



**DunhamTrimmer®**  
International Bio Intelligence

# **Biocontrol in the Big Picture: The Trends Shaping Our Industry**

October 25, 2023  
ABIM - Basel

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President & Founding Partner



**Mark Trimmer, Ph.D.**  
Founding Partner



35 Years - Crop Protection, Global R&D, Technology Acquisition & Licensing, BPIA Board Chair

**Manel Cervera**  
Managing Partner



20+ Years - Biostimulants & Specialty Fertilizers, Regional/Global Marketing and Sales

**Rick Melnick**  
Partner, Vice President



25+ Years - Global Ag Communications, Marketing & Brand Management, Former BPIA Chair

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25+ Years - Plant nutrition, Biostimulants, Specialty Fertilizers, New Product Innovation & Development

**Massimo Toni**  
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40 Years - Product Development  
20 Years Bio-Industry  
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25 Years - Global Ag Communications, Events, Marketing, & Executive Management

**Ashish Malik**  
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20+ Years Crop Protection, Biocontrol, Bus. Development  
Investor Relations & Licensing, BPIA Board Member



# BIOLOGICAL PRODUCTS

Source: DunhamTrimmer®, LLC

BIOSTIMULANTS <sup>1</sup>				BIOCONTROLS					
MICROBIALS		NON-MICROBIAL		BIOPESTICIDES <sup>3</sup>		MACROORGANISMS <sup>6</sup>			
NUTRIENT USE EFFICIENCY (NUE) (BIOFERTILIZERS) <sup>2</sup>	PLANT GROWTH PROMOTION (PGP)	PLANT & SEAWEED EXTRACTS	AMINO ACIDS	BIOCHEMICALS <sup>4</sup>	MICROBIALS <sup>5</sup>		INSECTS	MITES	NEMATODES
		ORGANIC ACIDS	INORGANIC COMPOUNDS	PLANT EXTRACTS	BACTERIA	FUNGI	<p>5 Microbials refer to products based on bacteria, fungi, viruses, and protozoans. Microbials comprise the largest market of biopesticides.</p> <ul style="list-style-type: none"> <li>• Bacteria, followed by fungi, make up the largest groups commercially (&gt;90%).</li> <li>• Biggest challenges relate to product formulation with regard to shelf-life, stability, and performance enhancement.</li> </ul>		
ORGANIC ACIDS	PGRs	PROTOZOA	VIRUS						
SEMIOCHEMICALS		YEASTS	OTHERS						
<p>1 Biostimulants are products which elicit one or more of the following effects: 1) mitigate abiotic stress; 2) enhance crop quality; 3) improve nutrient assimilation. Their functions are typically classified as NUE (Nutrient Use Efficiency) or PGP (Plant Growth Promotion).</p>		<p>Non-microbial biostimulants may target either NUE or other PGP effects.</p> <ul style="list-style-type: none"> <li>• Amino Acids and Seaweed Extracts are the fastest growing segments.</li> <li>• Seaweed Extracts are a complex mixture of components including plant hormones, phenolic compounds, and other active substances.</li> <li>• Amino Acid products include peptide fractions.</li> <li>• Organic acids are mainly humic and fulvic acids used as soil amendments.</li> </ul>		<p>3 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.</p>		<p>6 Macroorganisms include insects, mites, and nematodes. Insects &amp; mites are the largest groups.</p> <ul style="list-style-type: none"> <li>• Unique in that the live organism is used in the form of eggs, larvae, pupae, or adults.</li> <li>• The most important challenge in this category is logistics — shipping live organisms that require special care to survive.</li> <li>• Normally not classified as Biopesticides but rather Biocontrols.</li> </ul>			
<p>2 Biofertilizers are Microbials used to enhance plant nutrient uptake from soil (NUE).</p> <ul style="list-style-type: none"> <li>• N-fixing bacteria make up the largest segment.</li> <li>• N-fixing bacteria for non leguminous crops make up the fastest growing segment.</li> <li>• Other NUE microbials include mobilizers and solubilizers or chelators of specific nutrients such as P, K, S, Zn, Fe.</li> </ul> <p>PGP Microbials target other biostimulant properties beyond NUE.</p>				<p>4 Biochemicals include Plant Extracts (largest by sales volume), Organic Acids, PGRs (plant hormones e.g. cytokinins, auxins, etc), and Semiochemicals (allelochemicals and pheromones).</p>					

