
BIOSTIMULANT MARKET OVERVIEW

Introduction

2011—Co-Founded DunhamTrimmer LLC

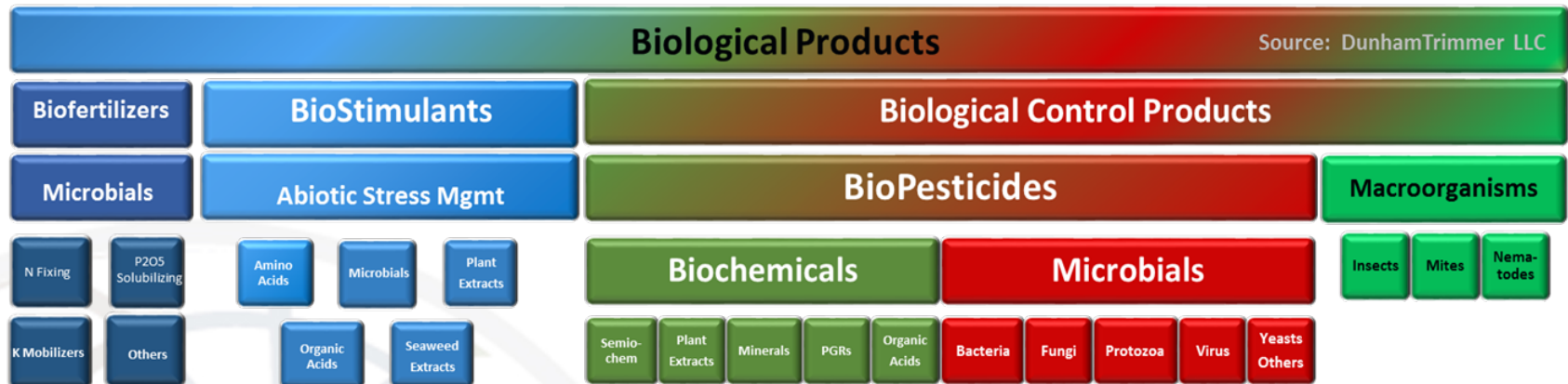
- Premier Biological Industries Strategic Business Consulting & Market Research Firm
- Clients: Multinationals (CPC, fertilizer, others); Bio Companies; Investors; NGO's
- Due Diligence, Multi-client market data, Single client studies

2013—Launched 2BMonthly

- The Global Biocontrol & Biostimulant E-Newsletter
- All the Bio Industry news direct to your inbox monthly
- Joint effort New Ag Int'l & DunhamTrimmer
- Subscribers: Companies, individuals interested in biological industries

BIOLOGICAL MARKET OVERVIEW

--INTRODUCTION--PRODUCT TYPES



Biofertilizers

- Microbials used to enhance plant nutrient uptake from soil
- Nitrogen fixing bacteria make up largest group
- Others include mobilizers of specific nutrients (zinc, sulfur) and mycorrhizal fungi
- Biofertilizers regulated under country/state fertilizer regulations

BioStimulants

- Seaweed Extracts make up the largest segment in this group
- Organic acids are humic and fulvic acids used as soil amendments, formed by the microbial degradation of plant matter.
- Microbials, primarily bacteria, often used as seed or soil treatment to aid in nutrient assimilation
- Definition and regulation of biostimulants is still under development in most parts of the world

BioPesticides

- Biopesticides are derived from natural materials, such as plants, bacteria and certain minerals. Biopesticides target specific pests and are inherently less toxic than synthetic pesticides.

Biochemicals

- Plant Extracts; Minerals & Others; PGRs; Semiochemicals; Organic Acids
- Plant Extracts make up the largest segment in this group
- Semiochemicals (pheromones) has the largest actual number of products
- Largest challenge for Plant Extracts is manufacturing and consistent quality in the active ingredient(s)

Microbials

- Bacteria; Fungi; Virus; Protozoan; Yeasts
- Bacteria, followed by Fungi make up the largest groups commercially (>90%)
- Microbials are the largest market of biopesticides at US\$1.3 Bn.
- Biggest challenges for microbials are formulation related: 1) Shelf-life; 2) Stability; 3) Performance enhancement

