



The BioAg Alliance

Opportunities, Accomplishments and Priorities

Thomas Videbæk

Executive Vice President
Business Development, Novozymes

Colin Bletsky

Vice President BioAg, Novozymes

Thomas Schäfer

Vice President R&D, Novozymes

Kerry Preete

Executive Vice President,
Global Strategy, Monsanto

Steve Padgette

Vice President, R&D Investment
Strategy, Monsanto



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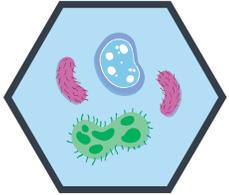
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Session Outline

- The microbial opportunity
- The BioAg Alliance: aim and year 1 accomplishments
- BioAg through the lens of Monsanto. Value for the grower
- Unique approach to BioAg technology development
- R&D starting point and priorities



Microbial solutions for agriculture



Microbials, notably **bacteria and fungi**, are types of agricultural biologicals that **protect** crops from pests and diseases and **enhance** plant productivity and fertility.

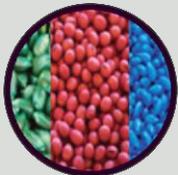
BioControl

- Complements or potentially replaces chemical pesticides
- Provides additional modes of action

BioYield

- Utilizes nutrients in the soil
- Creates stronger, healthier plants
- Provides new options for sustainable agriculture

How are microbials applied?



Seed treatment



Foliar



In-furrow



There are approximately
**50 billion
microbes**
in 1 tablespoon of soil¹

1. North Carolina State University Cooperative Extension

The BioAg Alliance opportunity: Unlocking potential of microbial solutions as a new tool in agriculture

1 Ag Biologicals Market¹

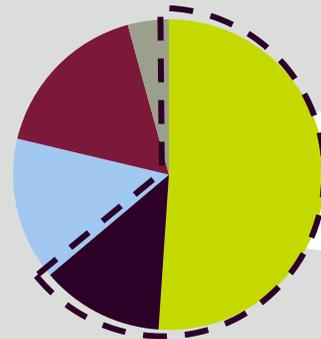
Market segmented by product class

Industry growth driven by increasing demand for sustainable options

2014 Estimated Sales **\$2.9 billion**

Annual Growth **Mid-teens CAGR**

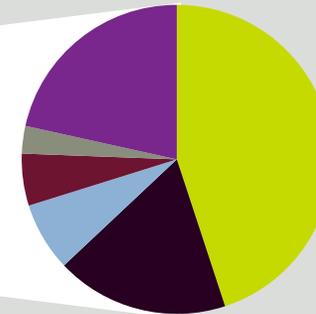
- Microbial Pesticides
- Microbial Inoculants
- Beneficial Insects
- Biochemical
- Other



2 Ag Microbiols Market¹

Market segmented by crop

- Fruits and Vegetables
- Soybeans
- Cotton
- Rice
- Corn
- Other Crops



Opportunity: Core Crops

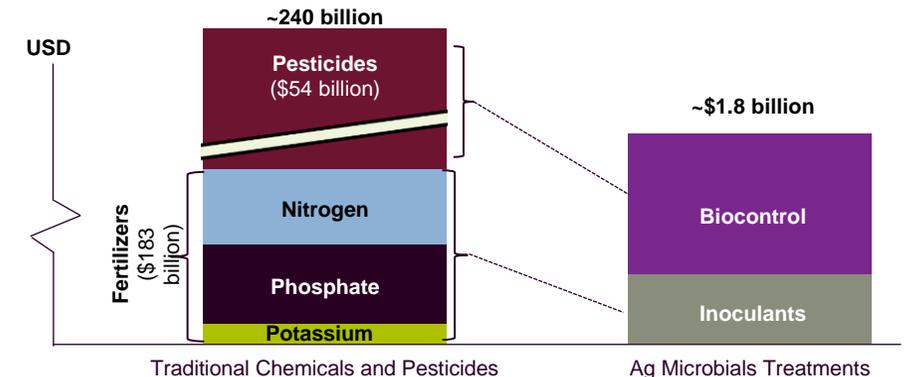
- Today, the majority of Ag microbiols are used in the fruits and vegetables market
- We see significant opportunities in broad-acre field crops such as corn, soy, cotton and canola

3 Ag Microbiols Opportunity

Example: Traditional chemicals & pesticides² vs. Ag microbiols market¹

There's significant opportunity for Ag Microbial market expansion

- Microbiols can be a range of products that can be complementary to, or replace, traditional pesticides and fertilizer options
- Today, the Ag microbiol market is worth approx. \$1.8 billion in sales, while traditional chemicals and pesticides are worth approximately \$240 billion



1. Monsanto estimates of Ag biologicals industry based on a combination of research data from DunhamTrimmer, Agrow, MarketsandMarkets, Frost & Sullivan, Boston Consulting Group, BCC Research, Phillips McDougall, Global Industry Analysts 2. MarketLine and Phillips McDougall market data; All figures in USD.

