Industry white paper report on Biostimulants

About this report-This report covers detailed information on biostimulants with a particular focus on seaweed-based biostimulants.

Aim-To have an overall understanding of biostimulants allowing readers to identify key investment and business opportunities in this segment.

1. Introduction to biostimulants-

1.1 Definition-

A plant biostimulant is a substance or microorganism applied to plants with the aim to enhance nutrition efficiency, abiotic stress tolerance and/or crop quality traits, regardless of its nutrients content.

By extension, plant biostimulants also designate commercial products containing mixtures of such substances and/or microorganisms. [1]

1.2 Key benefits- [1]

1. Improved nutrient uptake: Biostimulants can improve the availability and uptake of essential nutrients by plants, which can lead to improved growth, development, and yield.
2. Enhanced tolerance to abiotic stress: Biostimulants can help plants tolerate various abiotic stressors, such as drought, salinity, and extreme temperatures, by improving their physiological and biochemical responses.
3. Increased crop quality: Biostimulants can improve the quality of crops by enhancing their nutritional content, flavor, color, and shelf life.
4. Improved soil health: Biostimulants can improve soil structure, fertility, and microbial activity, which can benefit the growth and health of plants in the long term

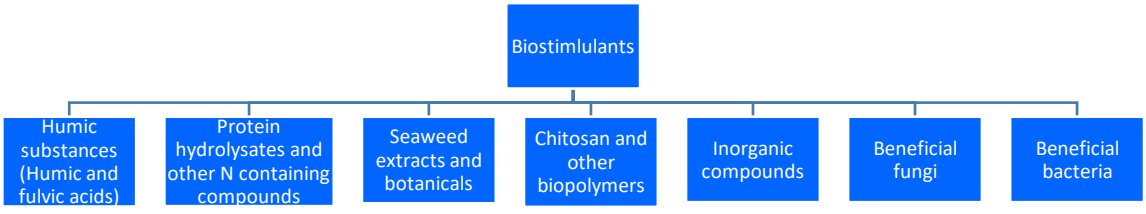
1.3 Range of applications-[2]

Industry Category	Applications
Agriculture Row crops on large areas	Potatoes, cereals, soybean, wheat, maize, rice, oilseed rape, sugar beet, barley
Horticulture- Vegetables, fruits, etc.	Fruits: Watermelon, apple, banana, grape, olive, orange, papaya, pear, strawberry, lemon trees, etc. Vegetables: bean, cabbage, broccoli, carrot, cauliflower, cucumber, eggplant, lettuce, onion, pepper, spinach, tomatoe, etc.
Ornamentals- Cut flowers, plants, bulbs, forest seedlings, etc.	Amaranthus tricolor, Marigold, Petunia, Pansy and Cosmos, paper birch, beech
Other applications- Pastures, sporting fields, etc.	Turf and forage grasses, tall fescue sod, turf grass, rye grass

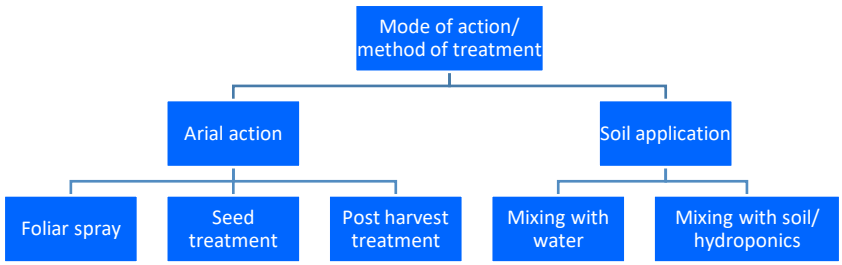
1.3 Categories-[2]

Bio-stimulants are categorized depending on their chemical composition and mode of action-

1.3.1 Chemical composition/active Ingredients-



1.3.2 Mode of action-



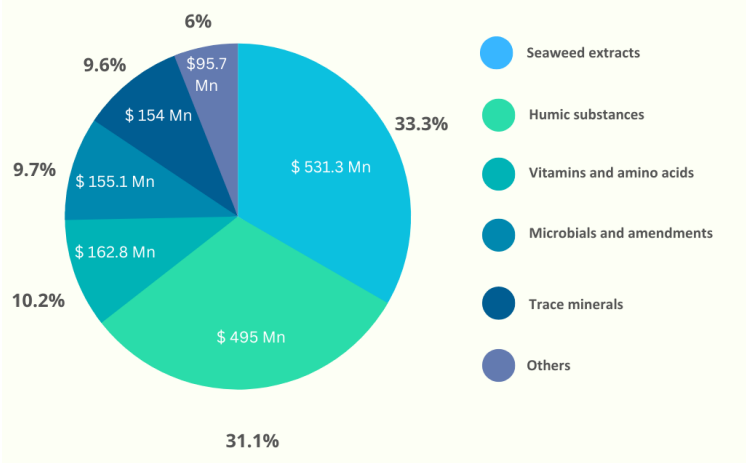
2. Global biostimulants market-

2.1 Overview-

The global biostimulants market size was valued at USD 2.6 billion in 2022 and is anticipated to expand at a compound annual growth rate (CAGR) of 7.4% from 2023 to 2030. [3]