Macroorganisms

- Insects; Mites; Nematodes
- Insects followed by mites makeup the largest groups
- Unique in that the live organism in the form of eggs, larvae, pupae or adult is used.
- Most important challenge for Macros is logistics—shipping live organisms that have to have special care to survive
- Normally not classified as a Biopesticide—only as Biological Control Products

BIOSTIMULANTS MARKET DEFINITION

- DunhamTrimmer biostimulant definition & approach
 - EU model definition
 - *Plant biostimulants contain substance(s) and/or micro-organisms whose function when applied to plants or the rhizosphere is to stimulate natural processes independent of the product's nutrient content with the aim of improving nutrient use efficiency, tolerance to abiotic stress, and crop quality traits.*
 - We include products whose value is predominantly based upon biostimulant activity
 - We exclude products whose main activity comes from fertilizer or other non-biostimulant components

BIOSTIMULANTS MARKET BENEFITS

Product benefits should be aligned with definition

- Abiotic stress mitigation
- Crop improvements
- Nutrient & water use efficiency
- Soil improvements

However, some product labels push the envelope

- Claim PGR like benefits
- Unrealistic yield or quality improvements
- Lack science to back up claims

Industry associations need to be effective at self policing

- EBIC leading in EU with Code of Conduct for members
- No similar code currently exists in any US biostimulant association

BIOSTIMULANTS MARKET GLOBAL MARKET DRIVERS

- Population growth
- Decreasing agricultural land
- Increasing input costs & limited availability
 - Fertilizers
 - Water
- Sustainability
- Climate change impacts & increased abiotic stress

FUTURE MARKET DRIVERS

- Crop improvement, including GMOs and new gene edited crops, will be the cornerstone of agriculture for defined traits/markets
- Improved market access for biostimulants will drive market growth
- Federal registration guidelines for biostimulants in EU and possibly USA will enhance market attractiveness for global players
- Integration of cost-effective alternatives – ICM for sustainable agriculture

GLOBAL MARKET PROJECTIONS ASSUMPTIONS-COMMENTS

- Market Value Resources
 - DunhamTrimmer interaction with wide global network of industry executives & leaders
 - Published market reports, articles, conference presentations, NGO / Government sourced reports

- Market Value Assumptions
 - No significant events are projected to impact market growth
 - Potential upside factors
 - Development of new technologies, especially in the area of microbial products could drive biostimulant market growth
 - Impact of regulatory changes impacting biostimulants in the EU, USA or other lead countries
 - Potential downside factors
 - Entrance of new technologies in to the market that directly impact existing biological technologies use (RNAi, CRISPR gene editing, other?)
 - Adverse macro economic events in key countries impacting key crop markets
 - Increased regulatory requirements for biostimulants in the EU, USA or other lead countries

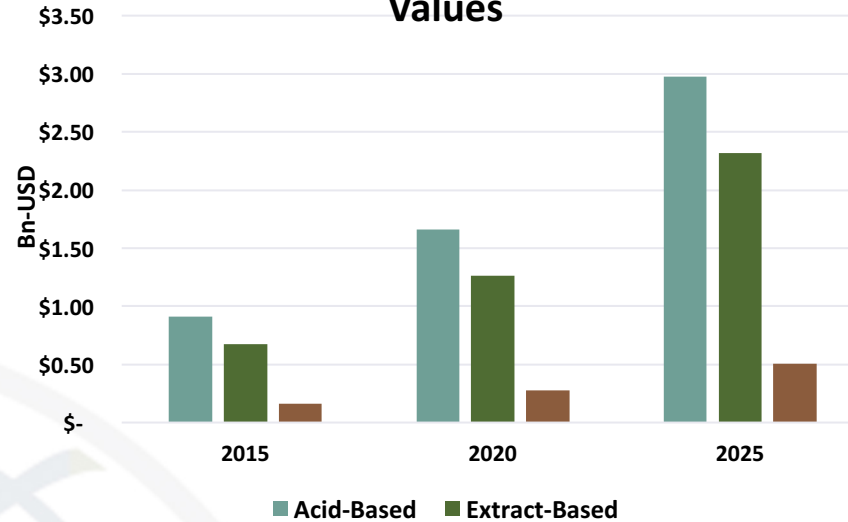
- DunhamTrimmer believes that it is highly likely that the development of new microbial technologies may positively impact the overall biostimulant market. This has not been projected because of the uncertainty of timing and actual success.