Inoculants hold significant opportunity for market expansion across crops and geographies



Factors driving inoculant growth:

- 1 Market expansion**
 - Significant opportunity across crops and geographies
- 2 Immediate commercial portfolio**
 - Working from strong starting position with existing commercial products
- 3 Advantageous commercial footprint**
 - Monsanto's broad global footprint enabling upstream distribution and leveraging relationships with distributor and retail channels

	Soybean	Pulses	Alfalfa	Canola	Corn	Wheat	Cotton	Rice
Global Planted Acres¹ (5 year avg. 2009–2013)	~260m	~190m	~15m	~85m	~425m	~540m	~80m	~400m
Inoculants Treated Acres²	~55-60%	~15%	~50%	~5%	~5%	<1%	<1%	<1%
BioAg Existing Product Portfolio	●	●	●	●	●	●	●	●
NA	●	●	●	●	●	●	●	●
LATAM	●	●	●	●	●	●	●	●
RoW	●	●	●	●	●	●	●	●
Current Inoculants Treatment Regime								
Upstream (Seed Company)	○	○	◐	◐	◐	○	◐	◐
Midstream (Distributor/Retailer)	◐	◐	○	◐	◐	◐	◐	○
Downstream (Grower)	◐	◐	◐	○	○	◐	○	◐

● Strong product position
 ● Moderate product position
 ● Minor product position
 ● No current product position