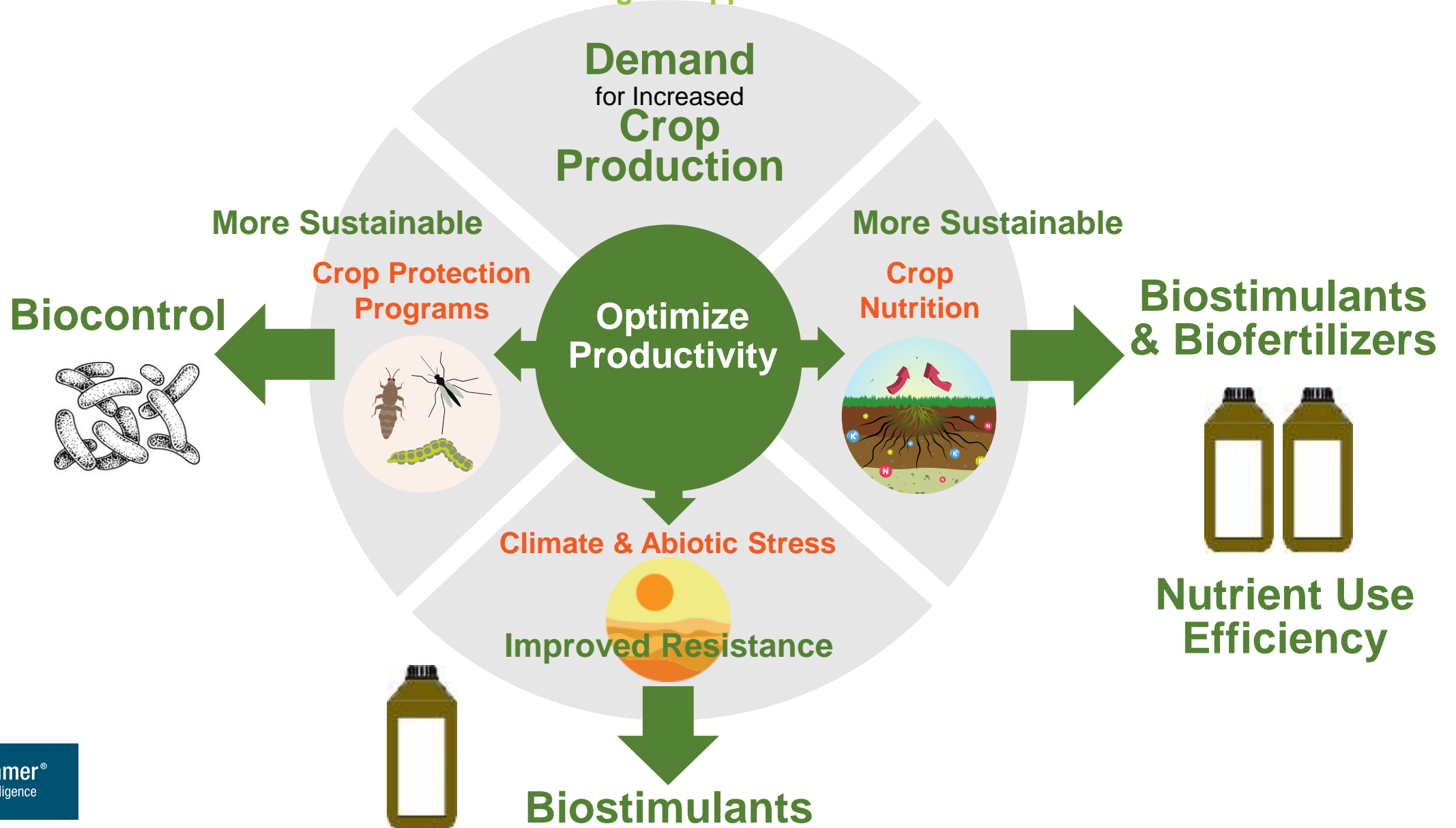
# BIOLOGICALS MARKET LANDSCAPE

## Market Drivers & Trends



# Evolving Agricultural Systems:

A Biological Approach



# Biological Products Market Landscape

## STAKEHOLDERS: POTENTIAL TO IMPACT ADOPTION



POLICY



MFG



GROWERS



ADVISORS



FOOD CO.



