



DunhamTrimmer®
International Bio Intelligence

Major Forces Driving Biocontrol Market Expansion Worldwide

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ABIM - Basel

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BIOLOGICAL PRODUCTS

Source: DunhamTrimmer®, LLC

BIOSTIMULANTS¹

MICROBIALS

NUTRIENT USE EFFICIENCY (NUE) (BIOFERTILIZERS)²

PLANT GROWTH PROMOTION (PGP)

NON-MICROBIAL

PLANT & SEAWEED EXTRACTS

AMINO ACIDS

ORGANIC ACIDS

INORGANIC COMPOUNDS

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).

2 Biofertilizers are Microbials used to enhance plant nutrient uptake from soil (NUE).

- N-fixing bacteria make up the largest segment.
- N-fixing bacteria for non leguminous crops make up the fastest growing segment.
- Other NUE microbials include mobilizers and solubilizers or chelators of specific nutrients such as P, K, S, Zn, Fe.

PGP Microbials target other biostimulant properties beyond NUE.

Non-microbial biostimulants may target either NUE or other PGP effects.

- Amino Acids and Seaweed Extracts are the fastest growing segments.
- Seaweed Extracts are a complex mixture of components including plant hormones, phenolic compounds, and other active substances.
- Amino Acid products include peptide fractions.
- Organic acids are mainly humic and fulvic acids used as soil amendments.

BIOCONTROLS

BIOPESTICIDES³

BIOCHEMICALS⁴

MICROBIALS⁵

PLANT EXTRACTS

BACTERIA

FUNGI

ORGANIC ACIDS

PGRs

PROTOZOA

VIRUS

SEMIOCHEMICALS

YEASTS

OTHERS

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.

4 Biochemicals include Plant Extracts (largest by sales volume), Organic Acids, PGRs (plant hormones e.g. cytokinins, auxins, etc), and Semiochemicals (allelochemicals and pheromones).

MACROORGANISMS⁶

INSECTS

MITES

NEMATODES

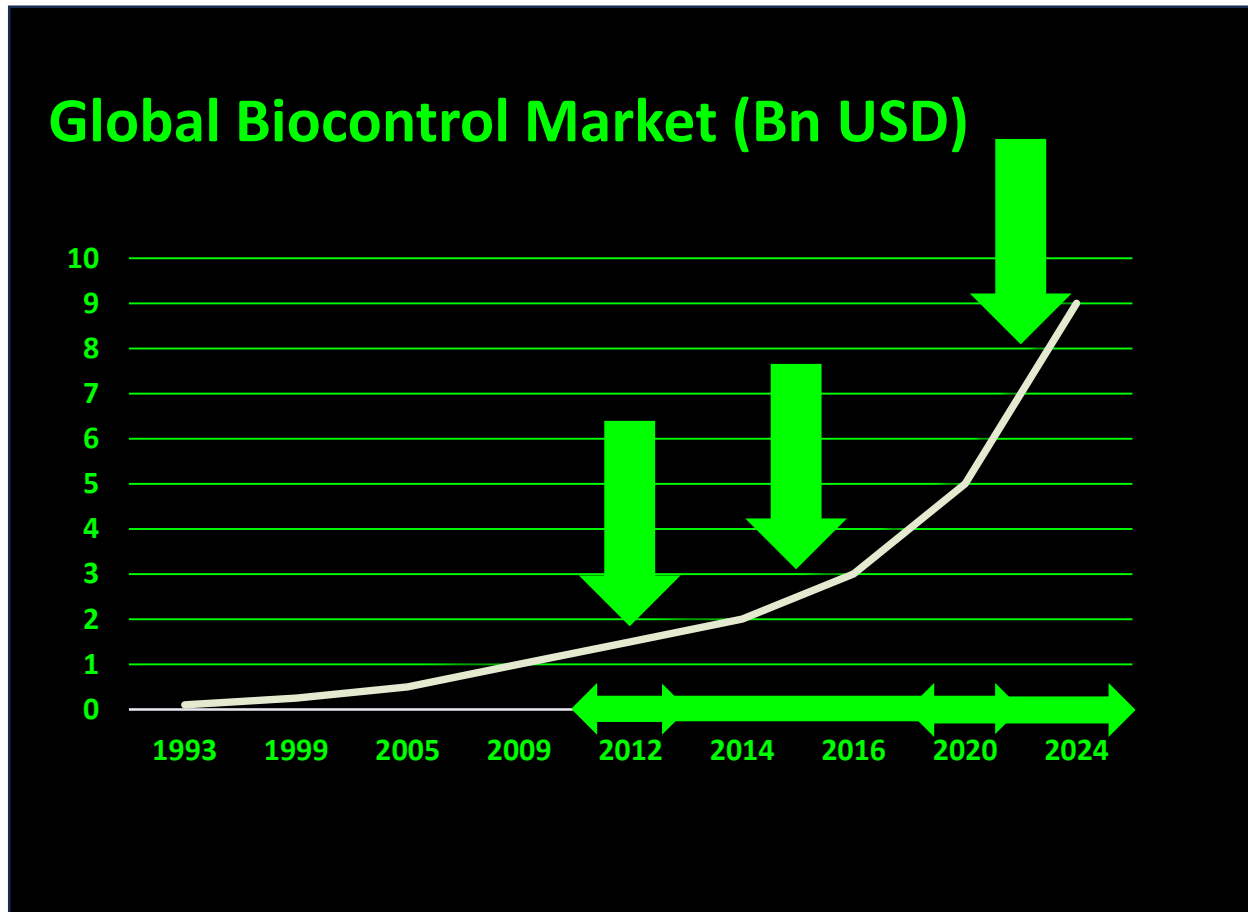
5 Microbials refer to products based on bacteria, fungi, viruses, and protozoans. Microbials comprise the largest market of biopesticides.

