

Plant biostimulants for efficient nutrient use and food security in Europe



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What are plant biostimulants?

A plant biostimulant is a (EU) fertilising product, the function of which is to stimulate plant nutrition processes independently of the product's nutrient content. Its objective is to improve the following characteristics:

- nutrient use efficiency,
- tolerance to abiotic stress,
- quality traits, or
- availability of confined nutrients in the soil or rhizosphere.

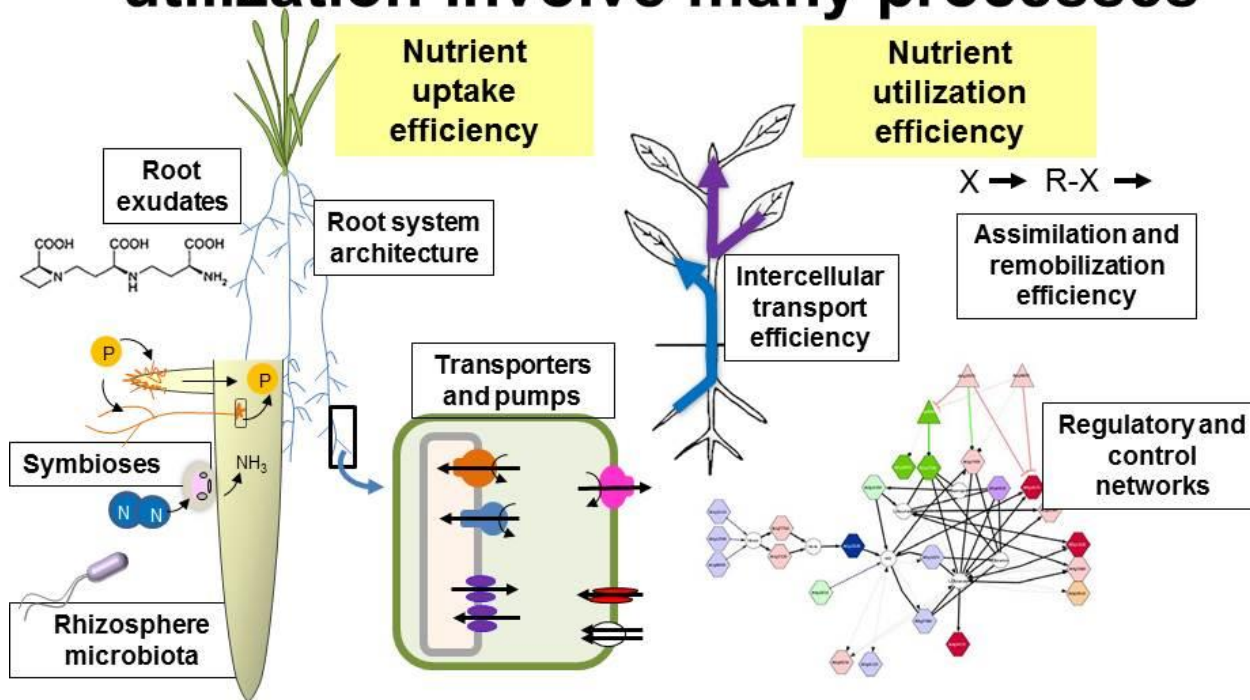
Defined in Reg (EU) 2019/1009

→ Plant biostimulants are defined by what they do, not what they contain!

- Plant biostimulant may contain various types of substances such as seaweed and plant extracts, hydrolysed proteins, microorganisms, humic and fulvic acids, chemical substances, etc.
- They are assembled in a product to obtain one or more beneficial effect(s) on the targeted crop(s), following specific use instructions.

Biostimulants increase **nutrient use efficiency (NUE)**

Nutrient uptake, assimilation and utilization involve many processes



NUE can be improved in many ways, which can have side benefits:

Few examples:

- increase root growth, which **improves nutrient and water uptake**, helps anchor soils against erosion, and increase soil carbon
- **solubilize nutrients blocked** in soil such as P into forms plants can absorb
- Impact **nutrient mobilisation, use and transformation** within plants, triggering nutrient uptake by roots
- Certain **microbial biostimulants fix N from the air** and share it with the plants they are in symbiose with.

Biostimulants can reduce nutrient losses & improve their use within plants.
→ Good for the environment and farmer's incomes!