1. Source: FAO stats and Internal estimates 2. Internal Estimates



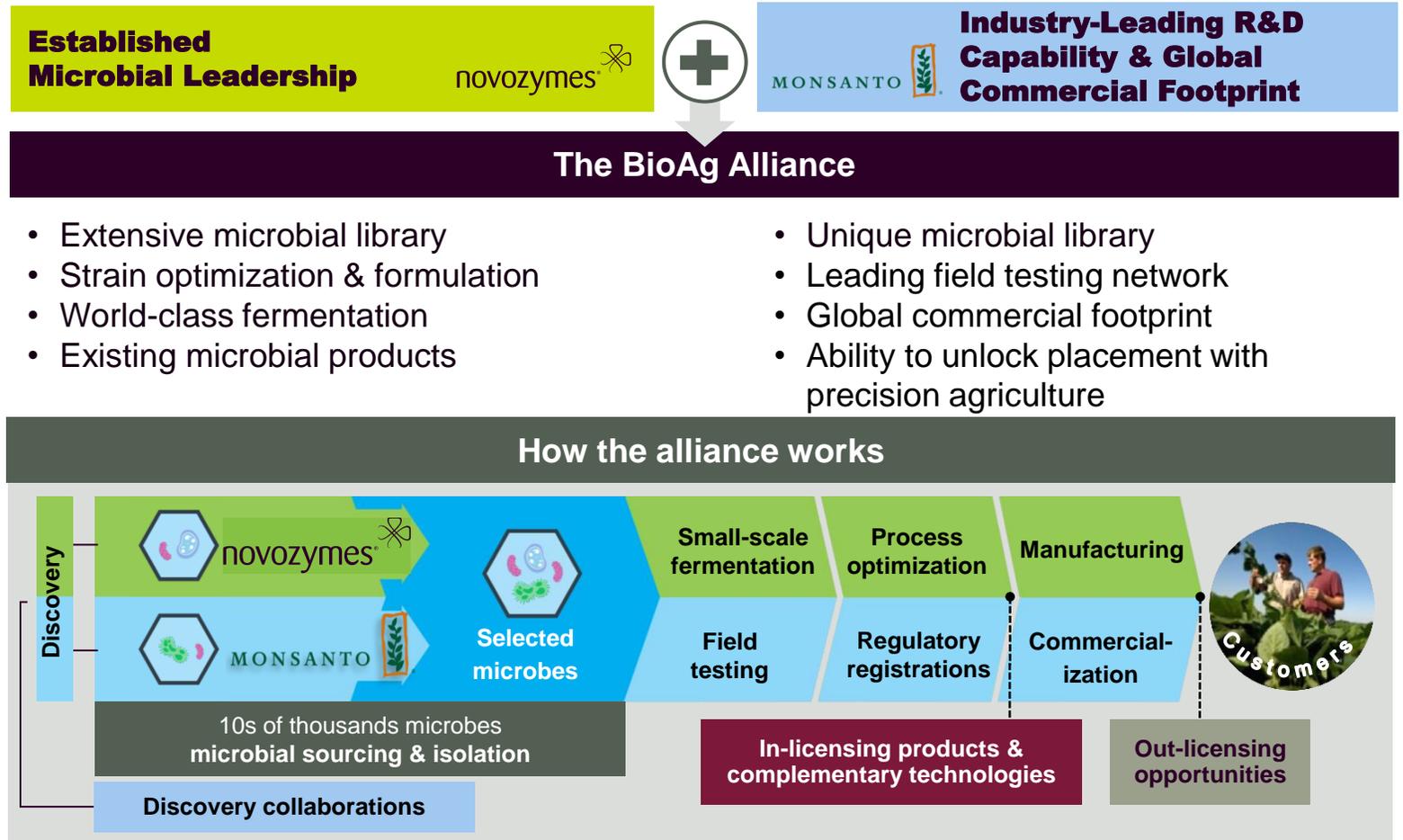
The power of The BioAg Alliance

A unique opportunity...

...to combine Novozymes' and Monsanto's capabilities and establish industry's most advanced microbial platform

A premier vehicle for bringing microbes to market and a sustainable Agriculture platform for farmers to produce more with less

A joint focus to transition this small niche into mainstream Ag practice

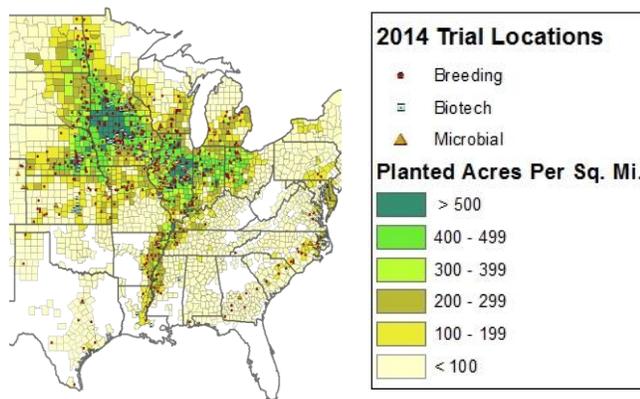


A Strong Start...

– evidenced by the year 1 accomplishments

New Commercial Platform & Defining Collaboration Partnership Model

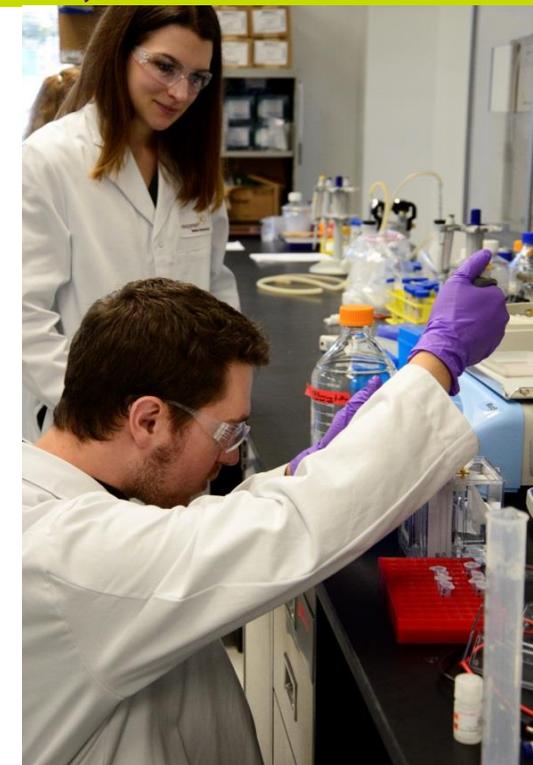
- **Commercial** activities transitioned from Novozymes to new dedicated unit: **Monsanto BioAg**
- **Distribution** transitioning to Monsanto's broad global footprint, enabling distribution through multiple brands, channels and geographies to give farmers more choice
- Leveraging Monsanto's industry-leading field testing network, creating a unique testing platform for microbes of an unprecedented scale
- >50 U.S. corn & soy locations in 2014¹
- 170K plots
- Hundreds of microbes



¹ Planted corn and soybean acre concentration (USDA 2009 – 2013)

New Novozymes BioAg R&D Center in North Carolina, USA

- Establishment of new Novozymes research center in Research Triangle Park, Raleigh, NC
- New team of 100+ scientists working on discovery, small-scale fermentation and stability testing of new microbe candidates across bacterial diversity.

