



Crop Science R&D Pipeline Update

*Delivering World Class
Innovation*



FEBRUARY 13, 2020





Agenda



**President,
Crop Science**

Liam Condon

Opening Comments – Liam Condon
President of the Crop Science Division



**Head of R&D,
Crop Science**

Bob Reiter

Investment & Advancements – Bob Reiter, Ph. D.
Head of R&D, Crop Science Division



Breeding

Mike Graham

Breeding Highlights – Mike Graham, Ph.D.
Head of Breeding, Crop Science R&D



**Plant
Biotechnology**

Jeremy Williams

Biotechnology & Genome Editing Highlights – Jeremy Williams, Ph.D.
Head of Plant Biotechnology, Crop Science R&D



**Small
Molecules**

Axel Trautwein

Crop Protection Highlights – Axel Trautwein, Ph.D.
Head of Small Molecules, Crop Science R&D



**Digital
Farming**

Sam Eathington

Digital Farming Highlights – Sam Eathington, Ph.D.
Climate Chief Science Officer



Forward-Looking Statements

This presentation may contain forward-looking statements based on current assumptions and forecasts made by Bayer management.

Various known and unknown risks, uncertainties and other factors could lead to material differences between the actual future results, financial situation, development or performance of the company and the estimates given here. These factors include those discussed in Bayer's public reports which are available on the Bayer website at <http://www.bayer.com/>.

The company assumes no liability whatsoever to update these forward-looking statements or to conform them to future events or developments.



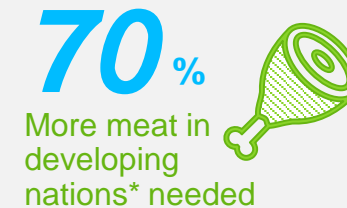
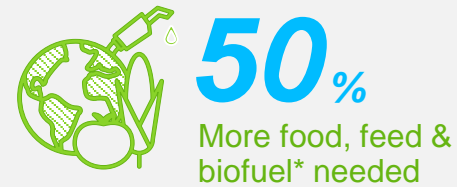
The World Needs More Innovation in Agriculture



Need to produce significantly more while protecting

natural resources

Demand



Supply



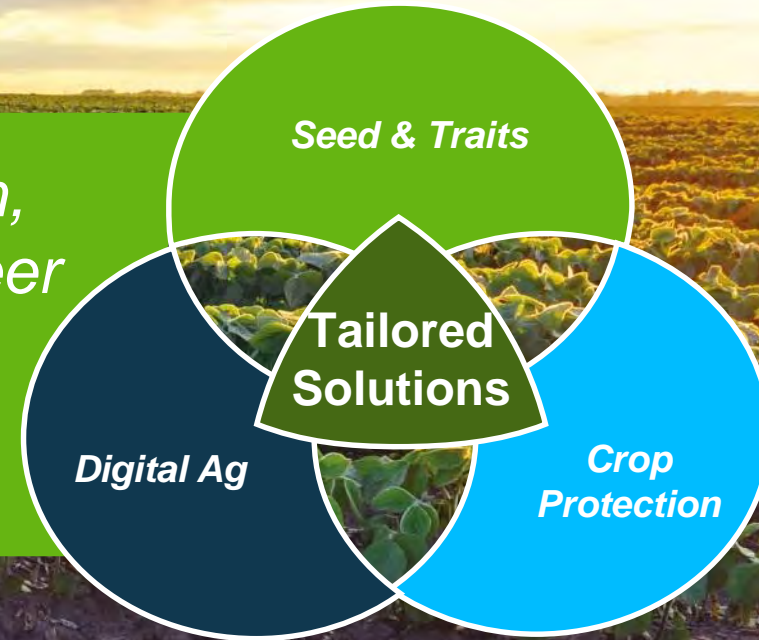
Source: FAO 2017, The Future of Food and Agriculture
* By 2050



Shaping Agriculture to Benefit Farmers, Consumers and Our Planet

As the Industry Leader Uniquely Positioned to Create Value through Innovative Tailored Solutions

We seek to deliver world-class innovation, new standards in sustainability and pioneer a digital transformation in agriculture to feed a growing global population



 **Future**

 **2019**

 **2018**

 **2000**

 **1980**

Each Plot
=10
Bushel Yield

 **1940**



Producing Better

The history of corn production plot demonstrates the great strides we have made in producing more with less, and the opportunity we have to continue to “produce better” through tailored solutions that drive us toward our reduced environmental impact commitment while meeting the needs of a growing population on an increasingly hotter planet.



Enhancing Sustainability and Biodiversity in Agriculture

Bayer's Sustainability Commitments by 2030

Advancing a carbon-zero future for agriculture

through helping our customers reduce field greenhouse gases by crop production.

