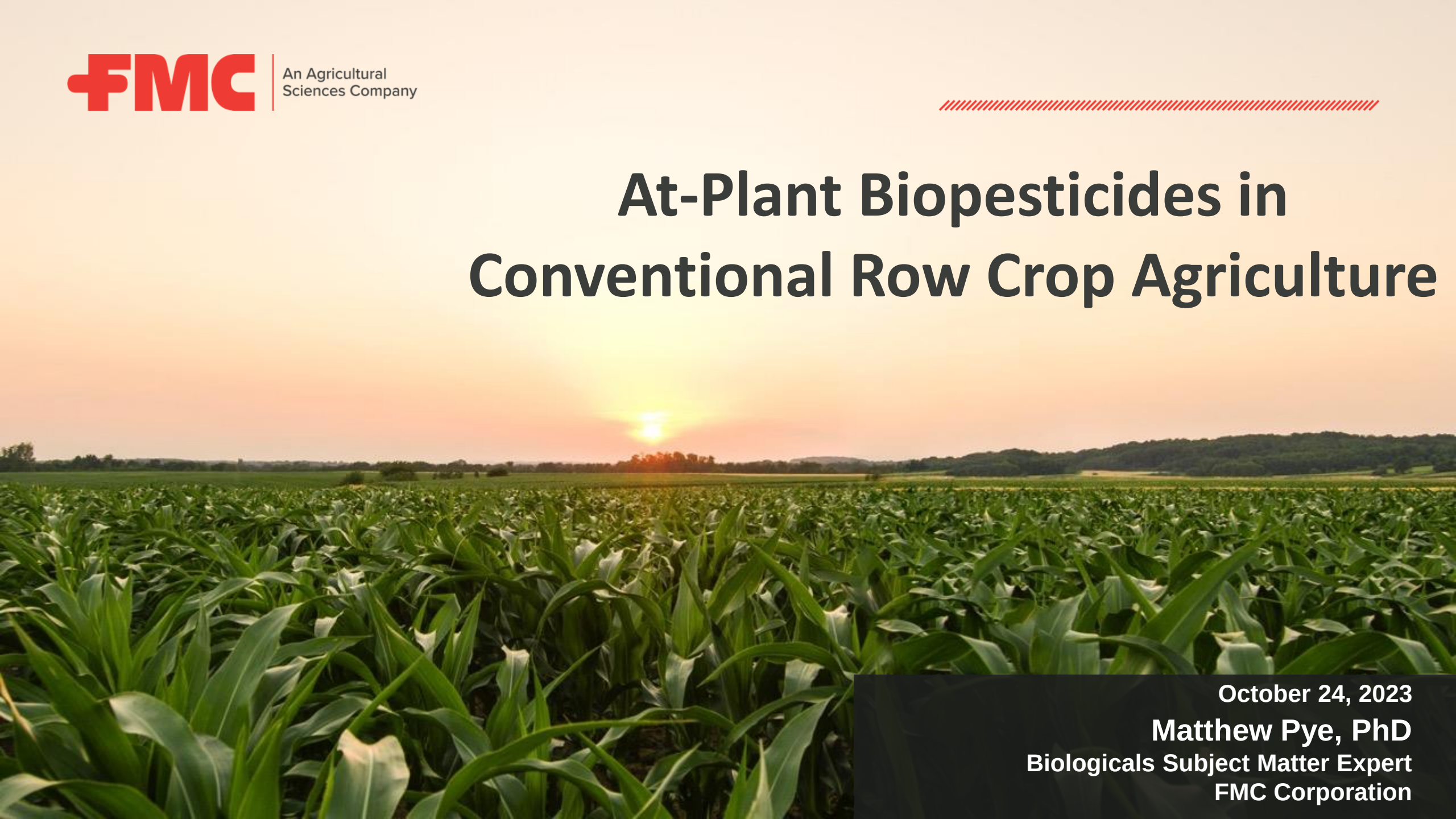
FMC An Agricultural Sciences Company

At-Plant Biopesticides in Conventional Row Crop Agriculture



October 24, 2023

Matthew Pye, PhD
Biologicals Subject Matter Expert
FMC Corporation

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Topics:

- Biopesticides in US Row Crops
- Trends and Challenges
- FMC’s Success in Row Crops

What is a Biologicals Subject Matter Expert?

