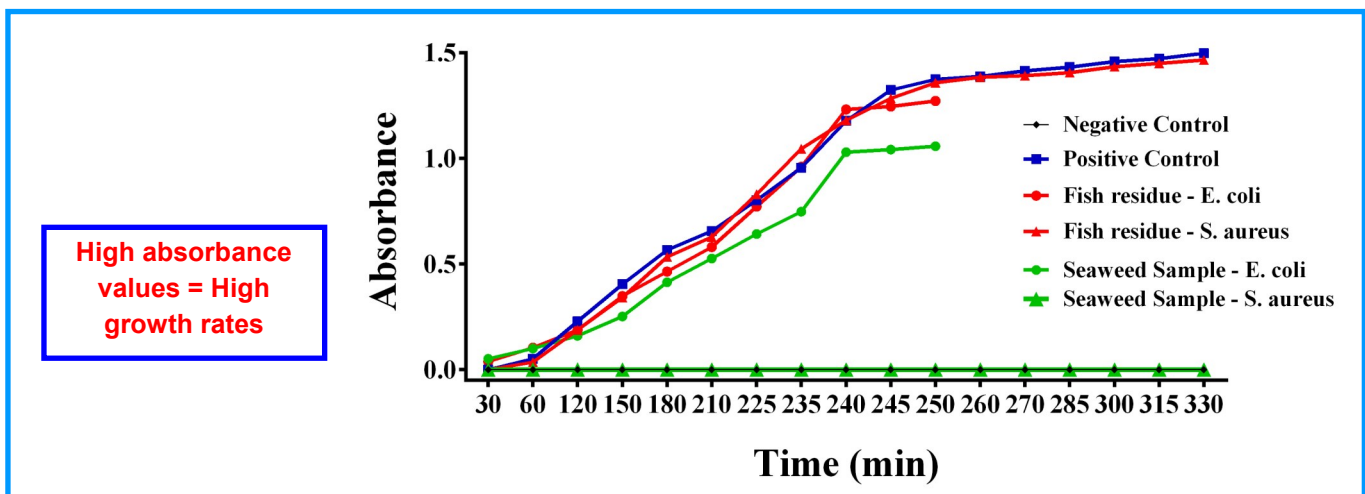
## Biological impact

concentrations higher than 1.0 mg/kg in seaweed samples, with the fish residue showing only excess of Arsenic (As). Moreover, compounds of potential biological interest in the growth profile of plants have been determined as shown in **Fig. 3**, including more than 14 different types of amino acids.



**Fig. 3: Compounds and aminoacids contained in BlueBio samples**

To that end, having a considerable amount of metal ions and organic compounds in both seaweed and fish types of samples renders important the investigation of their biological profile in prokaryotic and eukaryotic cells, thus ensuring that no toxic amounts of biostimulants pass through the soil and plants and then on to human metabolism. That way, they will be used in soil treatment and crop plant growth as long-term fertilizers and plant growth enhancers. In addition to containing stimulants enhancing plant growth, aquatic organisms are also known for their antimicrobial potency and ability to provide protection to plants against their natural invaders. In general, extracts of marine fish or algae samples can induce changes in the physiological-biochemical process associated with plant nutrient uptake and growth in agriculture. To that end, in this study, it has been shown that extracts of blue marine organisms do not affect growth of prokaryotic (**Fig. 4**) cells.



**Fig. 4: Biological effects of BlueBio samples in common bacteria**

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## Biological impact

On the other hand, only Gram-(+) bacteria have been shown to be affected, decreasing their growth rate, when treated with a specific type of blue organism seaweed extracts from *Ascophyllum nodosum*. In the case of eucaryotic (Fig. 5) cells, in most cases, an increase of cell growth rate is observed, thus verifying that the amounts of essential and non-essential metal ions as well as the existence of some fatty acids and amino acids in BlueBio samples will not affect the overall living organism systems in soil and plants.

### Physiological Neuronal Cell Line - N2a58

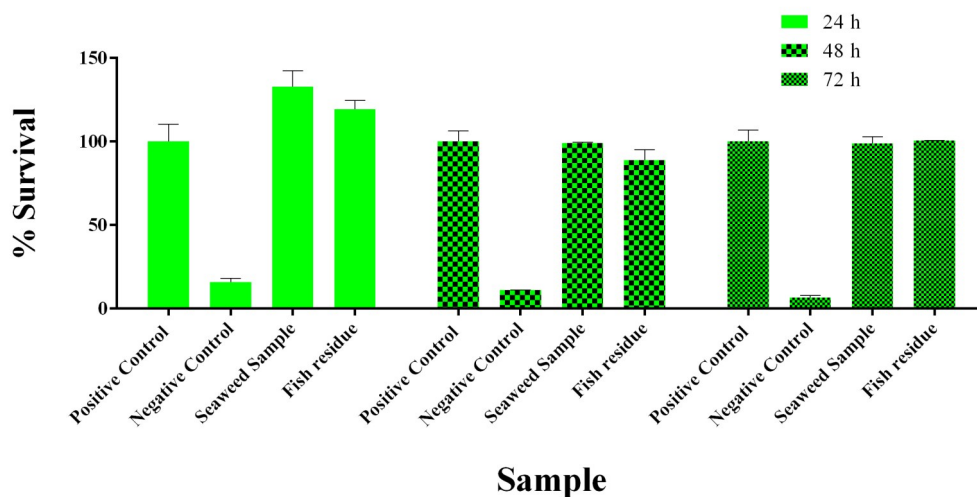


Fig. 5: Eucaryotic cell culture survival upon BlueBio mass exposure



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