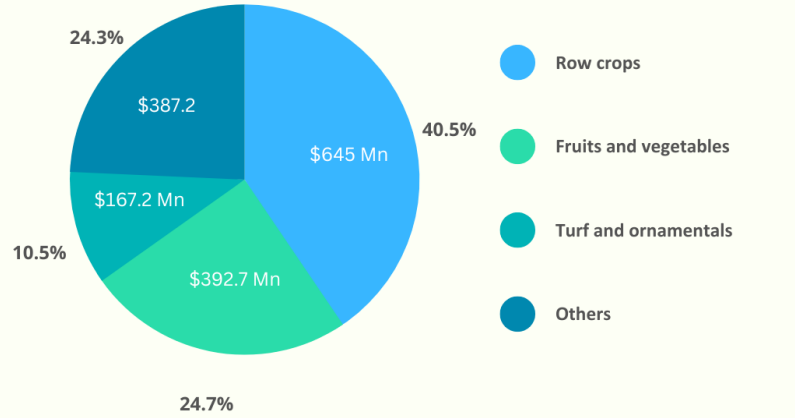
2.2 Biostimulant markets based on classifications-[2]

2.2.1 Market by chemical composition/active ingredients (as of 2016)-



- Seaweed extracts constitute 33% of the total consumption of biostimulants and are projected to grow with the highest CAGR of 10.5%.
- Humic substances constitute 31% of the total consumption of biostimulants and are projected to grow at a CAGR of 10.4%.

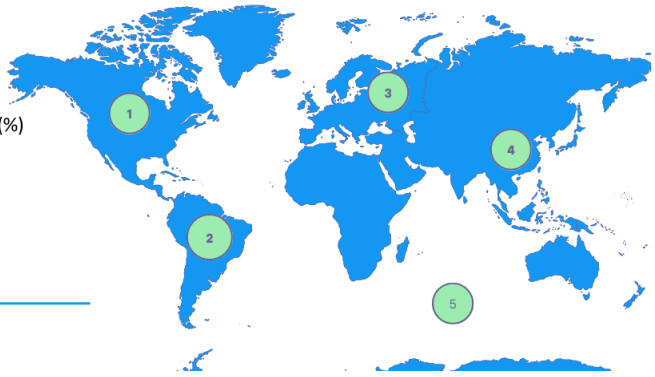
2.2.1 Market by crop type (as of 2016)-



- More than 40% of the global biostimulant market is represented by biostimulants used for row crops. Row crops generally include Cereals, oil-seeds, pulses and fiber crops.

2.3.3 Market value by geographic region (as of 2016)-

Region	Market value (USD Mn)	Share (%)
1) North America	231	14.5
2) South America	223	14
3) Europe	638	40
4) Asia Pacific	435.6	27.5
5) Rest of the world	66	4.2
Total	1593	100



- Europe has the highest global market share of 40% and represents $638 Mn of total value.
- For reference, Europe only uses biostimulants in 0.3% of its agricultural land leading to vast scope of growth.

2.2.4 Market by total area (%)-

- The global biostimulant market covered an area of 14.3 Mn hectares in 2016.
- Almost 40% of the globally treated area is used to produce row crops.
- The total area of global agricultural land is 4,689 Mn ha, which makes the area covered by biostimulants to be 0.003%.

3. Introduction to seaweed-based Biostimulants-

3.1 Introduction-

Seaweeds, also known as marine macroalgae, contain a wide range of beneficial compounds such as carbohydrates, amino acids, vitamins, minerals, and growth regulators that make them effective biostimulants in agriculture.

Seaweed extracts have been demonstrated to modulate gene expression and induce metabolic changes in treated plants, thereby enhancing nutrient use efficiency, and abiotic stress response and providing other biostimulant effects. [4]

3.2 Popular seaweeds used in Biostimulants-



1. *Ascophyllum nodossum*
2. *Kappaphyus alvarezzi*
3. *Sargassum spp.*
4. *Laminaria spp.*
5. *Gracilaria spp*

