Introduction—DunhamTrimmer LLC
“The Premier Biological Industries Strategic Business Consulting & Market Research Firm”

Industries
Biocontrol•BioStimulants•Biofertilizers

Services
Strategic Marketing
Bio Market Data
Technology Evaluation
Market Evaluations
Investment Due Diligence

Products
Single-Client Custom Projects
Multi-Client Reports
Retainer Support

Size of Organization
Headcount: 3
Global Network of Professionals

Bill Dunham
42 Years—Crop Protection & Seeds
Global & Regional Strategic Marketing Teams
Subsidiary Managing Director

Mark Trimmer, Ph.D.
30 Years—Crop Protection
Global R&D
Global Technology Acquisition & Licensing

Manel Cervera
15 Years—Biostimulants & Specialty Fertilizers
Regional / Global Marketing & Sales

2BMonthly
Global Biocontrol & Biostimulants
E-Newsletter
Organize Annual Biocontrol LatAm, Asia and Africa Conference
### Biological Market Overview – Introduction

#### Product Types

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<th>Biological Products</th>
<th>Source: DunhamTrimmer LLC</th>
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<td>Biofertilizers</td>
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<td>BioStimulants</td>
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<td>Biological Control Products</td>
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<td>Abiotic Stress Mgmt</td>
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<td>BioPesticides</td>
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<td>Biochemicals</td>
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<td>Microbials</td>
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<td>Macroorganisms</td>
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#### Biofertilizers
- Microbials used to enhance plant nutrient uptake from soil
- Nitrogen fixing bacteria make up largest group
- Others include fertilizers 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
- Microbials, primarily bacteria, often used as seed or soil treatment to aid in nutrient assimilation
- Organic acids are humic and fulvic acids used as soil amendments, formed by the microbial degradation of plant matter.
- 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; 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; Protozoa; Yeasts
- Bacteria, followed by Fungi make up the largest groups commercially (>90%)
- Microbials are the largest market of biopesticides.
- 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, larva, pupa or adult is used.
- Most important challenge for Macro is logistics—shipping live organisms that have to have special care to survive
- Normally not classified as a Biopesticide—only as Biological Control Products
OBJECTIVES

• Market data.
  - Global Market Landscape on Biocontrol Market.
  - Global Market Landscape on Biostimulant Market.

• Drivers (Influencers, Drivers & Trends).
  - Factors driving actual & future growth.

• Evolution of each Market.
  - How driving factors are shaping evolution of both Markets as Business Models.
Biological Products Markets Around the World

Market Landscape

7-Mar-2018
BIOSTIMULANTS MARKET
GLOBAL GROWTH

Global BioBiostimulant Market Benchmark Values (USD)

- 1990: $US 100 Million
- 1991: $US 250 Million
- 1999: $US 500 Million
- 2005: $US 1,000 Million
- 2011: $US 1,500 Million
- 2014: $US 2,000 Million
- 2017: $US 3,000 Million
- 2021: $US 4,000 Million
Global Market Performance—Biostimulant

Biostimulants—Sustainable Growth—12 to 15%
- Latin American market growing faster than any other region
- Climate and crops grown in Latin America well adapted to use of biostimulants

Technology for Abiotic stress & management’s constraints
- More efficient use of resources (fertilizer, water, other inputs)

Consumer willingness to pay for quality on fruits & veggies

Biostimulant market still dominated by rapidly growing entrepreneurial companies
- Large companies focused on microbials but consolidation has started
- Market consolidation underway

Market access as key success factor

Possible impact of increasingly strict regulatory requirements

R&D increase its importance as differentiation and future business sustainability issue
ACCELERATING GROWTH

Global BioControl Market Benchmark Values (USD)

<table>
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<tr>
<th>Year</th>
<th>Benchmark Values (USD)</th>
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<tbody>
<tr>
<td>1993</td>
<td>$US 100 Million</td>
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<tr>
<td>1999</td>
<td>$US 500 Million</td>
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<tr>
<td>2005</td>
<td>$US 1,000 Million</td>
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<td>2009</td>
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<td>2016</td>
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<td>2020</td>
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**Global Market Performance—Biocontrol**