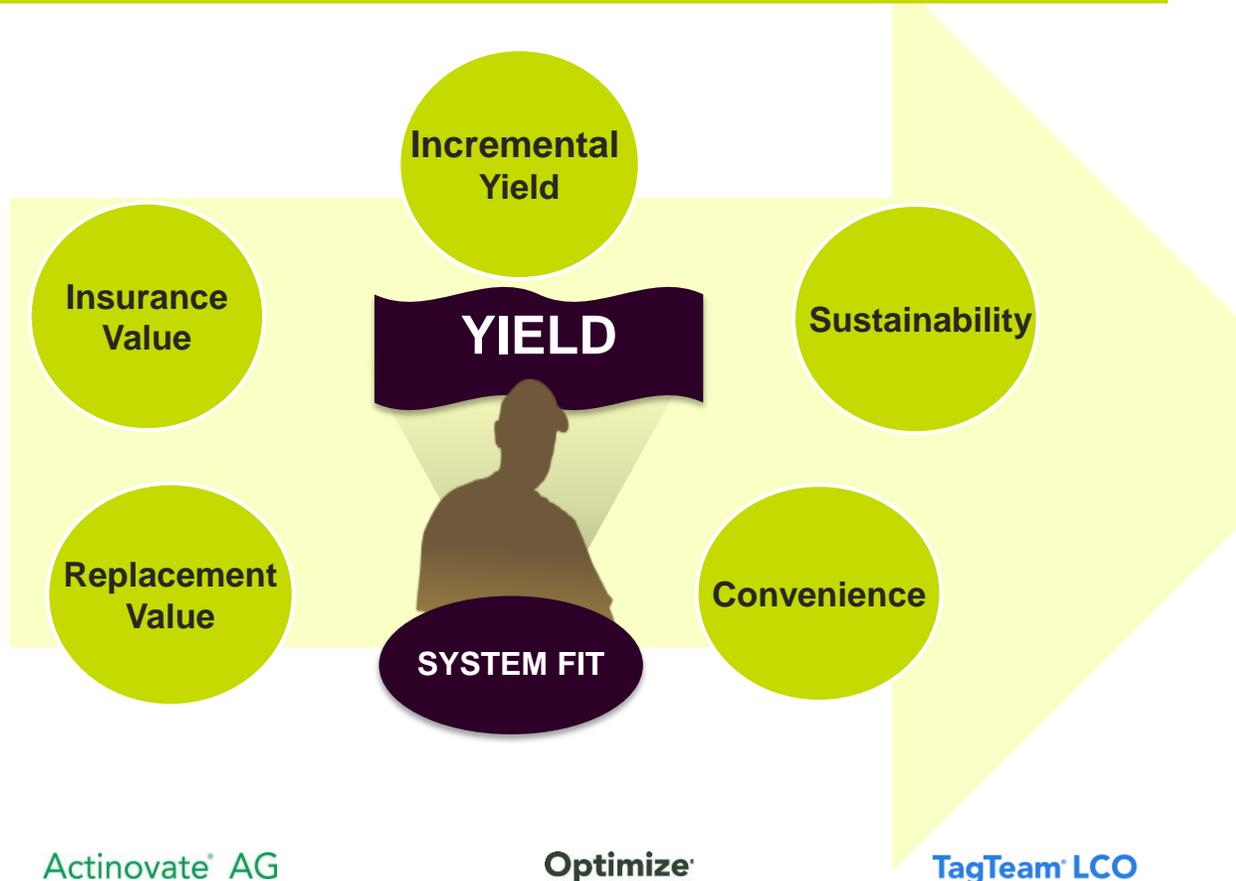


Ag Microbials provide pivotal tools in Monsanto's systems approach to deliver increasing yield