BIOSTIMULANTS MARKET LANDSCAPE

Product Type Comments

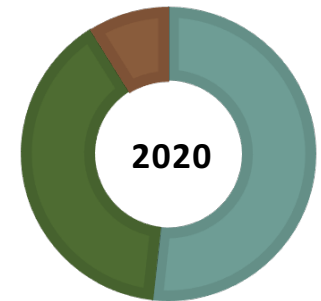
- ✓ Extract based products are fastest growing and gaining global share
- ✓ Acid based products are largest in size, but with less new product innovation, global share dropping
- ✓ Other products, e.g. microbials, are growing but remain much smaller in size

Global Biostimulant Market—Product Values

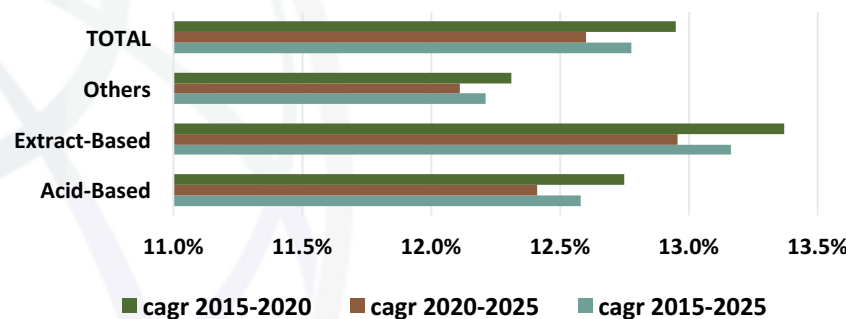


Product Market Shares

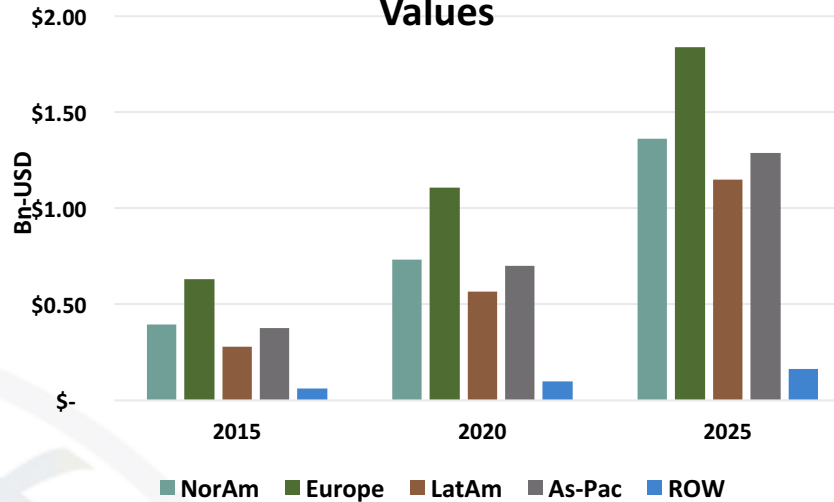
- Acid-Based
- Extract-Based
- Others



Global Biostimulant Market--Product CAGR



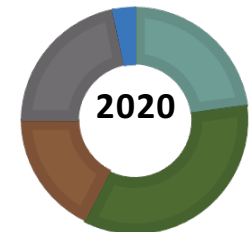
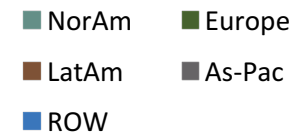
Global Biostimulant Market—Region Values



