Biological Products Market Overview: Past, Present, and Future

Keith Jones – Executive Director
Biological Products Industry Alliance (BPIA)
Who is BPIA?

Started in 2003 with 5 member companies

Today: 131 Member Companies

Manufacturers, Marketers, Distributors, Service Providers from North and South America, Asia, Europe, and Middle East

Members Range from Sole Proprietors to Multinational Companies

Incorporating biostimulant issues and members

Expanded to include Growers and Food Processors
Our Mission

Advancing Sustainability Through Biological Solutions
What Does BPIA Do?

- Influence
- Advocate
- Communicate
- Educate
- Collaborate
Member-Driven Committees & Meetings

Committees:
- Biostimulants
- Communications
- Finance
- Government Affairs
- Membership
- Nominating
- Regulatory
- Specialty Markets

Meetings:
- Annual Meeting
- Capitol Hill “Fly-Ins”
- Symposiums
- Workshops
Industry Collaboration

While BPIA member companies hold membership in multiple industry trade groups that represent diverse commercial interests, BPIA itself has joint initiatives with industry associations to collaborate on common goals.

- ASTA (American Seed Trade Association)
- BIO (Biotechnology Innovation Organization)
- CLA (Crop Life America)
- EBIC (European Biostimulant Industry Council)
- IBMA (International Biocontrol Manufacturers Association)
- TFI (The Fertilizer Institute)
**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
- 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.
- Bacteria; Fungi; Virus; Protozoa; Yeasts
- Bacteria, followed by Fungi make up the largest group commercially (>90%)
- Microbials are the largest market of biopesticides.
- Biggest challenges for microbials are formulation related: 1) Shelf-life; 2) Stability; 3) Performance enhancement

**Biological Control Products**
- 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

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**Source:** DunhamTrimmer LLC
What are Biopesticides?

Biopesticides are reduced risk pesticides that are naturally derived or synthetic equivalents of natural materials such as animals, plants, bacteria, fungi and certain minerals, generally posing little risk to humans or the environment. (aligns with EPA OPP definition)

Biopesticides:
• Allow conventional growers to integrate reduced risk pesticides into their pest management program
• Allow organic growers to control pests while maintaining their certified status
• Play an important role in public health protection
• Are important components of IPM Programs
• Allow greater flexibility when harvesting due to minimal re-entry and pre-harvest intervals
• Minimal Personal Protective Equipment (PPE) for agriculture workers
• Are effective resistance management tools because of their alternative modes of actions
• Can be used as residue-management tools
FIFRA Definition and Safety Standards Applies to Biopesticides

- Biochemical or microbial
- Naturally occurring or synthetic equivalent with a non-toxic mode of action (MOA)
- Plant incorporated protectant (PIP)
Biopesticide & Tolerance Exemptions

• Most biopesticide registered through BPPD are exempt from a tolerance
• There may be residues, but there are no residues of toxicological concern
• Very high safety standard
• Tolerance exemptions are not necessarily harmonized or recognized across the globe but can be used as a residue management tool
Biopesticides: regulated to a higher safety standard

- Biochemical classification – the safety funnel
  - Non-toxic mode of action
  - Naturally occurring or (synthetic equivalent) with a history of safe use
- Informs a potential for reduced risk
  - Requires less (animal) studies in a tiered manner that discloses hazard potential
  - Does not guarantee biopesticide registration
This is not a biopesticide (obviously?)

- Plant extract
- MOA: Central nervous poison
- Acute LD50: 200-400 mg/kg
- Adverse affects: mild cerebral hyperemia, occasional psychotic-like self mutilation, gastric ulcers, and inhibition of oogenesis; hypertrophy of the salivary glands, gastrointestinal tract, liver, heart, kidneys, and lungs; a stressor reaction in the adrenal and thymus glands; minor changes in organ water levels; an occasional death apparently from bronchopneumonia (1965 Boyd)
This is not a biopesticide (caffeine)
Biopesticide Product Examples

The largest market for biopesticide is the conventional crops
Polyoxin D Zinc Salt

• Fermentation product of naturally occurring microorganism (non-GMO)
• Used on many fruit and vegetable crops, turf, and ornamentals
• Mode of action:
  • Stops sensitive fungi from growing; **stops the pathogenicity**
  • Does **NOT** kill the fungus
• Resistance management tool: **Unique mode of action** (FRAC 19)
• IPM Tool: Very low environmental risk (birds, bees, soil, water, etc.)
• Dietary risk management tool:
  • **No** mammalian toxicity observed in any study, including in chronic studies
  • May be applied up to the time of harvest (0-day PHI)
Baculoviruses – natural pathogens of insects

Only found in insects (mainly lepidopteran species)
• No effects on plants, mammals or aquatic organisms
• Narrow host range, no adverse effects on beneficial insects
• No production of metabolites or toxins
• Highly efficient control of the target lepidopteran insect pest
• Used in organic farming and IPM programs
• Excellent resistance management tool
• High compatibility with other products
- Biological Insecticide
- Protein Strain of microorganism BT
- Armyworms, Diamondback Moth Larvae
What are Biostimulants?

A plant biostimulant is a substance or substances and/or micro-organisms whose function when applied to seeds, plants or the rhizosphere is to stimulate natural processes to enhance/benefit nutrient uptake, nutrient efficiency, tolerance to abiotic stress, crop quality and/or yield.

Biostimulants:
• Derive from natural or biological sources
• Enhance plant growth and development
• Improve the efficiency of plant nutrients, as measured by either improved nutrient uptake or reduced nutrient losses to the environment, or both; and/or
• Act as soil amendments, with demonstrated ability to help improve soil structure, function or performance and thus enhance plant response
Integrating Biostimulants

✓ Globally:

✓ >400 Companies have a commercial interest in Biostimulants

✓ ~200 Companies have Biostimulant products in the market or in development

✓ BPIA officially included Biostimulants in it’s scope, mission and priorities

✓ Established a committee infrastructure to focus on biostimulant issues, give voice to the industry, and integrate biostimulants into existing BPIA initiatives & priorities

✓ Dedicated member volunteers with expertise to drive key biostimulant initiatives in coordination with BPIA staff and consultants
ACCELERATING GROWTH

Global BioControl Market Benchmark Values (USD)

- 1993: $US 100 Million
- 1999: $US 250 Million
- 2005: $US 1,000 Million
- 2009: $US 2,000 Million
- 2012: $US 3,000 Million
- 2014: $US 5,000 Million
- 2016: $US 5,000 Million
- 2020:

BioControl Market Bn USD
Global Market Performance—Biocontrol

**67%**
NAm & Euro Share of Global Market

**58%**
Microbials Largest Product Line

**>17%**
Microbials Product Line Fastest Growing

**47%**
Bioinsecticides Still Largest Use Segment

**18%**
Bionematicides Fastest Growing Use Segment

Global CAGR

2020 Global Biocontrol--Segment Mkt Shares
- Bio-insect: 1%
- Bio-Fung: 3%
- Bio-Herb: 5%
- Bio-Nemat: 47%
- Others: 44%

2020 Product Line Mkt Share
- Microbials: 30%
- Macro-organisms: 13%
- Biochemicals: 58%

2020 Global Biocontrol Regional Mkt Share
- N.Am: 16%
- EU: 15%
- Asia-Pac: 32%
- LatAm: 35%
- ROW: 2%

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
BIOSTIMULANTS MARKET
GLOBAL GROWTH

Global BioBiostimulant Market Benchmark Values (USD)


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Dunham Trimmer
International Bio Intelligence
Global Market Performance—Biostimulant

- 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
Thank you for your time and attention!

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