Failed harvests = wasted nutrients



The potential impact of climate change on European food production is considerable

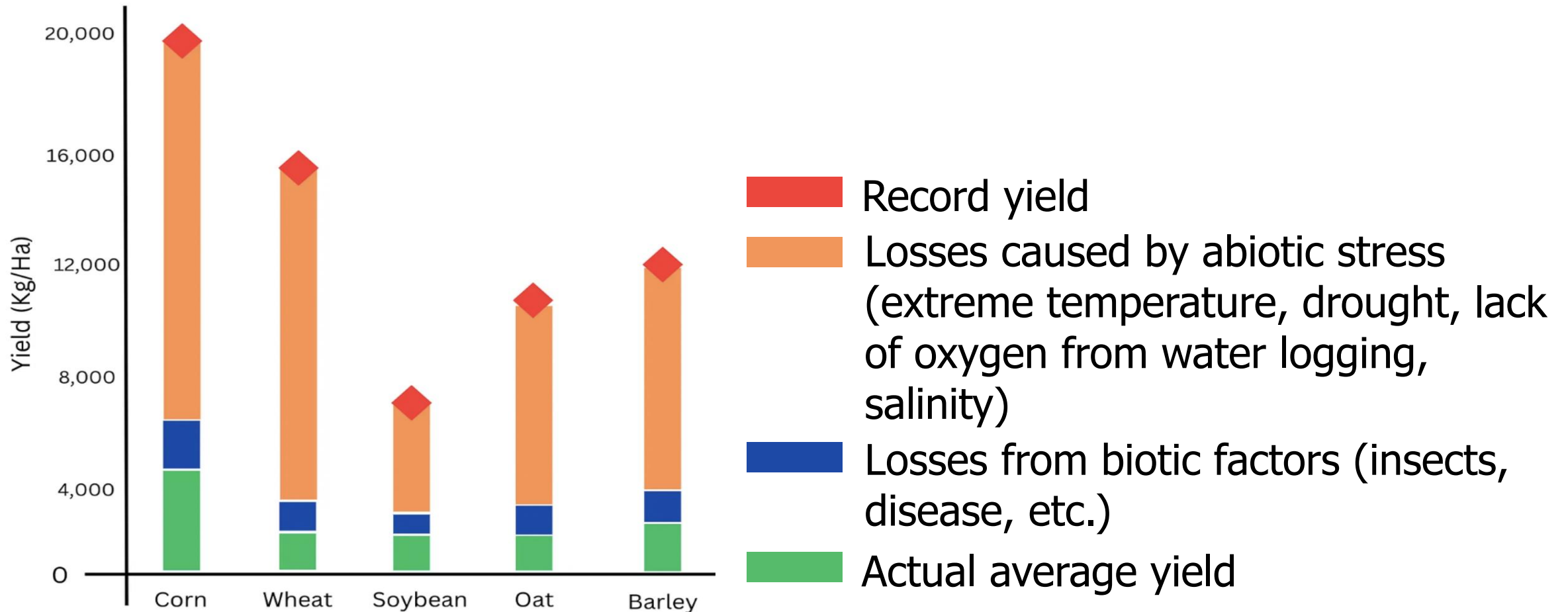
According to the European Environment Agency (EEA)'s 2019 **Climate change adaptation in the agriculture sector in Europe** [report](#),



Under a high-end emission scenario, southern Europe is projected to face **reduced yields of non-irrigated crops of up to 50% by 2050**, and a reduction in farmland economic values of over 80% by 2100.

EU Agriculture needs to adapt to climate change fast if we are to secure our food production.
→ **Biostimulants, thanks to their benefits, are part of the solution!**

Crop losses due to abiotic stresses dwarf those caused by pests and diseases



Source: Buchanan, Gruissem, Jones: Biochemistry and Molecular Biology of Plants, American Society of Plant Physiologists, 2000

Most abiotic stresses are worsened by climate change

- Drought
- Extreme temperatures
- Salinity
- Excessive sunlight
- Wind
- Rainfall
- Flooding



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Abiotic stresses have implications at plant-level

Elevated Temperature

- Destabilization of membranes and proteins
- Photosynthetic and respiratory inhibition
- ROS Production
- Cell Death

Soil compaction

- Reduction of breathing
- Inadequate ATP production
- Production of toxins by anaerobic microbes
- EROS Production
- Stomatal closure