4. Indian seaweed-biostimulants landscape-

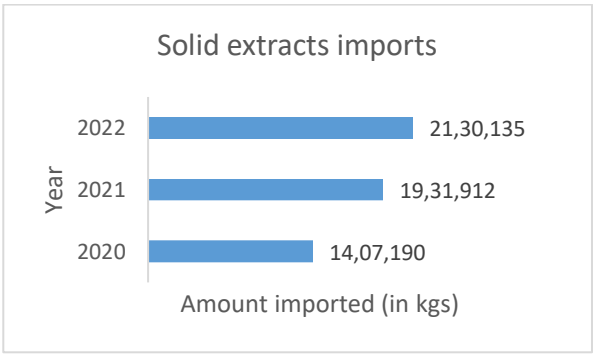
4.1 Overview-

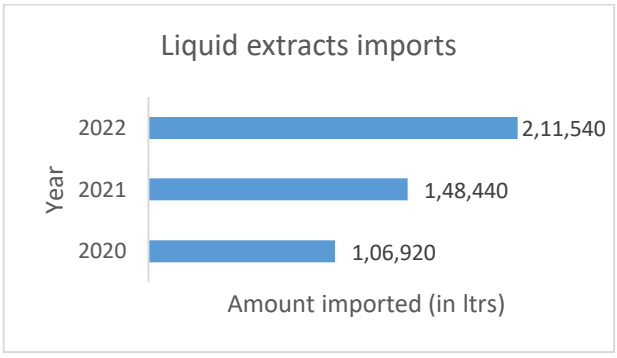
- The India biostimulants market is currently valued at $58.11 Mn in 2022 and is projected to grow to $734.13 Mn by 2029, at a CAGR of 15.57%. The seaweed-based biostimulant market is valued at $37 Mn constituting 63% of the total market share.
- Major players in this segment include Biostadt industries, PI industries, IFFCO, Nova agriscience, and Sea6 energy.
- India imports majority of its seaweed extracts (solid extracts and liquid conc.) from countries such as China, Canada, Norway, South Africa etc.

4.2 Imports data analysis (Jan 2020- Dec 2022)-

As mentioned, India is highly dependent on foreign imports making it important to analyze its import data.

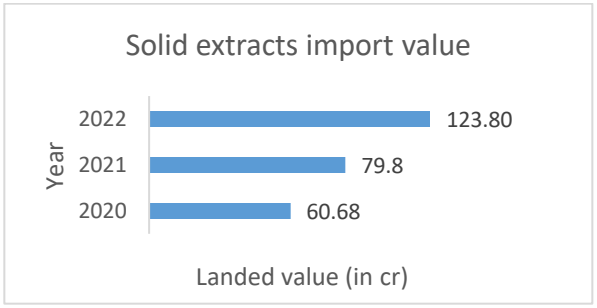
4.1.1 Quantity imported-

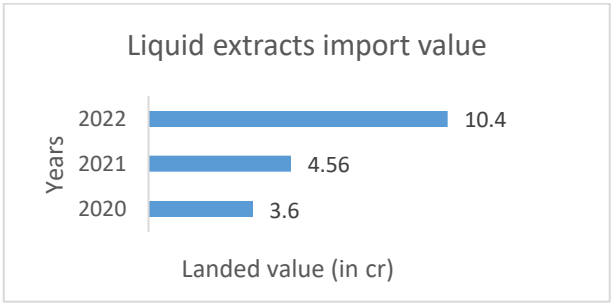




4.1.2 Value of shipments imported-

- The landed value of shipments (solid extract and liquid conc.) doubled from 54cr in 2020 to 112 cr in 2022.





4.2 Local biostimulants production landscape-

- The top major seaweed-based biostimulant manufacturers are- Biostadt Industries, PI Industries, IFFCO, Nova Agriscience and Sea6 Energy.
- Majorly imported non-indigenous seaweed extracts such as Ascophyllum Nodosum and Laminaria are favored over locally available species.
- Seaweed-based Biostimulants in India are sold in 3 forms Granular, powder, and liquid conc.
- The standard formulations are as follows-
    1. Granules- 5% seaweed extract sprayed over zeolite granules mixed with macro/micro nutrients
    2. Liquid- 28% w/v seaweed extracts mixed with macro/micro nutrients
    3. Powder - Powdered seaweed extracts with macro/micro nutrients

- Kappaphycus Alvarezii and Sargassum wightii are the favored local seaweed extracts used for biostimulant manufacturing.
- Major biostimulant manufacturers favor imported seaweed extracts for the following reasons-
    1. Existing products lined based on above mentioned non-indigenous seaweed species
    2. Lack of consistent and continuous supply due to fragmented seaweed cultivation in India.

4.3. Market potential for seaweed-based biostimulants in India-

India's biostimulant market presents a vast untapped potential, driven by a range of compelling factors that contribute to both consumption and production. The following reasons highlight the immense opportunities that lie ahead:

1. Majority of the seaweed extracts are imported into India making it heavily reliant on imports
2. Less than 1% of the total agriculture area in India is treated with biostimulants
3. Increasing government subsidies and incentives for the usage of biostimulants
4. Increasing government subsidies and incentives for cultivating seaweeds
5. Increasing government restrictions on the usage of synthetic chemicals in agriculture
6. Increasing consumer awareness of the benefits of organic and chemical-free vegetables and plants
7. Steady demand and consumption of biostimulants in India.

References-

[1] (Du Jardin, P. (2015). Plant biostimulants: Definition, concept, main categories, and regulation. *Scientia horticulture*, *196*, 3-14.)

[2] https://www.noordzeeboerderij.nl/public/documents/Bio4safe_WP1_D111_Seaweed-Biostimulants-Market-Study_2018.pdf

[3] https://www.grandviewresearch.com/industry-analysis/biostimulants-market#:~:text=The%20global%20biostimulants%20market%20size,%2C%20soil%2C%20and%20foliar%20treatment.

[4] https://biostimulants.eu/wp-content/uploads/2023/01/20230116-EN-Seaweed-WhitePaper-v11.pdf