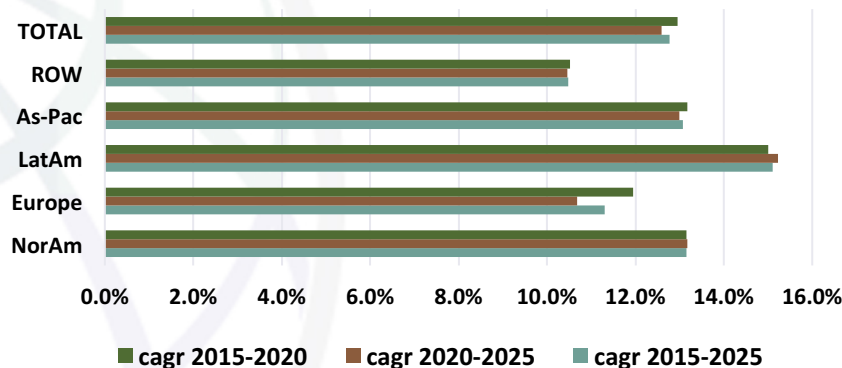
Regional Comments

- ✓ Europe will continue to be largest region
 - ✓ Slowing growth in West EU leads to decreasing global share for Europe
- ✓ Faster growth in Eastern Europe
- ✓ USA market will reach similar markets size as that of Western Europe
- ✓ LatAm market fastest growth rate through 2025 leads to increasing global share
- ✓ North America, Latin America & Asia/Pac will reach similar sizes by 2025

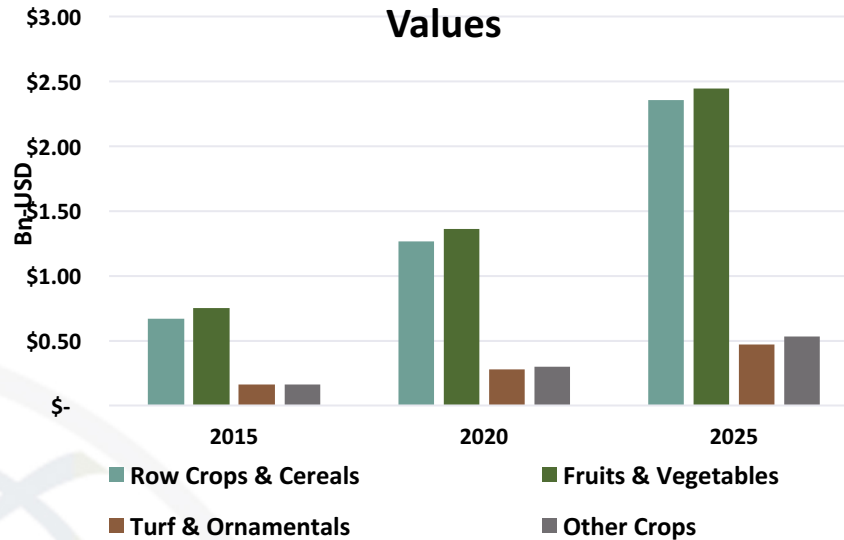
Regional Market Shares



Global Biostimulant Market--Region CAGR



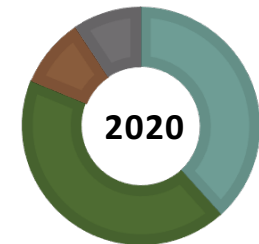
Global Biostimulant Market—Crop Values



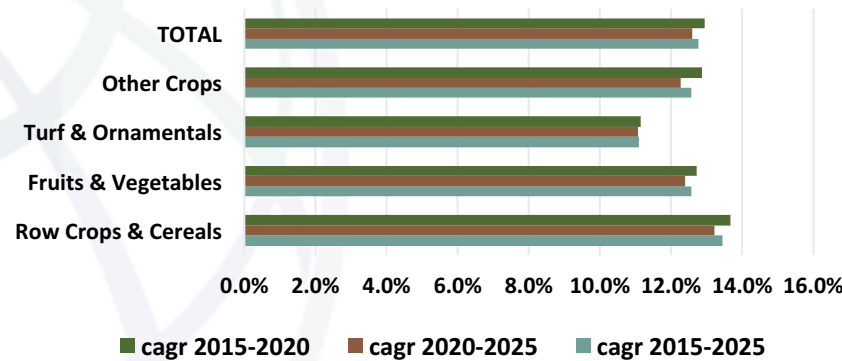
Crop Group Comments

- ✓ Row Crops & Cereals and Fruits & Vegetables dominate representing over 80% of global market
- ✓ Row Crops & Cereals show fastest growth, particularly in the near term
 - ✓ Increasing use in seed treatments
 - ✓ Foliar use also increasing, particularly in Europe
- ✓ Turf & Ornamentals growing at slower rate than other segments