Soil salinity

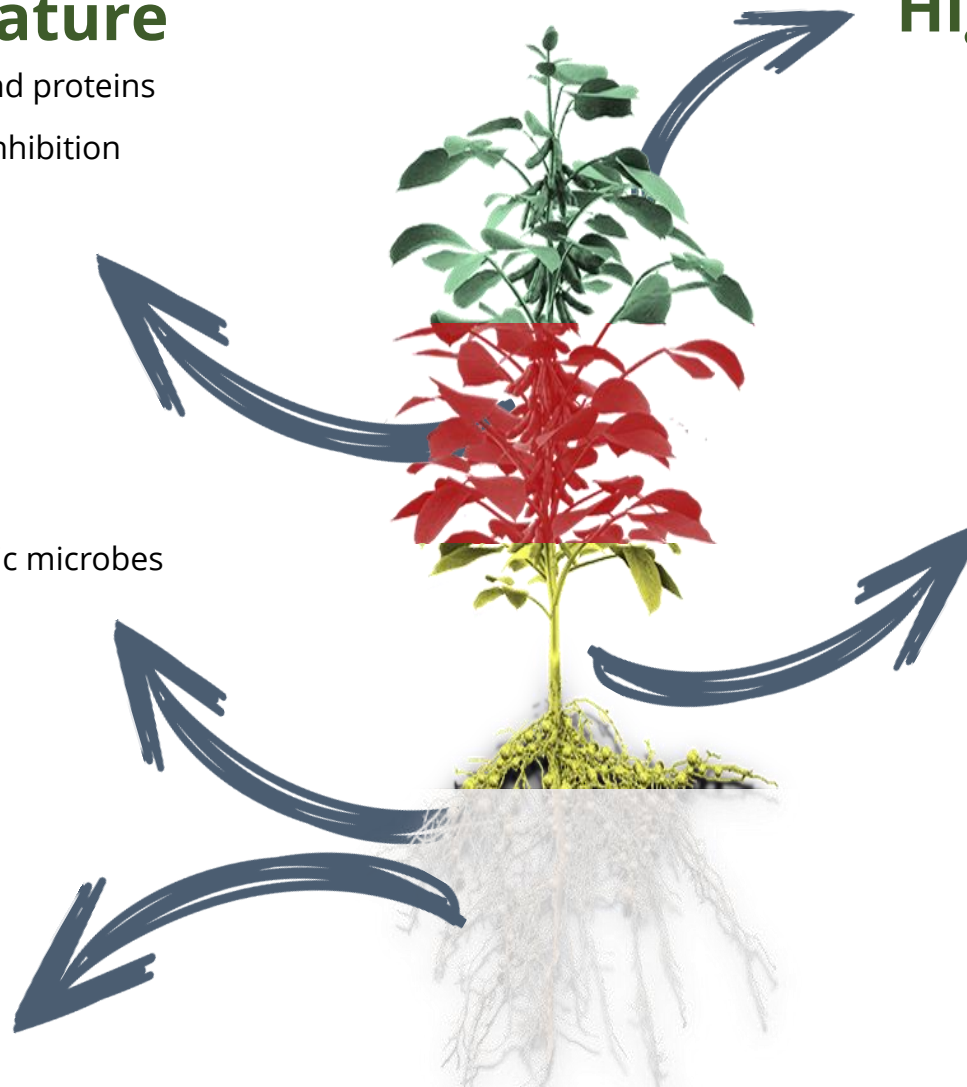
- Ion toxicity
- Nutrient imbalance
- Osmotic stress
- Cellular damage
- Degradation soil structure

High light intensity

- Photoinhibition
- ROS Production
- Inhibition of FPII repair
- Reduction of CO₂ fixation

Water deficit

- Reduction of leaf expansion
- Reduction of metabolic activities
- Stomatal closure
- Photosynthetic inhibition
- Leaf abscission
- ROS Production
- Cell Death



As well as reducing yields, abiotic stress can diminish quality

Stress type					Physiological response	Prevalent effect on crop quality
Drought	Heat	Salinity	Ozone	UV/light		
✓	✓	✓	✓	✓	Altered gene expression	↑ Anti-oxidants Protein
✓	✓	✓	✓	✓	Oxidative stress	
✓	✓	✓	✓	✓	Accelerated senescence	↓ Minerals Sugar
✓	✓	✓			Reduced water content	
✓		✓	✓		Altered mineral household	
✓	✓	✓	✓	✓	Reduced biomass	↓ Feed value Starch P/S traits Lipids, PUFA