- Bacteria, followed by fungi, make up the largest groups commercially (>90%).
- Biggest challenges relate to product formulation with regard to shelf-life, stability, and performance enhancement.

6 Macroorganisms include insects, mites, and nematodes. Insects & mites are the largest groups.

- Unique in that the live organism is used in the form of eggs, larvae, pupae, or adults.
- The most important challenge in this category is logistics — shipping live organisms that require special care to survive.
- Normally not classified as Biopesticides but rather Biocontrols.

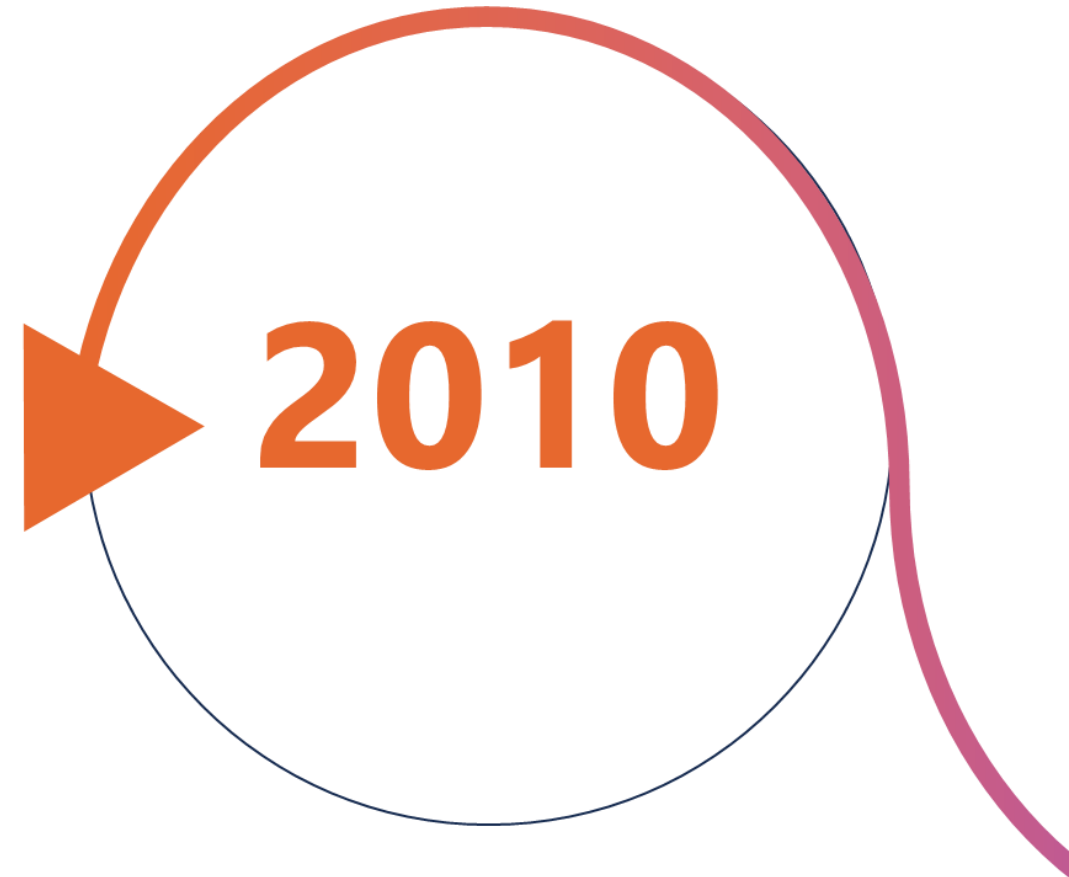
Biologicals Market Historical Growth



- Market grew slowly until early 2000s
- Multiple pivotal moments over last 15 years have positively impacted biocontrol market:
 - **2012** – Entry of global companies
 - **2010-2021** – Positive investment climate
 - **2020-2024** – Brazil expansion into row crops