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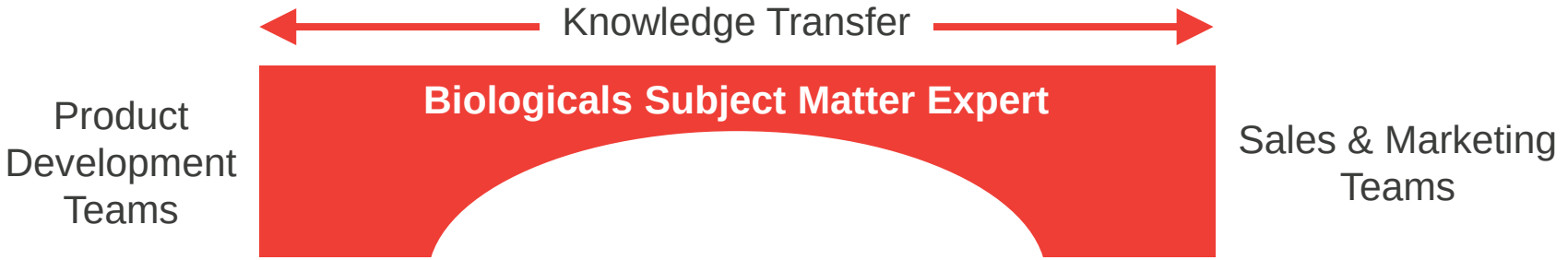
A bridge. We wanted to equip our sales force to better integrate our biologicals and synthetics portfolio.



- Technical support of biological products and systems in the USA.
- Develops biological trial programs, training materials, and localized sales tools.
- Works closely with product development on new biological products.

Biological Control in the United States

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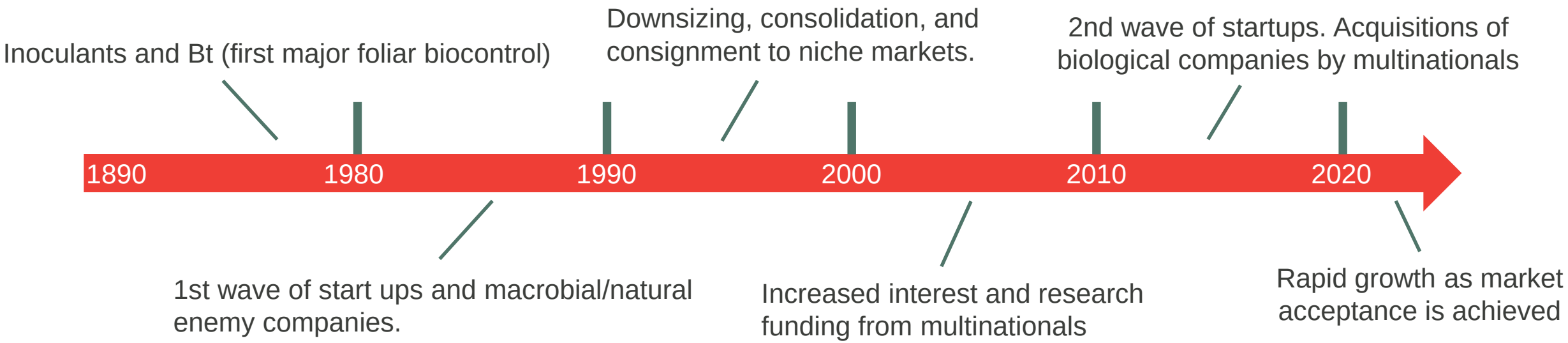
After decades of relative obscurity, biologicals have broken out into mainstream US agriculture and are here to stay with ~10% CAGR.