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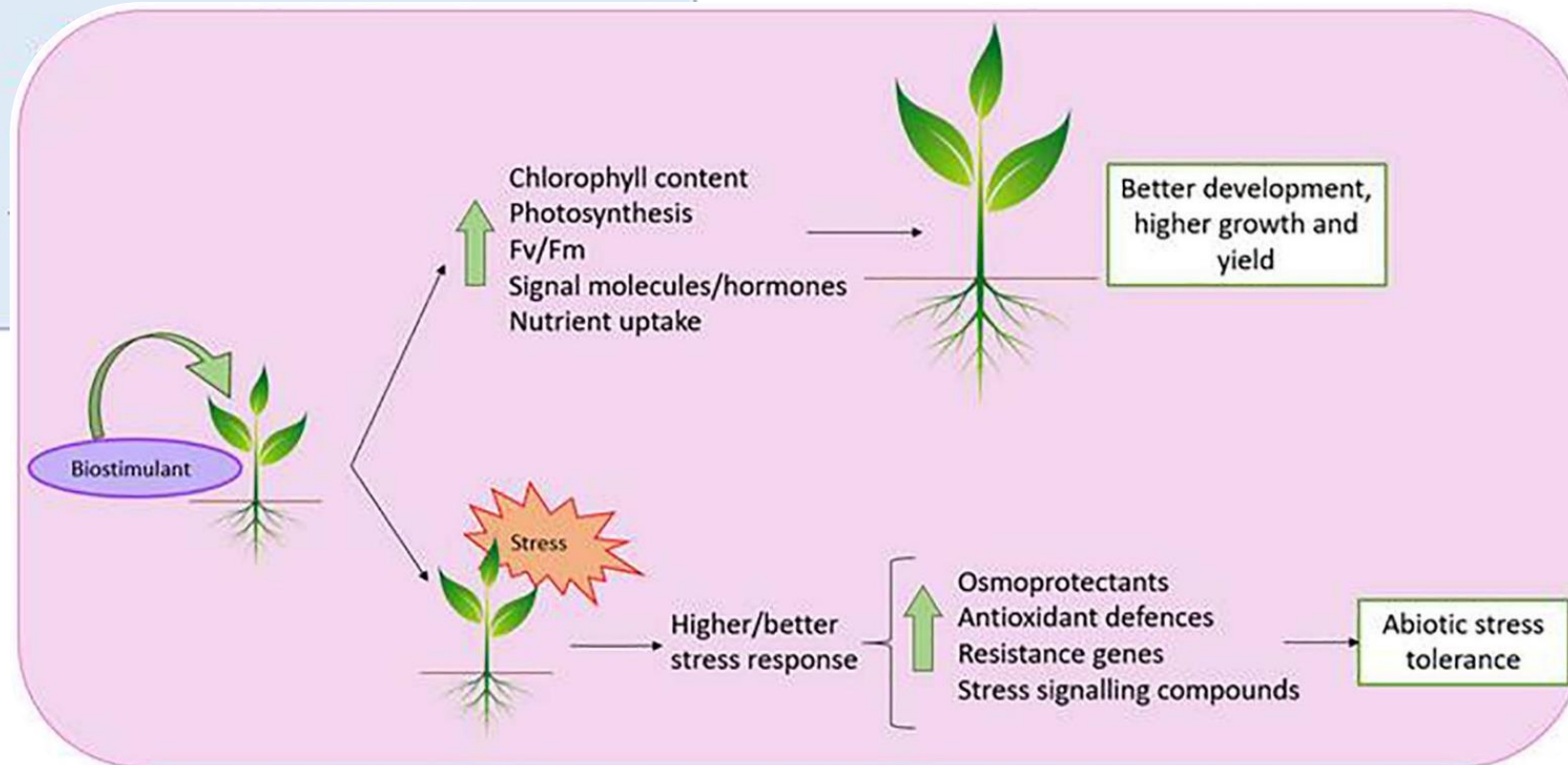