### Key Points:

- **Biological Control—Sustainable Growth—17%**
  - Latin American market growing faster than any other region
  - Climate and crops grown in Latin America well adapted to use of biopesticides
- **Green technology / Sustainable technology**
  - Consumer demand for lower residues driving adoption
  - Key part of an integrated system for food production
- **Biopesticide market still dominated by rapidly growing entrepreneurial companies, but consolidation has started**
  - New technology & new companies continue to emerge
- **Market access needs drive consolidation**
  - Many existing small companies lack market access
  - Larger companies/investors will acquire & consolidate to eliminate inefficiencies in current market

### Market Share:

- **2020 Global Biocontrol—Segment Mkt Shares**
  - 47% Bio-Insect, 30% Microbials, 13% Bio-Nemat, 5% Others

- **2020 Product Line Mkt Share**
  - 58% Microbials, 30% Bio-Insect, 13% Bio-Nemat

- **2020 Global Biocontrol Regional Mkt Share**
  - N.Am: 16%, EU: 15%, LatAm: 2%, ROW: 32%, Asia-Pacific: 15%
**BIOCONTROL AS INTEGRATED ON PLANT PROTECTION MARKET**

**Assumptions:**
- **Conventional Global Plant Protection:**
  - $64 billion$\(^1\)
  - Herbicides 40% | Insecticides 30% | Fungicides 25% |
  - Row Crops & Cereals 70% | Fruit & Vegs 20% |
  - Slow growth (<6% CAGR) or even stagnated

**Conclusions:**
- Biocontrol products represent ~ 5% of total P.P. Market.
- They are positioned on a different way in terms of Use’s & Crop’s Segments\(^2\):
  - Biocontrol products are mainly used in Fruits & Vegs (~80%).
  - Bioherbicides are very small share of Biocontrol.
- Biocontrol is growing at 17% CAGR

Source: 1: Philipps McDougal & Others | 2: DunhamTrimmer Bio Market Report
OVERALL CONTEXT - BIOCONTROL IN THE PROTECTION MARKET 2017

Global Crop Protection Market
- Biocontrol: 5.2%
- Conventional: 94.8%

Without Herbicides & Bioherbicides
- Biocontrol: 8.3%
- Conventional: 91.0%

Fruits & Veggies
- Biocontrol: 17.6%
- Conventional: 82.4%
MARKET LANDSCAPE

- Both Bio. markets growing at two digit % number up to 2025.
- Biocontrol Market bigger than Biostimulant.
- Biocontrol Market growing faster (CAGR) than Biostimulant.
- LATAM fastest growing region up to 2025 for both Markets.
- Microbials fastest growing products for both Markets.
- Biocontrol well established in F&V sector.
Biological Products Markets Around the World

Drivers & Trends
Common Drivers
• Population Growth
• Climate Change
• Ecological Needs

Biocontrol More Specific Drivers
• Consumer Demands
• Pest Resistance
• Regulatory Advantages
• Entry Of Global Companies

Biostimulant More Specific Drivers
• Snake Oil To Science
• R&D Investment
• Industry Consolidation
• Regulatory Issues
• Precision Ag
Biological Products Markets Around the World
Actual & Future Market Access
Both, as business, have common objective of gain acces to the market in the most profitable long term way as possible.

Both, from their beginning, or immediate evolution, have been shaped as different business models because differences on:

- Product characteristics.
- Market integration & Consumer perception.
- Key initial success factors to grow as a business.
BIOPESTICIDE SECTOR

- Higher investment requirements
- Bigger barriers to enter
- More IP

- More specific solution oriented
- More differentiation
- More limited portfolio offer

- Market: They are compared with chemical pesticides:
  - Field performance of biopesticides
    - Preventative not curative!
    - Application thresholds may differ for biopesticides
    - Biopesticides perform best in a program with chemicals> Integration needs to be done
    - Integration needs involvement from commercial channel, which will depend on profitability & technical capacity and time.
  - Stronger market position Fruits & Vegs (Consumer demand, Secondary standards,...)

- ¿profitability to farmer and/or commercial channel?
Strategical focus for Market Access
BIOSTIMULANT SECTOR

Original drivers for biostimulant adoption and growth

• **Consumer level:**
  • Increased willingness to pay for fresh & high quality fruits and vegetables (F&V) during the whole year.