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Trends and Challenges

Biological Control in the US Row Crops

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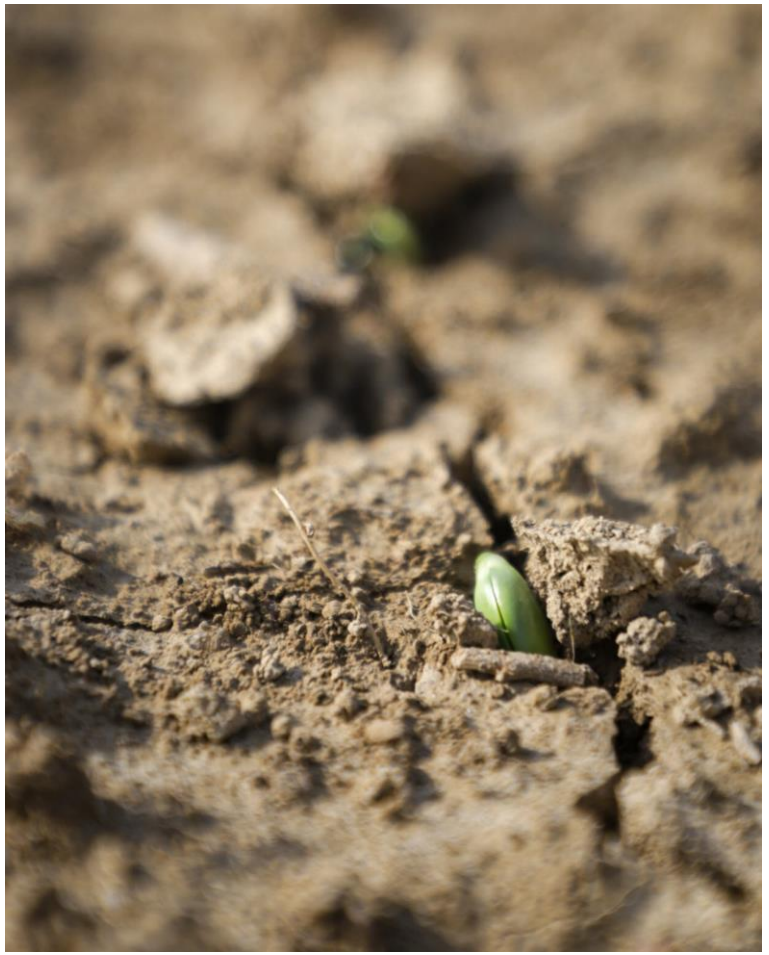
The use of biologicals in US row crops is often underappreciated and/or overlooked.

- Biological Seed treatments are the most common use of biologicals in row crops
  - Growers often plant corn seed pretreated with biocontrols (*Bacillus firmus* and others) without knowing it.
  - Soybeans seed treatments are often tailored to the grower. Common treatments include inoculants, bionematicides, and biofungicides.
- The At-Plant, soil-applied market adds flexibility and customization to a grower's management program. Here bionematicides, biofungicides, biostimulants and biofertilizers are common.



A Comparison of US Market Drivers

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	Fruits, Vegetables & Tree Nuts		Row Crops
Market	Well-developed organic markets and maximum residue limit requirements for export.	⟷	Organic and/or sustainably produced markets are still very limited. Animal feed is a major end use.
Consumer	Consumer demand for reduced pesticide usage and sustainable production.	⟷	Little to no consumer demand for organic row crop commodities.
Profitability	High value crops with margin to support additional or more expensive inputs.	⟷	Lower value crops with narrow margins requiring careful management of inputs.