AGENCIES



AG RETAIL



ACADEMIA



ENVIRO



CONSUMER

# Biologicals Trends and Drivers

## Macro Adoption Promoters

**Consumer Demand** strongly favors use of biologicals in some markets:

### ❖ Demand for Reduced Pesticide Residues





- The global organic food market was estimated at \$259 billion in 2022, with a CAGR of 11.3% since 2017.
- The US owns a 41% share of the global organic food market.
- The top 10 countries in per capita spend on organic food are all European nations, along with the US and Canada.
- South Africa and New Zealand food retail promote brands based on reduced chemicals and use of “natural” products in food production
- Major export markets in Latin America are responsive, but domestic markets in both Latin America and Asia lag behind in this area

### ❖ Willingness to pay for quality and year-round supply

### ❖ Demand for year-round supply of fresh produce

Consumer demand for reduced pesticide use in food production creates opportunities for biological products with growers and their input suppliers

Consumer concerns about agriculture’s impact on the environment and fruit quality have led multiple supermarket chains to impose secondary standards on allowable residues on fresh fruits and vegetables. These standards are marketing-oriented and are more stringent than FAO’s Codex Alimentarius International Food Standards in terms of Maximum Residue Limits (MRLs), Acute Reference Dose (ARfD) and detectable active ingredients allowed. Although Codex MRLs are science-based, RESIDUE = RISK in the minds of consumers.

			
MRL <sup>1</sup> : 70%	MRL1: 33%	MRL1: 50%	MRL1: 50%
ΣMRL <sup>3</sup> : 80%	ΣMRL3: 80%	ΣMRL3: 100%	ΣMRL3: --%
ARfD <sup>2</sup> : 80%	ARfD2: 100%	ARfD2: 50%	ARfD2: 100%
ΣARfD <sup>4</sup> : 80%	ΣARfD4: 100%	ΣARfD4: --%	ΣARfD4: --%
a.Ingredient ≤ 4/5	a.ingredient ≤ 5	a.ingredient ≤ 5	a.ingredient ≤ 5
<sup>1</sup> % of Maximum Residue Level <sup>2</sup> % of Acute Reference Dose		<sup>3</sup> Sum of total MRL <sup>4</sup> Sum of total ARfD	

# Biologicals Markets Trends and Drivers

## Political Drivers

- ❖ **Government support** for biologicals has demonstrated the ability to affect rapid acceleration of biologicals adoption
- ❖ **Governments** are politically positioned as **environmental stewards**
- ❖ **Regulatory agencies** are facing growing pressure to adapt existing processes – designed for registration of conventional products – to account for inherent differences in biologicals
- ❖ **Evolving clarity of regulations** surrounding product and use definitions is shown to positively impact on biological and specialty nutrition product availability, adoption, and market performance



POLICY



AGENCIES



MFG



GROWERS

Prior challenges surrounding Biological product classification are being addressed in major markets, improving the environment for bio products



BIOLOGICALS MARKET  
**REGIONAL**  
**TRENDS**



# Biologicals Markets Trends and Drivers

## Regional Drivers: Europe

- ❖ The **Green Deal** and **Farm to Fork** initiatives are significant promoters of biological product adoption
- ❖ Europe is **lagging behind in microbial biocontrol** markets because of regulatory barriers, but great efforts are being made by industry (IBMA and regional actors) to overcome these barriers. When these barriers are lifted, we predict **rapid growth in microbial market in Europe**.
- ❖ Europe is the **most advanced biostimulant market**, a trend which has been accelerated by the **EU Fertilizing Products Regulation** (July 2022)