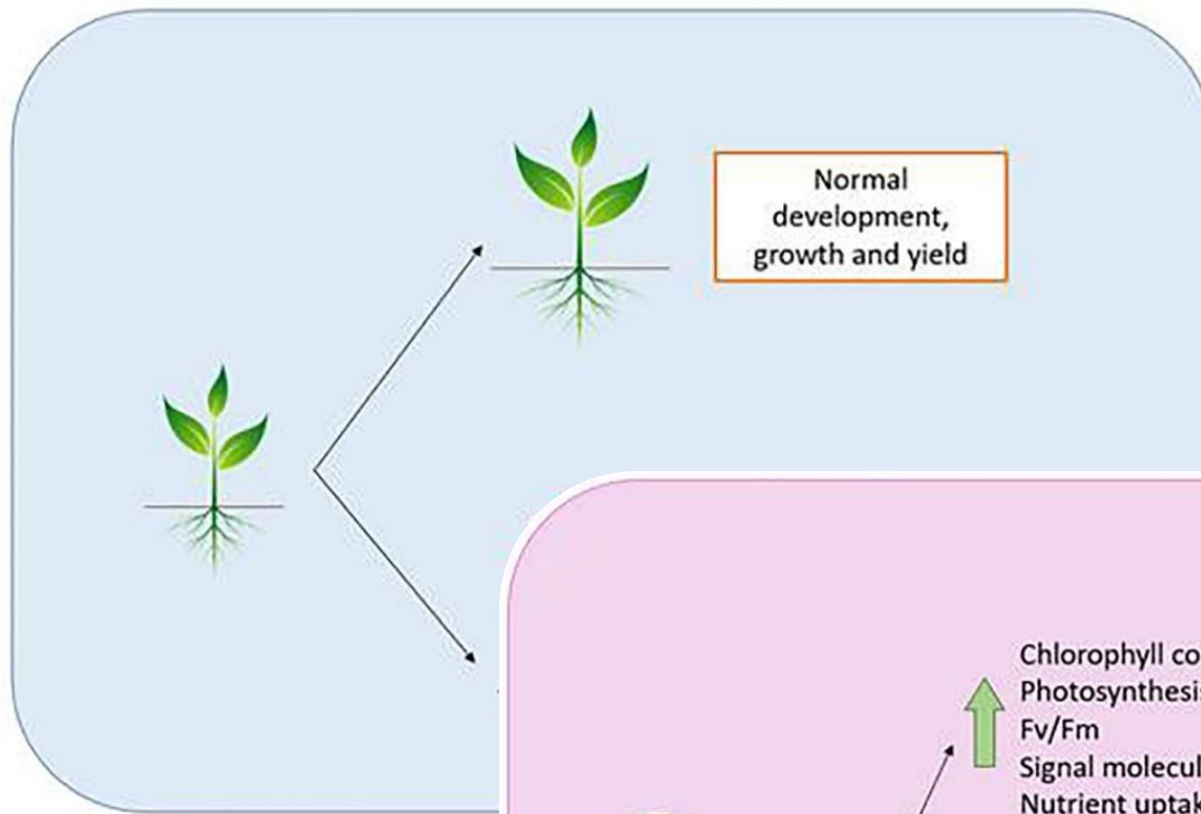
Michigan State University