Current Trends in US Row Crops

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Consolidation, reduced and aging workforce:

- Farmer age is often cited as a reason growers might not choose biologicals
- Management decisions are transitioning to a new generation of farmers

Rise of Precision Ag:

- New generation open to products/technologies that allow better input management
- Many growers utilize At-Plant biologicals from FMC

Regenerative Agriculture:

- Focus on soil health, the protection of biodiversity, carbon sequestration, etc.
- Biofertilizers, biostimulants, and biopesticides are often employed

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FMC’s Success in Row Crops

FMC's Success in Row Crops: Principles

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- Reduce barriers to adoption by making products "easy to use" and integrate into current/conventional production systems
- Develop product understanding on multiple levels: lab, greenhouse, and field
- Effectively educate and set realistic expectations with growers
- Demonstrate product performance through on-farm trials and excellent product support

Bifenthrin

ETHOS® ELITE LFR® INSECTICIDE / BIOFUNGICIDE

Ethos Elite LFR Insecticide/Biofungicide contains bifenthrin synthetic. This product is a restricted use pesticide registered with the US EPA.

FMC's Success in Row Crops: Product Development

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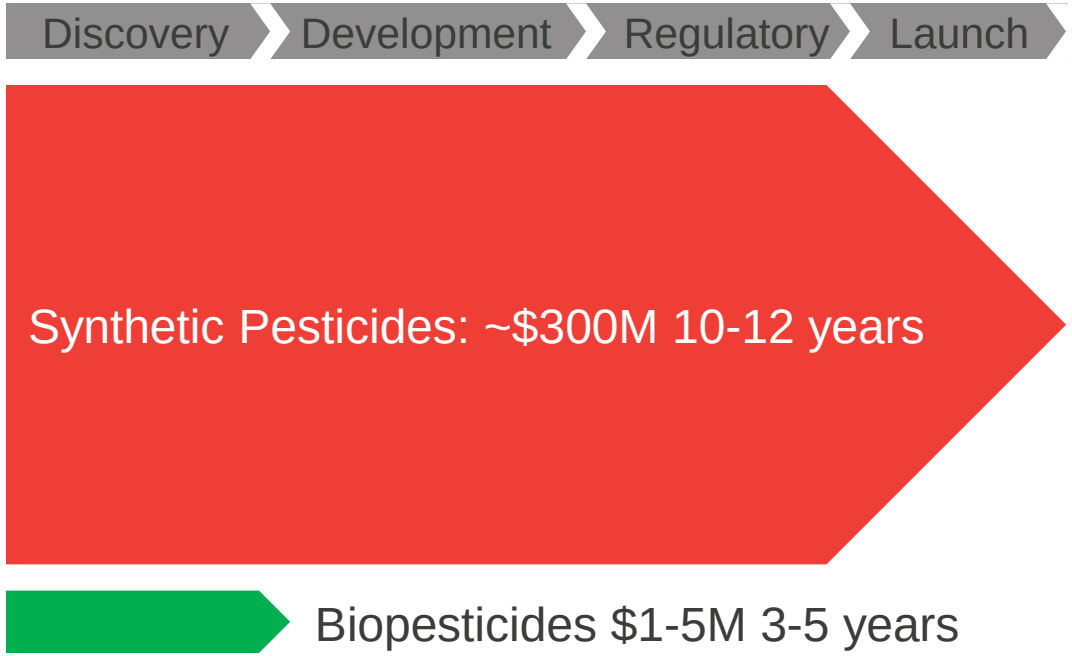
- Biopesticides generally have fewer regulatory hurdles and expedited paths to registration in the US.
- Any biological with pesticidal claims requires US EPA registration.
- At FMC, biologicals and synthetics undergo parallel discovery and development processes.
- All FMC biologicals undergo multiple years of lab and field trials prior to registration.