Biocontrol Market in 2010

- Global Market Value: **US\$1.0 - \$1.5 Bn**
- Global Growth Rate: **>16% CAGR**
- Market dominated by large number of **small entrepreneurial companies**
- **Fewer than five companies** with >\$100 million revenue
- **North America and EU** represent majority of market



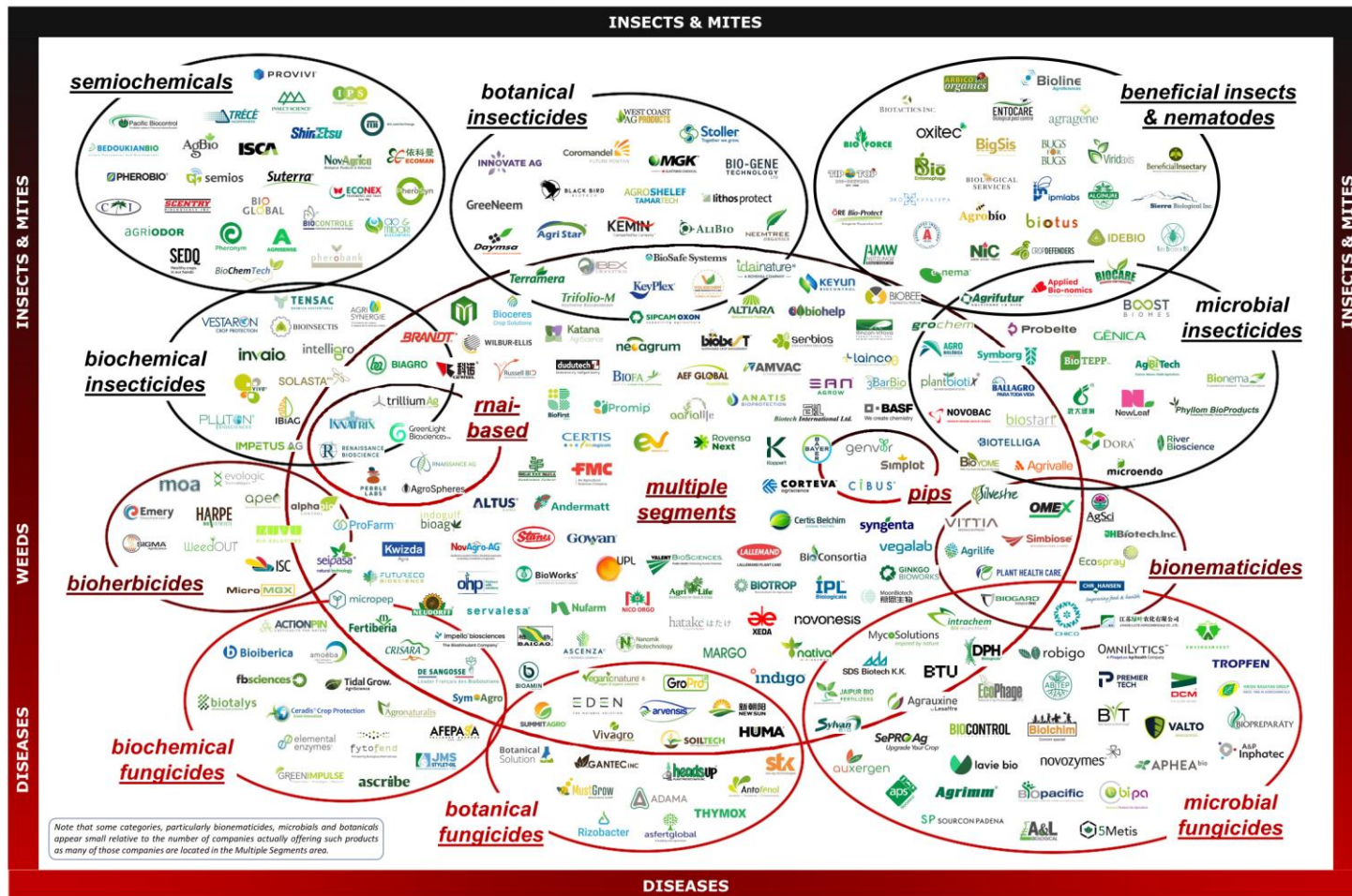
2012: Pivotal Moment #1

- Sudden entry of multiple global crop protection companies
 - Bayer acquires AgraQuest
 - Syngenta acquires Pasteuria Bioscience
 - BASF acquires Becker Underwood
- Dramatic increase in market access for acquired companies
- New entrants boost credibility of biocontrol technology in the eyes of distribution and growers
- Increases investment in biocontrol product development
- Signals established crop protection companies see biocontrol as future growth opportunity
- Fuels a surge of investor interest in biocontrol



2024 CROP BIOCONTROL LANDSCAPE

The Mixing Bowl
CONNECTING INNOVATORS IN FOOD, AG & IT



Where did that pivotal moment take us?