Novavine.com

Wang & Frei (2011) Agric. Ecosyst. Environ. 141(3-4): 271-286

Plant biostimulants provide insurance against abiotic stress



Source: García-García
et al. (2020) Front.
Plant Sci. 11: 575829

Plant biostimulants can mitigate stresses

- Biostimulants help plants **cope with abiotic stresses** like extreme temperatures, drought, water logging, salinity and others.
 - Biostimulants may help the plant **tolerate the stress** itself **and/or recover more quickly** when the period of stress is over.
- Farmers benefit at a time when the climate is less predictable, and they need help **safeguarding yields against harsh growing conditions**

**To make their full contribution to
optimising nutrient use in Europe,
plant biostimulants need enabling
policies and regulation**



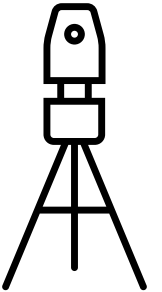
Industry and policy-makers require more data on plant biostimulants

EBIC is well aware of the **challenges** involved in collecting data on the use of plant biostimulants by farmers in Europe; particularly in contrast to data on application of nutrients.

EBIC has called for the EU to ensure data collection on all fertilising products, including plant biostimulants, not just classical N, P, K and micronutrient fertilisers

However, we have not yet succeeded in getting plant biostimulants included in these areas:

- Statistics on Agricultural Inputs and Outputs (SAIO) Reg. 2022/2379
- Eurostat's revision of the statistical classification of products by activity



We are aware that it might be complex sometimes for Member States to collect data on newer products; however, **EBIC is ready to help the EU overcome these obstacles so that we can better understand the impact of biostimulants on fertiliser markets, farmer incomes, and European food security.**

Missed opportunities for increased food security in Europe

There is often a gap between the **EU's intention** to improve resilience of food systems, and the **practical aspects of regulations**

Regulators prioritised the easiest cases, so the Fertilising Products Regulation has not provided access to many other **innovative products that are more complex:**

- Many plant biostimulants that improve **nutrient use efficiency** and **plant tolerance to abiotic stress** are currently **not covered by the FPR**.
- These factors are **limiting the uptake and market growth** for the plant Biostimulants sector in Europe



General data and trends at EU level for Biostimulants

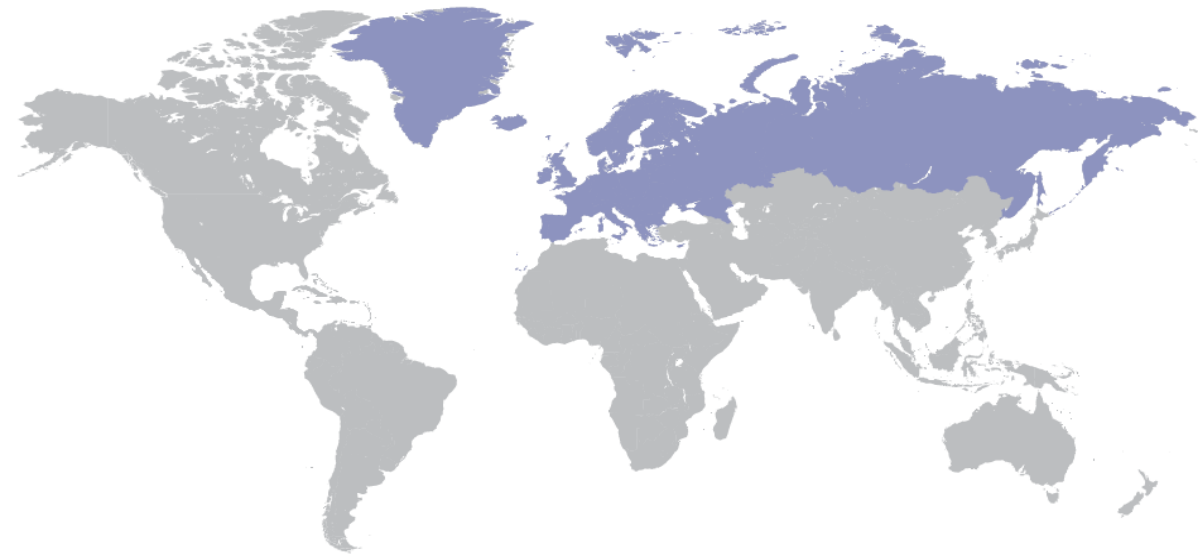
Source: Dunham Trimmer

Biostimulants Europe

Regional > EUROPE BIOSTIMULANT MARKET

- CAGR growth in Europe is clearly focused in East European countries. Biostimulants have taken longer to be adopted in this Region, but the level of acceptance and use is both increasing and accelerating.
- Spain and Italy are the two markets demonstrating the highest degree of maturity, with the lowest CAGR and deaccelerating growth. However, in absolute terms, both will remain among the top 10 countries within the forecasted period and DunhamTrimmer expects that most of the possible new product types and technologies will start to be commercially developed in these countries.
- France is the third major market in Europe and is showing good growth possibilities both in Fruits and Vegetables as well as in Cereals and Row Crops.