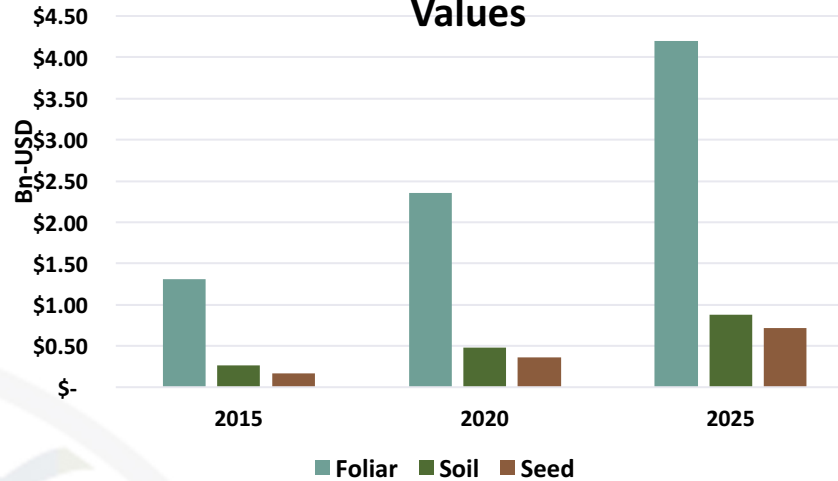
Crop Market Shares



Global Biostimulant Market--Crop CAGR



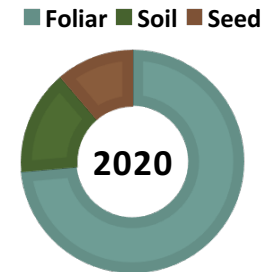
Global Biostimulant Market—App. Values



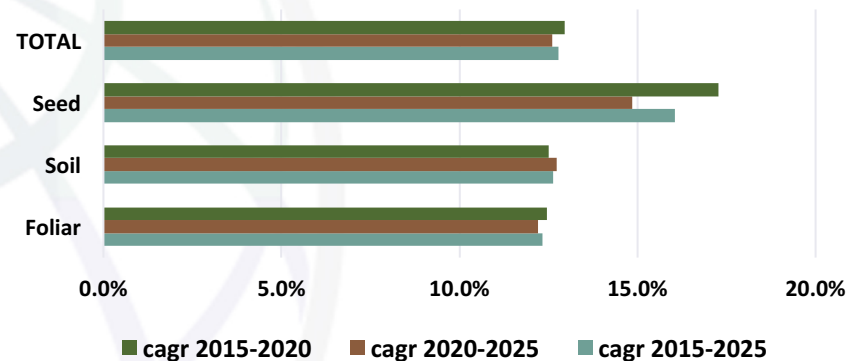
Application Comments

- ✓ Foliar treatments dominate today and will continue to in future, although with slightly lower global share
- ✓ Seed treatment uses growing much faster as biostimulants are included in seed coatings with high value germplasm
- ✓ Despite growth, lower use rates in seed treatments result in low volumes of product
- ✓ Soil uses, largely humic and fulvic acid based products, growing at similar rate as foliar

Application Market Shares



Global Biostimulant Market--Apps. CAGR



Closing

- Biostimulant markets
 - Consistent growth-12%-15%
- Green technology / Sustainable technology
- More efficient use of resources
 - Pesticides / Fertilizers / Water/ Other Inputs
- Rapidly growing entrepreneurial companies
- Consolidation – Market Access

THANK-YOU FOR YOUR ATTENTION

“Be decisive. Right or wrong,
make a decision. The road of
life is paved with flat squirrels
who couldn’t make a
decision.”

~Unknown~

SHARED ON I'M NOT RIGHT IN THE HEAD.COM

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