# Biologicals Markets Trends and Drivers

## Regional Drivers: LATAM & Brazil

- ❖ **LATAM is the fastest growing biologicals market in the world, led by rapid expansion in Brazil**
- ❖ Growth in Brazil can be attributed to **government support** that provides **economic incentives**, basic **research**, grower **education**, and an **improved regulatory** process to facilitate biological adoption
- ❖ Brazil also marks the first market where biocontrols and biostimulants have been **widely adopted in row crops**
- ❖ Continued **expansion of soybean-planted hectares** is a key driving force when combined with extensive bio adoption in this crop
- ❖ **Competition between bio companies**, both local and global, is increasing as all jockey to capture a position in this high growth market



BIO MARKET  
**MARKET**  
**STATUS &**  
**FUTURE**



# Biological Products Market Landscape

## GLOBAL BIOLOGICAL MARKET EVOLUTION

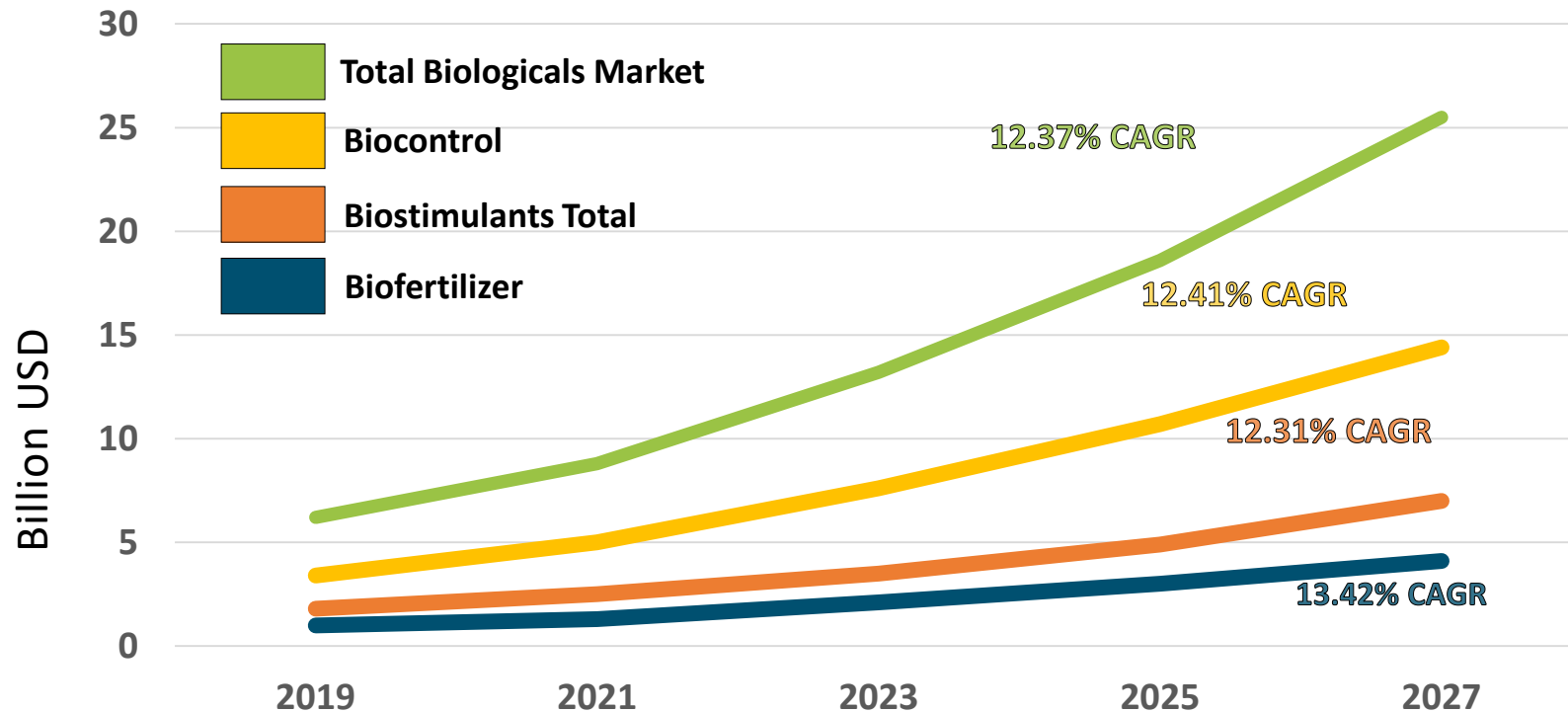


Chart does not include Specialty Nutrition market

- Total global bio market revenue > \$9B in 2021 and projected to reach \$25B by 2030
- Biologicals are increasing market penetration into row crops
- Integrated use of biologicals and chemicals driving transition in market
- Biologicals increasing sustainability and optimizing productivity despite challenges from climate change