FOCAL POINT: FARMER CUSTOMER	IN THE SEED		IN THE BAG		IN THE FIELD	
	BREEDING	BIOTECHNOLOGY	MICROBIALS	CROP PROTECTION	BIODIRECT™ TECHNOLOGY	CLIMATE CORP.
 <p>40+ KEY DECISIONS a farmer makes that influence on-farm yields and productivity center on critical needs</p> <ul style="list-style-type: none"> SEED CROP PROTECTION SOIL FERTILITY DATA ANALYSIS GRAIN MARKETING FINANCIAL MANAGEMENT LABOR/OPERATION 	<p>Industry-leading breeding engine drives key commercial advantage for Monsanto globally</p>	<p>Monsanto's pipeline delivering 3rd- & 4th- gen. upgrades to insect-and-weed-control platforms</p>	<p>The BioAg Alliance with Novozymes positions microbial solutions as a next major new technology advance in industry</p>	<p>New technologies that improve in-field protection</p>	<p>New RNAi-based tools to provide potential new options for disease, insect and weed control</p>	<p>The Climate Corporation has potential as integrating platform for Ag on 1B acre opportunity</p>
	<p>SEED</p> 		<p>Working collaboratively with our distributor partners to deliver innovative microbial and chemical seed treatments and crop protection products</p>		<p>Integrating technologies & improving farmer productivity through industry-leading production systems</p> 	
	<p>SEEDSMAN-SHIP</p> 		<p>TREATMENT</p> 			
	<p>REGIONAL BRANDS</p> 					

Microbials can help farmers mitigate risk and maximize yield through soil health and pest control activities

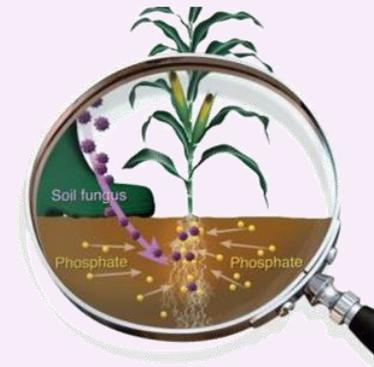
VALUE PROPOSITION TO GROWERS



Microbial value proposition examples

Inoculant example: JumpStart

- Microorganism applied to the seed before planting
- The active ingredient, a soil fungus, grows on the roots and solubilizes the residual soil phosphate, unavailable for plant use
- Yield increases due to superior nutrient uptake in plant's early life stage



BioControl example: Actinovate

- Formulation is water-soluble and may be used as a drench, liquid feed, in irrigation, as a spray or similar applications
- The active ingredient, a beneficial bacteria, effectively protects against many common foliar and soil-borne diseases