2019 EUROPE REGIONAL MARKETS

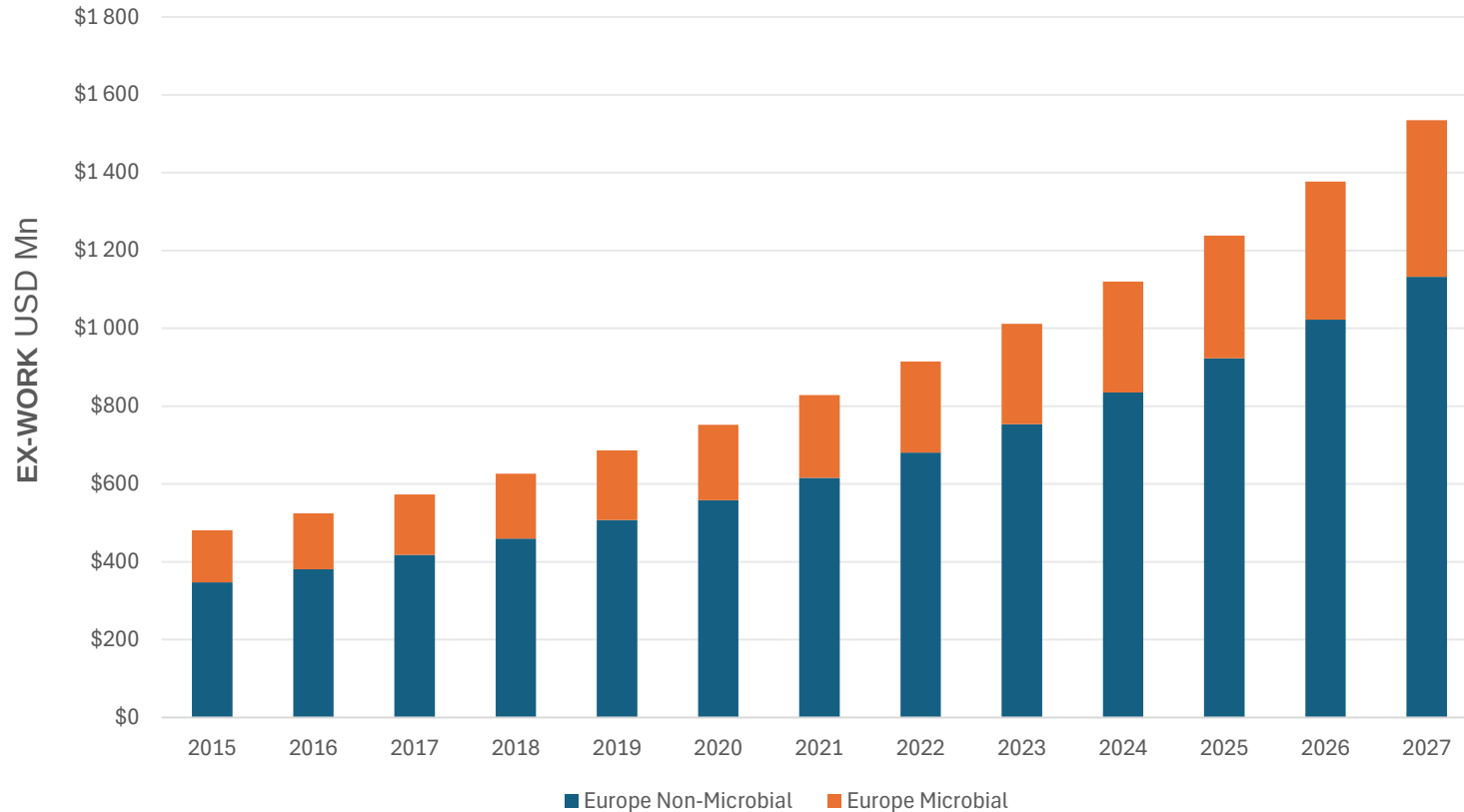


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Biostimulant Market - EUROPE



	CAGR 15-23	CAGR 23-27
Non-Microbial	10,19%	10,69%
Microbial	8,56%	11,76%



Non-microbial segment mainly based on protein hydrolysates, organic acids and seaweed extracts.

Main markets for non-microbial Biostimulants are; Spain, Italy and France.

Non-microbial based products account for near 75% of total Biostimulant market.

Eastern Europe and Northern Europe markets growing at faster CAGR.

Microbial Biostimulants growing at faster pace than other Biostimulant product types, although much below than figures from other Regions, due to regulatory constraints in Europe.

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Thank you

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