# GLOBAL BIOCONTROL MARKET LANDSCAPE

## 2021 REGIONAL BIOCONTROL MARKET VALUES



US/Canada  
\$2097 Mn

Europe  
\$1542 Mn

LATAM  
\$1231 Mn

Asia/Pacific  
\$1182 Mn

ROW  
\$146 Mn

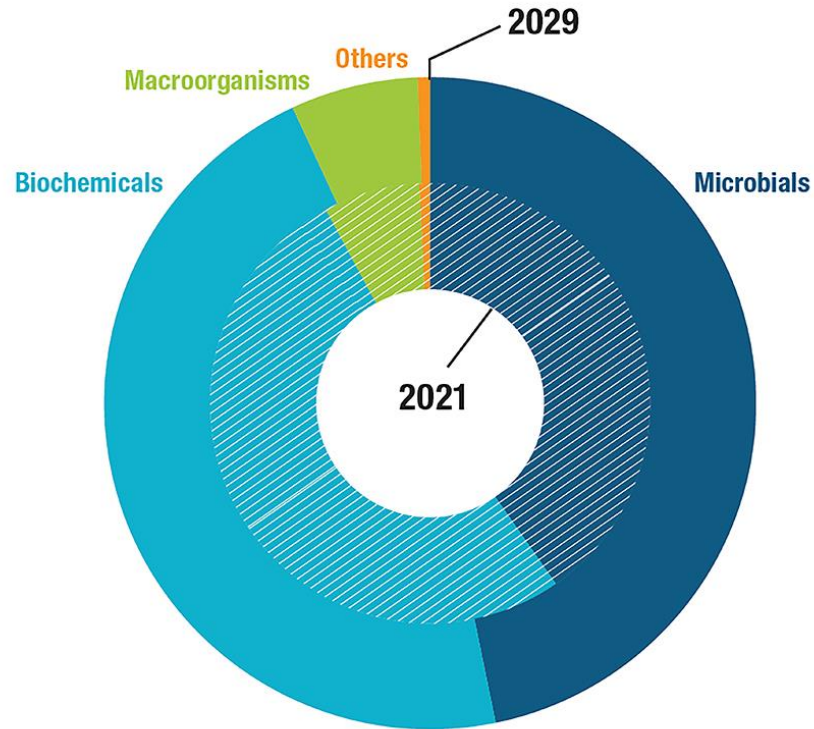
**TOTAL \$6198 Mn**

- US/Canada is the leading region in 2021
- EU is second, but growing more slowly than others
- Brazil driving LATAM growth as first country with significant use of biologicals in row crops
- Seeing signs of market maturity in US and western EU
- PGRs represent US\$1200 Mn of market in 2021