It's **IMPORTANT** to remember that while registration timelines are shorter for biopesticides, **there is no shortcut to understanding our products**

FMC's Success in Row Crops: Product Understanding

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- We conduct hundreds of on-farm grower trials every year
- Average trial size: 50 acres (20 ha)
- Real world use cases and results
- Easier to identify and troubleshoot problems
- Feedback from actual growers
- Simultaneous generation of marketing materials and additional data

Check

ZIRONAR™
BIOFUNGICIDE/BIONEMATICIDE

FMC's Success in Row Crops: The At-Plant Approach

BIOLOGICALS by FMC

- A successful growing season starts with proactive approach to maximizing the productivity of each seedling
- Seed traits and seed treatments have limitations, At-Plant solutions have season-long effects on crop health
- At-Plant solutions can help reduce the number of mid-season treatments and tractor passes, saving time, labor and emissions
- FMC offers 3x At-Plant biologically based solutions

FMC AT-PLANT

ZIRONAR™ BIOFUNGICIDE/BIONEMATICIDE

AVODIGEN™ BIOFUNGICIDE/BIONEMATICIDE

ETHOS® ELITE LFR® INSECTICIDE/BIOFUNGICIDE

CHR. HANSEN Improving food & health Alliance Project

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ZIRONAR™
BIOFUNGICIDE/BIONEMATICIDE

AT-PLANT

BIOLOGICALS by FMC

- Active Ingredients: *Bacillus licheniformis* FMCH001 and *Bacillus subtilis* FMCH002
- Liquid SC Formulation
- Targets: Protection against seedling blight caused by *Rhizoctonia solani* and *Fusarium spp*.; suppression of Root knot nematode, Soybean cyst nematode, and Lesion nematode
- Application: In-furrow, At-plant
- Crops: corn, soybean, cotton, sugar beets, sugarcane
- Compatible with fertilizers, fungicides, and insecticides

***Rhizoctonia solani* in Sugar Beets**

Inoculated Check ZIRONAR™ BIOFUNGICIDE/BIONEMATICIDE **Synthetic Standard**

AVODIGEN
BIOFUNGICIDE/BIONEMATICIDE

AT-PLANT

BIOLOGICALS by FMC

- Active Ingredients: *Bacillus licheniformis* FMCH001 and *Bacillus subtilis* FMCH002
- Liquid SC Formulation
- Targets: Protection against seedling blight caused by *Rhizoctonia solani* and *Fusarium spp*.; suppression of Root knot nematode, Soybean cyst nematode, and Lesion nematode
- Application: Seed Treatment, At-plant
- Crops: corn, soybean, cotton, wheat, etc.
- Compatible with fertilizers, fungicides, and insecticides

Base Seed Treatment

Base Seed Treatment + AVODIGEN BIOFUNGICIDE/BIONEMATICIDE

Red arrows indicate nematode galls on soybean roots

ETHOS® ELITE LFR®
INSECTICIDE / BIOFUNGICIDE

AT-PLANT

BIOLOGICALS by FMC

- Active Ingredients: Bifenthrin, *Bacillus velezensis* RTI301 and *Bacillus subtilis* RTI477
- Liquid SC Formulation
- Targets: Corn root worm, wireworm, *Rhizoctonia*, *Fusarium*, *Pythium*, *Phytophthora*
- Application: In-furrow, At Plant
- Crops: Corn (Field & Sweet), Soybeans, Dry Beans/Peas, Cotton, Peanuts, Canola, Tobacco
- Compatible with fertilizers, fungicides, and insecticides

ETHOS® ELITE LFR®
INSECTICIDE / BIOFUNGICIDE

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Ethos Elite LFR Insecticide/Biofungicide contains bifenthrin synthetic. This product is a restricted use pesticide registered with the US EPA.