Actinovate® AG

Optimize®

TagTeam® LCO

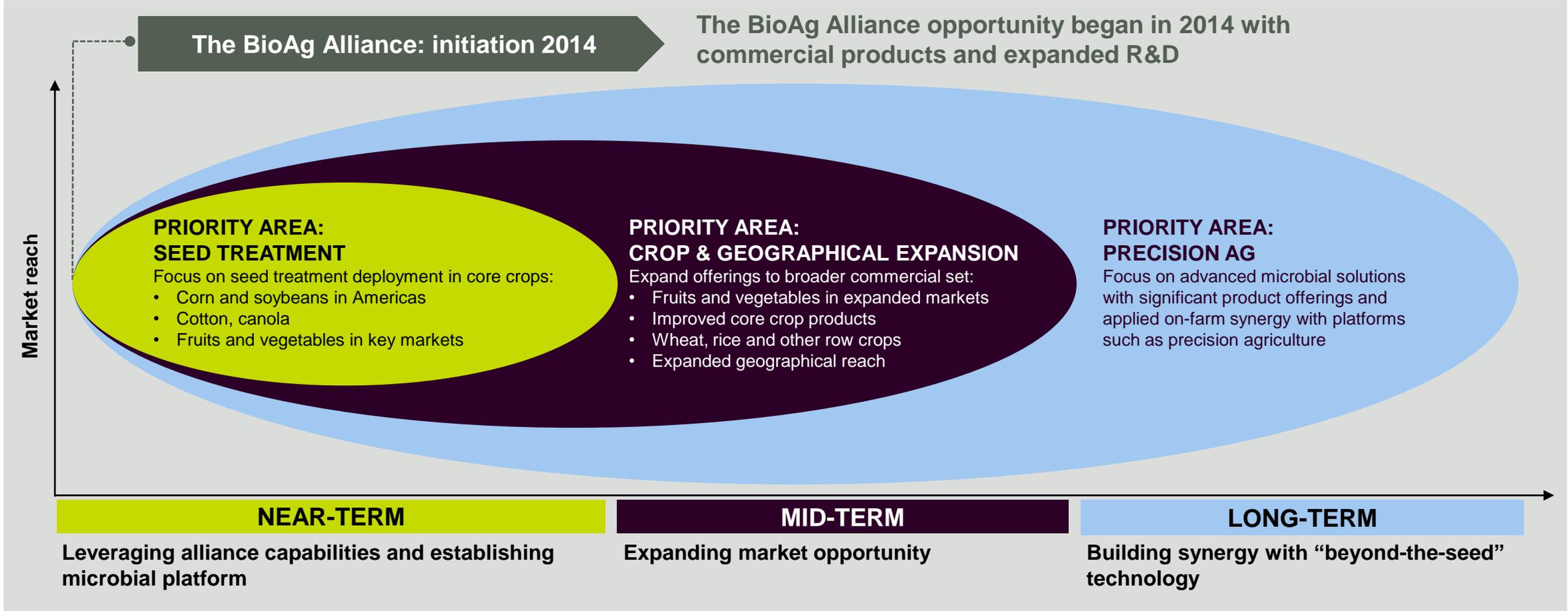
QuickRoots®

Torque®

MONSANTO 

JumpStart® 
 novozymes®

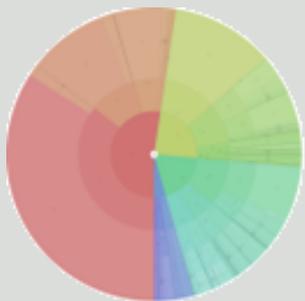
Establishment of alliance to drive microbials as industry platform for next wave of “beyond-the-seed” yield and sustainability solutions



The Bioag Alliance R&D pipeline: Industry's most advanced microbials platform and R&D capability

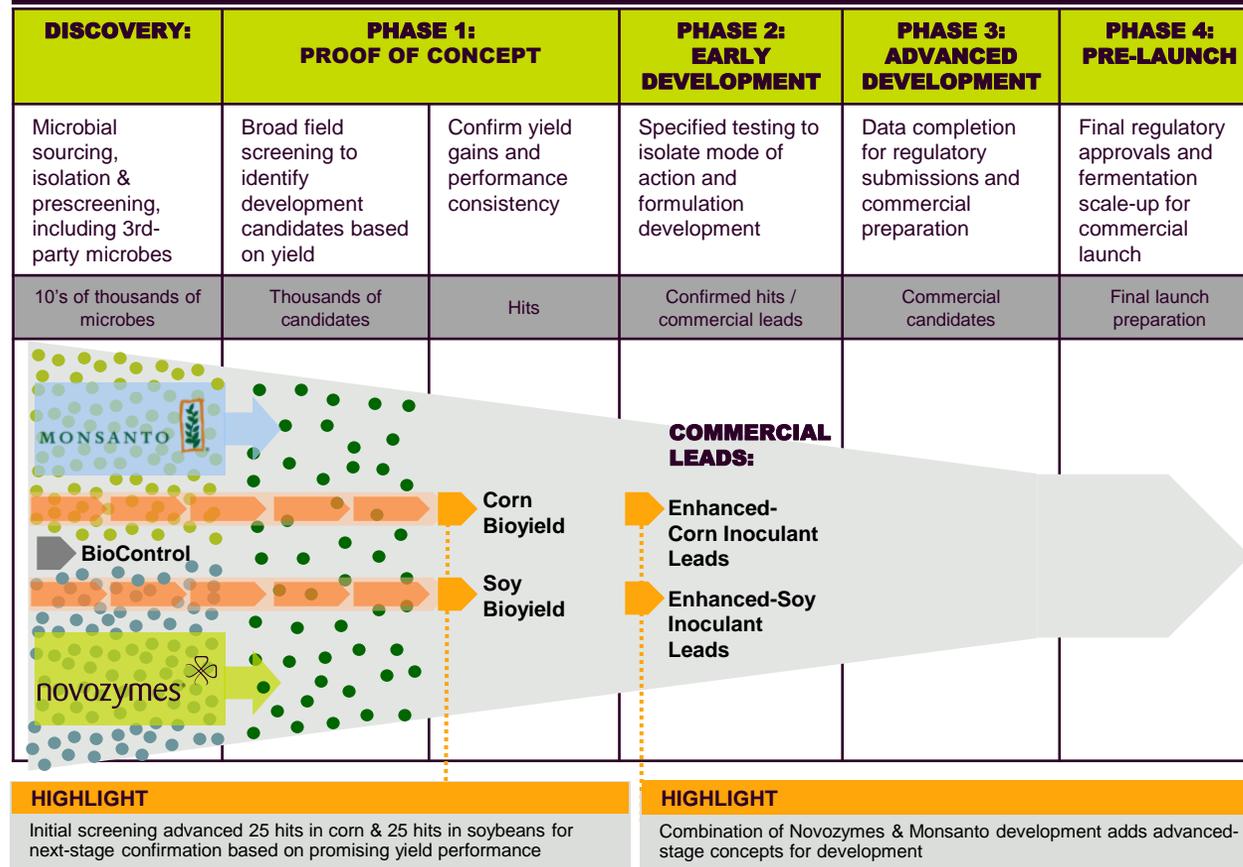
Industry's Most Diverse Microbial Discovery Effort