# GLOBAL BIOCONTROL MARKET LANDSCAPE

## GLOBAL BIOCONTROL PRODUCT TYPES SHARES 2021-2029

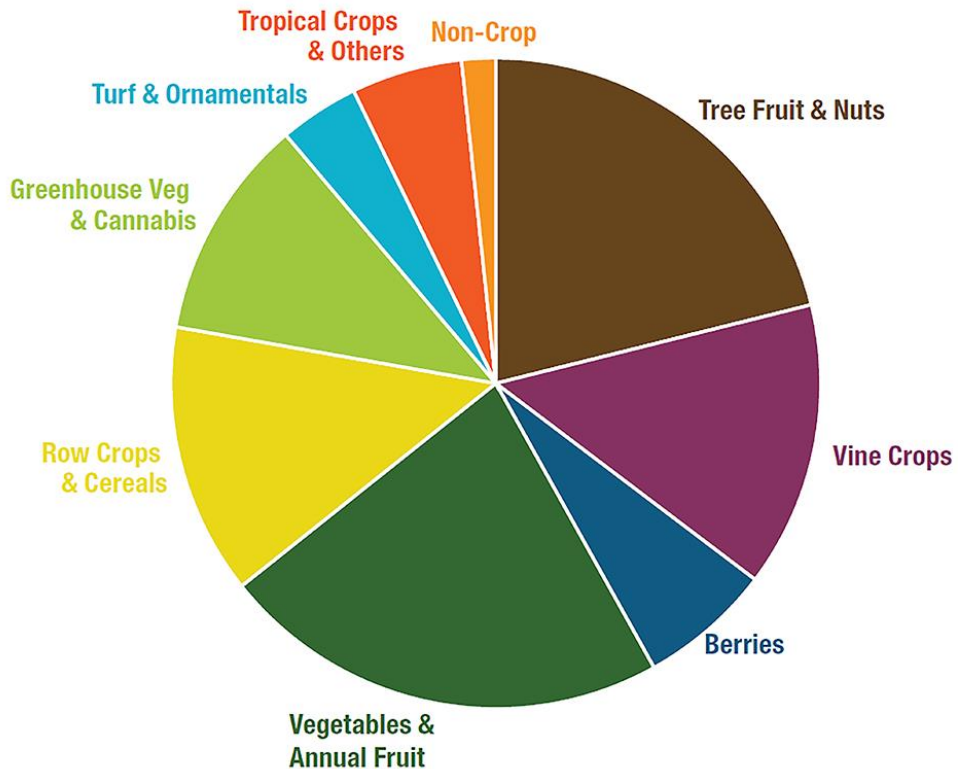
PRODUCT TYPE	2021	2029
Microbials	40%	47%
Biochemicals	52%	46%
Macroorganisms	7%	6%
Others	1%	1%



- Microbial growth driven by expanded use especially in LATAM
- Microbial use in EU is much smaller than in LATAM and US/Canada
- Biochemicals revenue increasing but not at same pace as microbials
- Macros are beginning to see some use in open field in several markets with potential for future growth

# GLOBAL BIOCONTROL MARKET LANDSCAPE

## 2021 GLOBAL BIOCONTROL CROP GROUPS MARKET VALUES (MN) USD



APPLICATION	2021
Tree Fruit & Nuts	1309
Vine Crops	880
Berries	410
Vegetables & Annual Fruit	1387
Row Crops & Cereals	836
Greenhouse Veg & Cannabis	684
Turf & Ornamentals	247
Tropical Crops & Others	342
Non-Crop	105
<b>Total</b>	<b>6199</b>

- Vegetables & annual fruit combined with tree fruits and nuts represent over 40% of market
- Vine crops and berries remain leading adopters of biocontrol
- Row crops and cereals capture nearly as much as vines
- Greenhouse vegetables and cannabis represent 11% share in 2021 with flat growth