FMC's Success in Row Crops: Customer Support

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- Set the right expectations from the start.
- Technical support for every product when challenges arise
- Remove obstacles to adoption with guarantees: assurance programs, replant assistance

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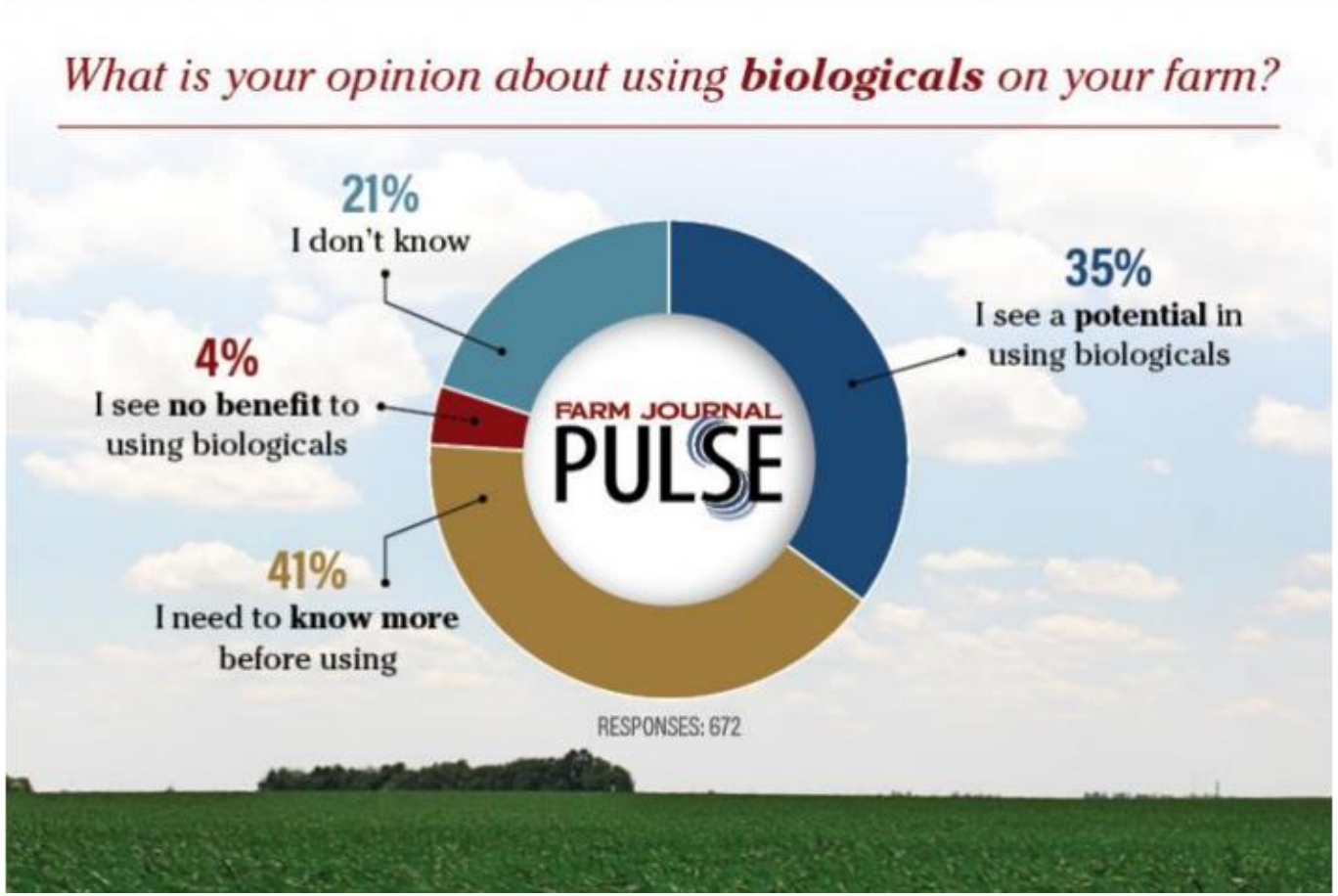
US Row Crop Takeaways

- Education remains the primary need for all biologicals in the US.
- **You're a Guide, not the Hero**. No one product is a complete solution. Growers need options and knowledge for success.
- Biologicals have a big part to play in row crop success, but we haven't achieved replacement yet so our approach must be integrated.
- When we position biologicals correctly, grower confidence and our market grows.



Source: Farm Journal Pulse Survey, January 2021

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Questions?