- Complementary strategies bring broad diversity across genera, and deep diversity within key genera
- The Alliance evaluates and includes key 3rd-party sources as well



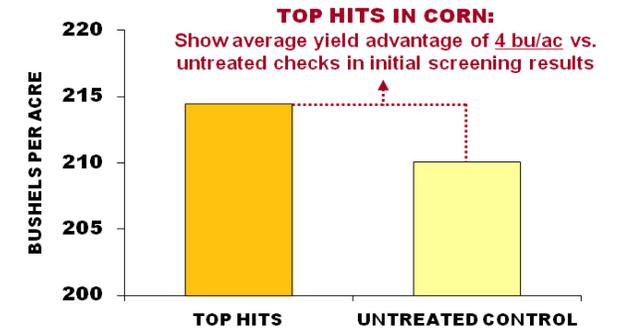
THE BIOAG ALLIANCE MICROBIAL GENERA SOURCES

The BioAg Alliance: R&D Development Pipeline

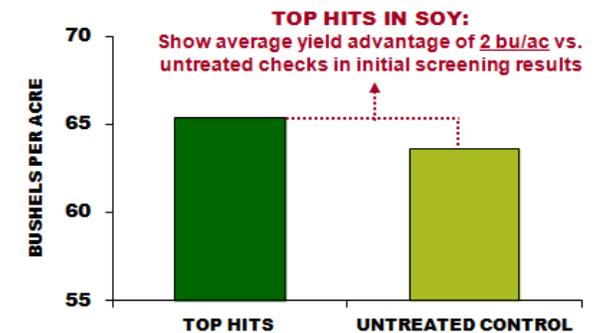


2014 Microbial U.S. Field Trials (Phase 1 Screening)¹

CORN TRIALS: NEW MICROBIAL STRAINS VS. UNTREATED CONTROL



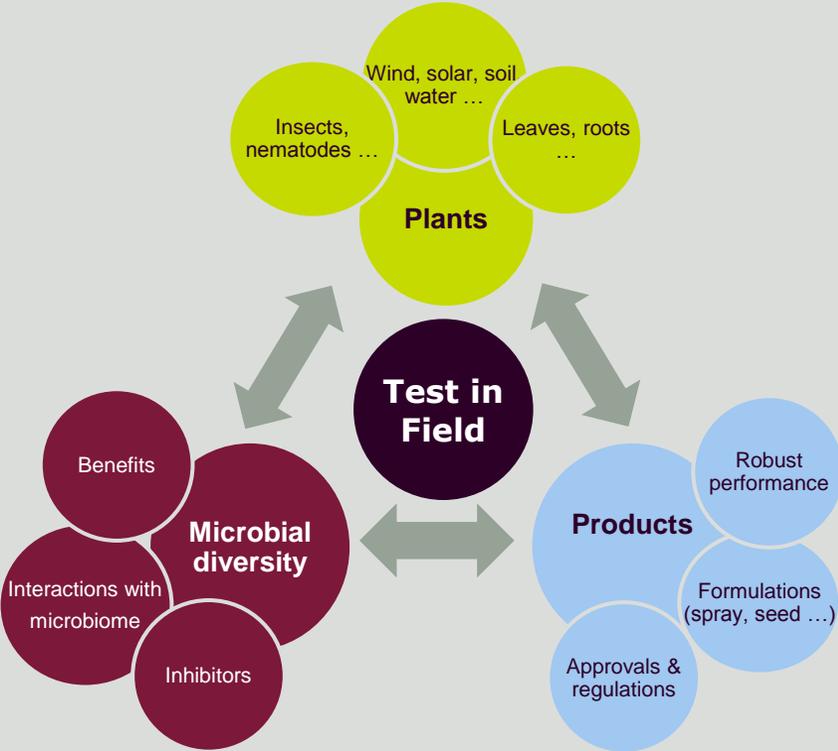
SOYBEAN TRIALS: NEW MICROBIAL STRAINS VS. UNTREATED CONTROL



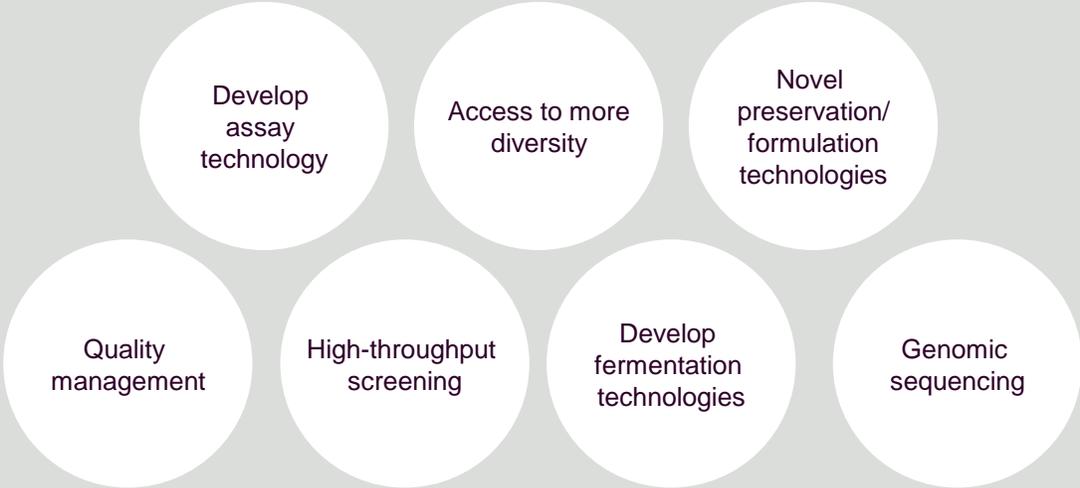
1. 2014 field trial data from early microbial screening in corn and soybeans across more than 50 locations.

Complex microbiome: Deploying novel technology and unique combined expertise to bring new solutions to market

BioAg is a complex world...



...Technology deployment will make the difference

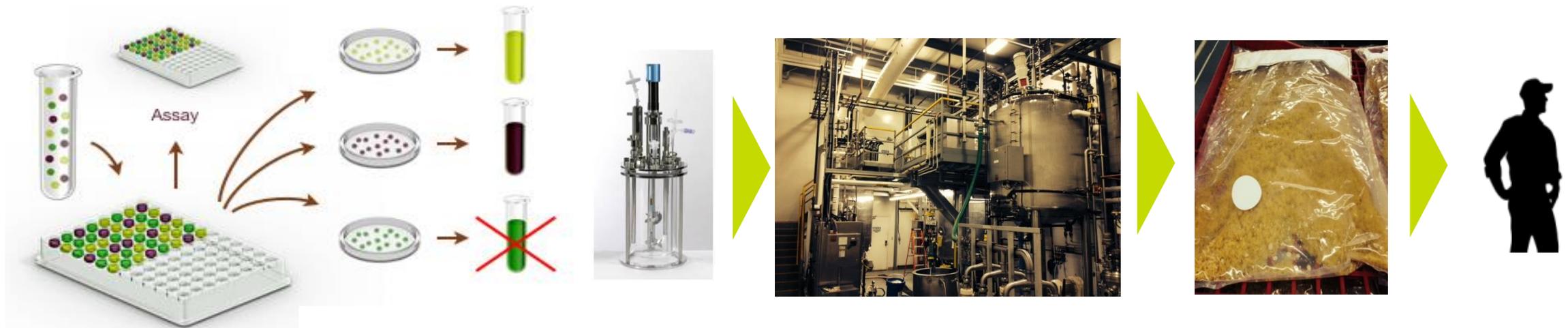


World leading fermentation and upscaling of microbes

Leveraging Novozymes' core competencies:

60+ years of microbial fermentation, upscaling, formulation and quality experience
position The BioAg Alliance as leader for the manufacturing of microbes for agriculture

Fermentation scale-up from microtiter to tons



Growth in microtiter plates

Isolation

**Test in
Shake
flasks**

**Test in lab &
pilot scale**

Production
Sub-merged or
solid state fermentation

Formulation
Liquid, granular or
wetable powder

Conclusion

- Tremendous opportunities in agriculture for Ag Biologicals: Sustainable solution to maximize yield potential
- Strong start for The BioAg Alliance with significant year 1 accomplishments
- R&D capabilities positioned to unleash long-term potential
- Near-term we expect to increase penetration of existing technologies
- Approach and capabilities of both parties are differentiating factors from the competition and increase the likelihood of success



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Rethink Tomorrow