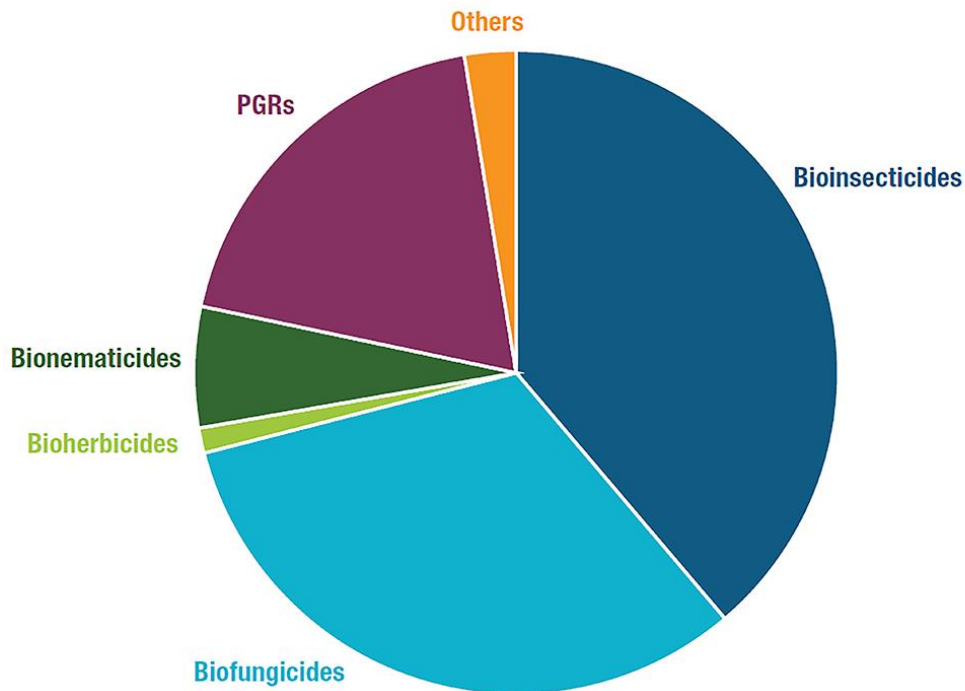


# GLOBAL BIOCONTROL MARKET LANDSCAPE



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## 2021 GLOBAL BIOCONTROL USE SEGMENTS MARKET VALUES (MN) USD



PRODUCTS	2021
Bioinsecticides	2404
Biofungicides	1996
Bioherbicides	78
Bionematicides	376
PGRs	1184
Others	160
<b>Total</b>	<b>6198</b>

- Bioinsecticides and biofungicides combined represent over 70% of market
- PGRs account for 19% of market in 2021 with strong adoption in tree fruit, vines and some row crops
- Bionematicides are only 6% in 2021 but are growing rapidly
- Bioherbicides are nearly absent from the market

# BIOCONTROL MARKET CHALLENGES

## Bioherbicides

- Chemical herbicides represent 45% of global conventional pesticide market
- In contrast, microbial bioherbicides are nearly non-existent
- Result is bioprotection only participates in roughly half of crop protection market

## Row Crops

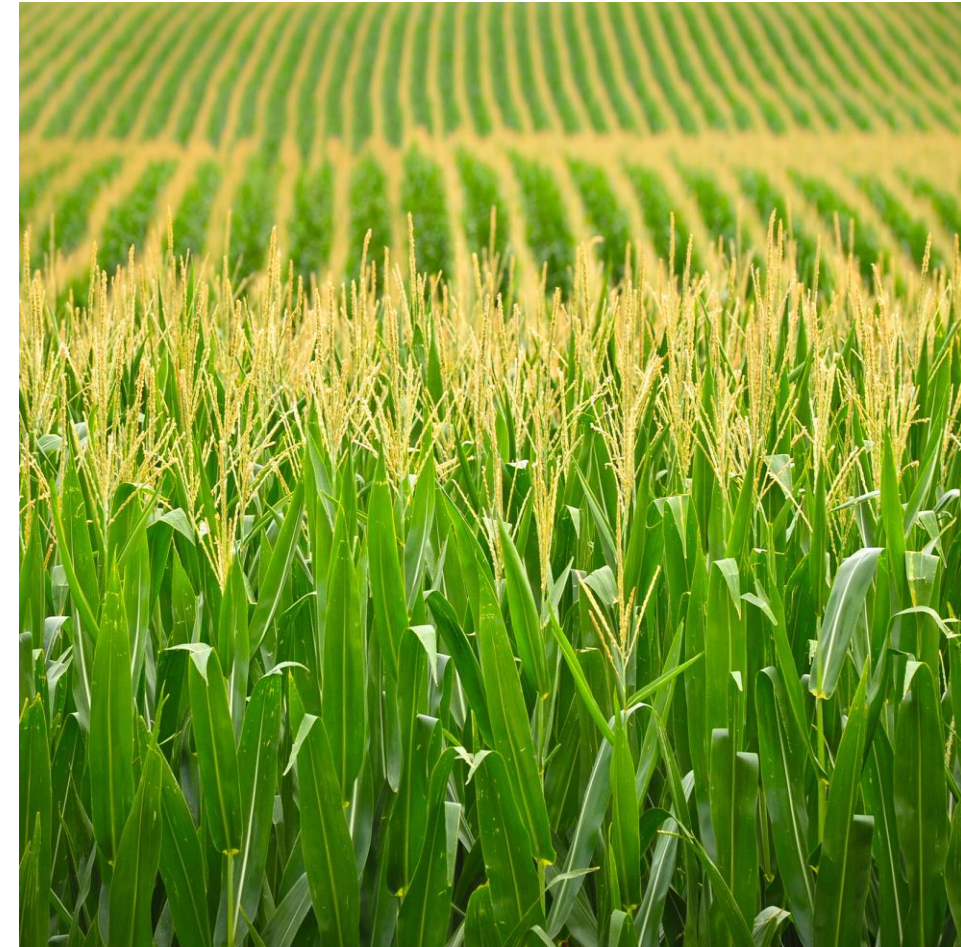
- Row crops & cereals capture 70% market share for conventional crop protection
- Bioprotection is concentrated in specialty crop markets, especially in US/Can and EU
- Increased row crop use is beginning in some markets