- Today: Huge number of companies active in biocontrol
- Includes many established companies investing in the space as well as a large number of startups
- What factors provided funding for all of these startup companies?

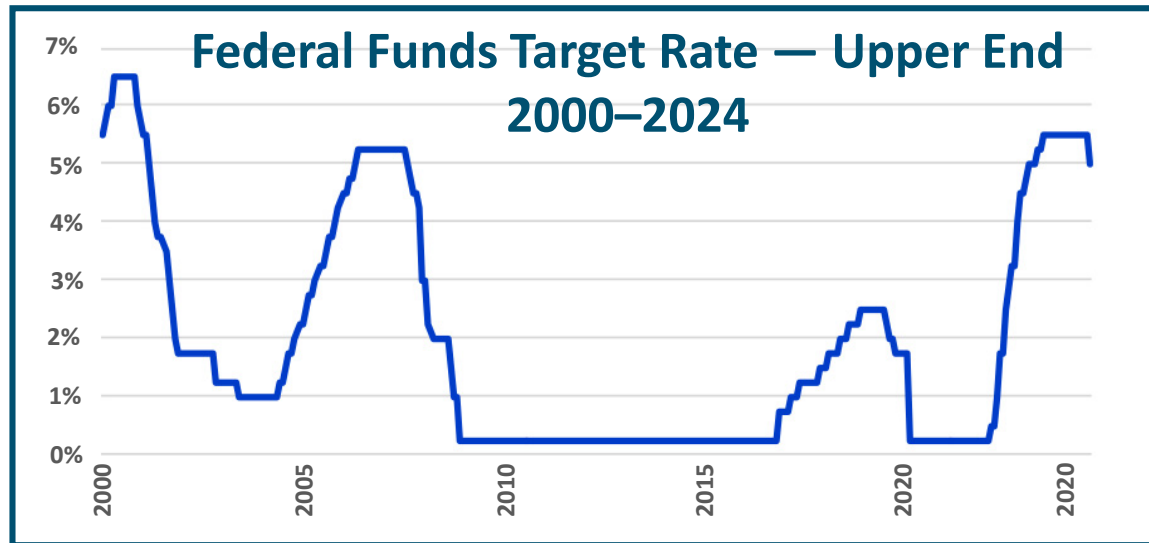
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Note that this landscape is representative, not comprehensive. Also, companies appear on the landscape only once, although some offer products in multiple categories. Most of those companies may be found in the Multiple Segments area.

2010-2020: Pivotal Moment #2



- Historically low interest rates 2009–2021 helped drive VC & PE investment that provided capital to startup biocontrol companies, fueling continued innovation and expansion
- Rapid increase in interest rates in 2022 resulted in a more constrained investment climate



Emerging Trends

- Biocontrol emerged in the US and Western EU fruit and vegetable markets
- Early success and expansion in these crops were the engine that fueled the early growth of the global biocontrol market
- These markets are now maturing and growth, while healthy, is slowing
- Expanded use of biocontrol in Row Crops is key to future growth



2020 – Present: Pivotal Moment #3

- Brazil becomes the first market where biocontrols have been widely adopted in row crops
- Microbial bionematicides and bioinsecticides use has expanded dramatically 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
- Extensive bio adoption in soybeans – combined with continued expansion of soybean-planted hectares – is a key driving force in this crop
- Today, LATAM is the fastest growing biologicals market in the world, led by this rapid expansion in Brazil



Biocontrol market in 2024

- Global Market Value: Approaching US\$9.0 Bn
- Global Growth Rate: >12% CAGR
- Multiple companies approaching US\$500 million in revenue with more than 10 companies now with >\$100 million revenue
- While North America is currently the largest region, Latin America is rapidly gaining and will take the lead by end of decade.



2024

Biocontrol market: 2010 - Now

2010

- Global value US\$1.5B
- Global CAGR >16%
- Many small companies
- Few companies >\$100M
- US & EU dominate

3 Pivotal Moments

**Global Companies Enter
Strong Investment
Brazil Row Crops**

2024

- Global value near US\$9B
- Global CAGR 12%
- Increasing consolidation
- Several companies >\$500M
- LATAM drives growth

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