• **Farm level:**
  • Intensive, added value production of F&V is subject to agroecological & management stress which increases producer’s business risk.
  • Producers become avid for increasing number of inputs that could help them to reduce risks on production quality and stability, as well as assure the better possible yield.
  • Biostimulants probe to support farmer under these stressing conditions.

• **Manufacturer (& Distribution):**
  • Smart visionary’s entrepreneurs who found in biostimulants a profitable business opportunity, began to appear.
  • In order to be closer to the farm (due to biostimulant product’s characteristics) commercial channel players have found an important an profitable role to play.
Biostimulants appeared into the market bringing some intrinsic characteristics that will be crucial on defining the business as we know it today.

- They have a multisite effect.
- Final result is dependent on triad plant-environment-product (management).
- Replicability of results is not always the same.
- Most of them are based on organic materials. Many were waste products from other industries.
- Main active substances used are very similar among commercial products.
- Mode of action not completely understood.

- Biostimulants appear as a new additional solution, not directly substituting any existing one.

- IP level is low.
- At regulatory level most of times trend was to assimilated them as fertilizers (special nutrition products).
- There is a fragmented regulatory treatment. (talk better about commodity...)
- Result is a lack of clarity for industry and users.
Market needs

- **Offer side:**
  - Low barriers to enter (low IP & lack of harmonized strict regulatory framework at global level) create a good atmosphere for SME’s to establish as main initial players in the market. Those companies lack of enough resources to invest in research.
  - Product characteristics create a high risk of product commoditization. Companies need to grow fast on the commercial chain. Marketing and Commercial approach are key.
  - Biostimulant business is not considered to jeopardize other agricultural input business in most of the cases.

- **Demand side:**
  - Risk of snake-oil claims due to lack of understanding of product characteristics and low barriers to enter that can favor opportunistic sales.
  - Proximity to production level (farm) is needed in order to address appropriate message & a close follow up of product performance, as well as building good relationship with consumer.
  - Intensive added value crops have high willingness to pay for biostimulants, but stressing conditions in row crops & cereals can make them interesting markets whenever willingness to pay exist.
**BIOSTIMULANT SECTOR**

- Manufacturer
  - Production
  - R&D
  - IP & Regulatory
  - Development
  - Marketing
  - Commercial
  - Sales
  - Farmer
  - Consumer & Food Chain Distribution

**Trend**

- Need better knowledge of the product. Knowledge on mode of action
- Need differentiation & specialization.
- Regulatory requirements.
- Technological improvement

**Strategical focus for Market Access**

7-Mar-2018
Business consolidation will increase gap among companies in terms of market access, product differentiation capacity, and financial muscle to fund R&D.

The entry of global companies into this business will definitely impact the business model structure for other players.

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<th>R &amp; D / Manufacturing</th>
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Source: 2B MONTHLY reported intercompany agreements
Macro Drivers & Influencers

- Precision AG -

Precision ag provides growers with better knowledge about their crop status and information to use in decision making. Impact on biostimulant adoption has potential to be highly positive, especially on row crops and cereals, as knowledge of abiotic stress leads to increased use. Global company investment in precision ag may further accelerate this trend.
**FUTURE TRENDS**

- Both Markets have different focus as business model.
- Actual drivers and Trends are shaping a new business model for lot of Biostimulant companies.
- Biostimulant will boost when future efficiency needs for agricultural resources become more and more crucial.
- Biostimulant product’s shares as we know them today will change.
  - More specific.
  - New technology & Products.
  - More unique and protected in terms of IP
- Consolidation process and entry of multinationals will reinforce those trends as will bring investment, resources and market access for new product to come.
Country Gentlemen Early 1900's
THANK-YOU FOR YOUR SUPPORT

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• DunhamTrimmer has developed databases covering the biological industries of Biocontrol, Biopesticides, Biostimulants & Biofertilizers including data on companies, products and market landscape. All databases are available for purchase from DunhamTrimmer.

• For more information about these products please contact DunhamTrimmer LLC at info@DunhamTrimmer.com