## Fragmentation

- Bioprotection remains a growth market with 100's of small companies
- Market access and resources (people and \$\$) are major hurdles for most bio companies

## Investment Climate

- Investors becoming more selective
- Valuations are lower than in recent years
- Creating difficulties for start-up companies



## DUNHAMTRIMMER GLOBAL BIOLOGICAL MARKETS REPORTS



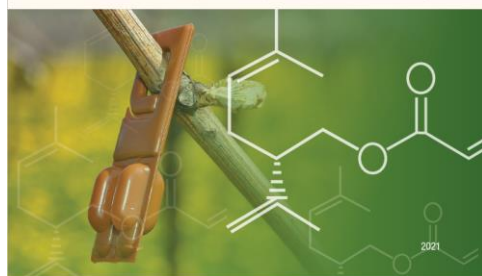
DunhamTrimmer<sup>®</sup>'s Global Biostimulant Report  
**Market Overview, Trends, Drivers and Insights**



**BIOSTIMULANTS - 2020**



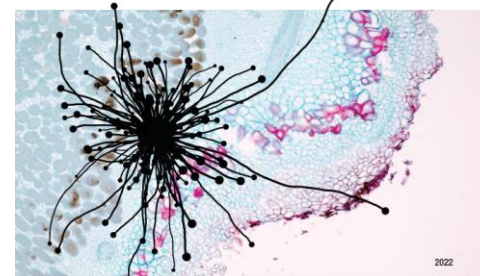
DunhamTrimmer<sup>®</sup> Global Pheromones Report  
**Market Overview, Trends, Drivers and Insights**



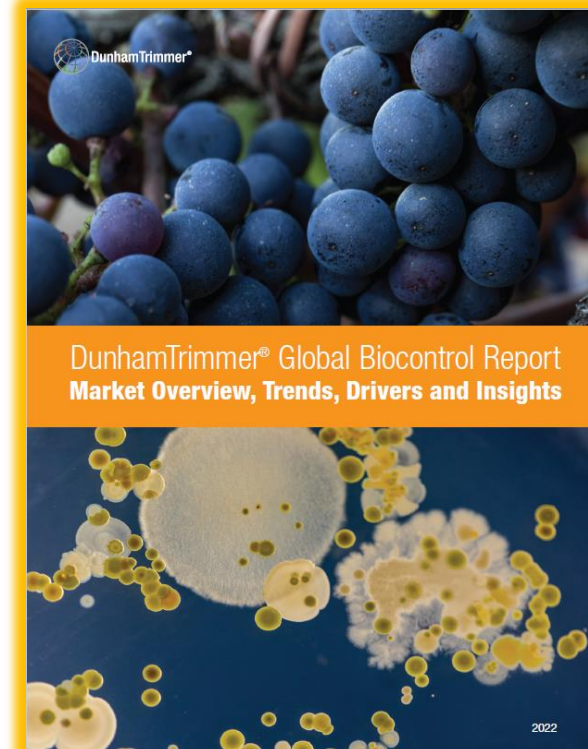
**PHEROMONES - 2021**



DunhamTrimmer<sup>®</sup> Global Biofertilizers Report  
**Market Overview, Trends, Drivers and Insights**



**BIOFERTILIZERS - 2022**



DunhamTrimmer<sup>®</sup> Global Biocontrol Report  
**Market Overview, Trends, Drivers and Insights**

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**THANK YOU FOR YOUR  
KIND ATTENTION!**

**QUESTIONS?**

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