30%

Reduction in field greenhouse gases emitted per kg of crops produced

- // Climate-smart practices:
 - // No-tillage Highly Productive Crops
 - // Cover Crops Precision Agriculture
- // Optimize use of synthetic fertilizers through the use of microbes



Produce higher-yielding crops with fewer natural resources and inputs

30%

Reduction in impact on the environment

- // Climate FieldView for precision application of pesticides /fertilizers
- // Resistant traits help to reduce pesticide use
- // Develop crop protection products with lower environmental impact



Empower 100 million smallholder farmers

100m

Smallholders benefit e.g. from access to education, tailored solutions & partners

- // Enhancing social innovation (e.g. with Better Life Farming)
- // Digital transformation with FarmRise
- // Introduce new, higher-yielding, resource efficient rice hybrids





Unmatched Investment in R&D Powers Industry-Leading Profitability

Shaping the Future of Agriculture with Most Productive Innovation Platform in the Industry

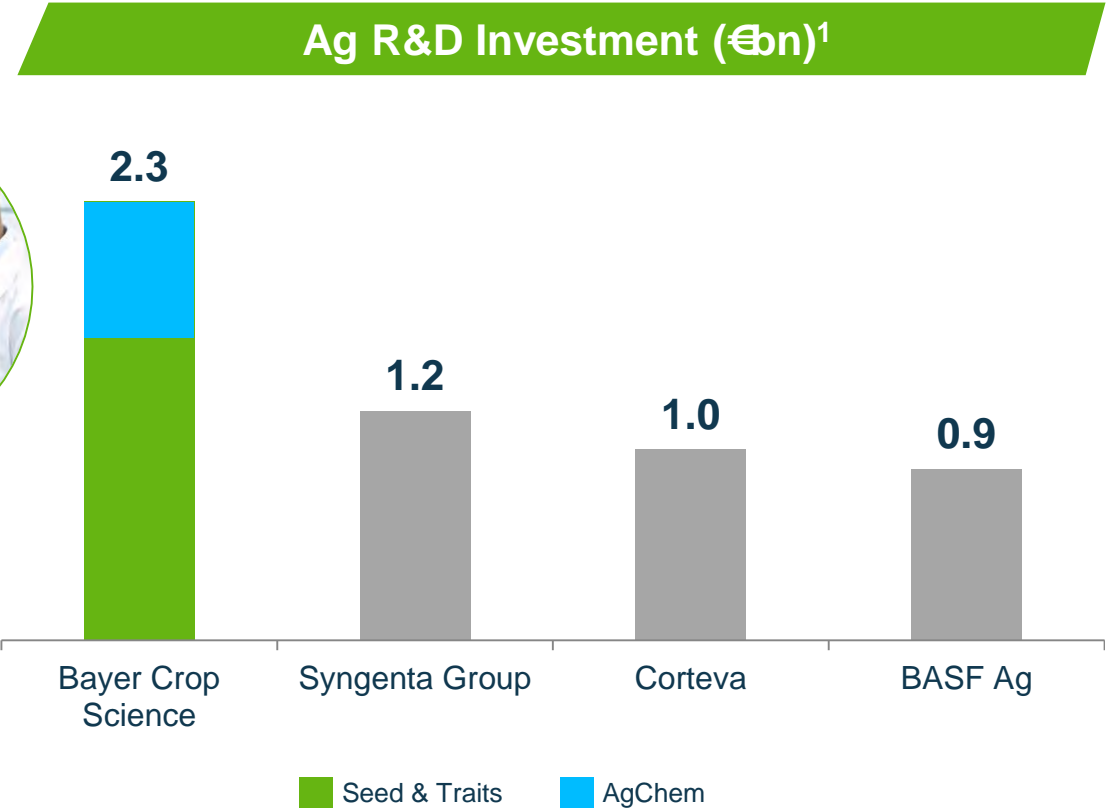
#1 R&D Platform in Crop Science

// >7,800 R&D employees² in >50 countries

// >20 large-scale R&D centers

// Partner of choice

// Technology provider to the industry



¹ Pro-forma estimates based on company information and internal calculations for BASF and Bayer. Amounts are from 2018 for Bayer and BASF, 2019 reported R&D for Corteva and is a 2018 proforma estimate derived from company reports for the newly formed Syngenta Group. The Syngenta Group estimate does not consider Sinochem R&D. Bayer Pro-forma figures consider Monsanto acquisition and related divestments.

² Includes permanent and temporary employees



Leveraging Open Model for Incremental and Disruptive Innovation

Enabling Innovation and Effective Delivery on Industry-Leading Pipeline

Incremental Innovation

- // Annual germplasm upgrades
- // New modes of action in weed, insect and disease control through biotech and crop protection
- // New formulations and uses in crop protection to expand spectrum and crops

Disruptive Innovation

- // Genome-editing
- // Next generation biological science
- // Precision breeding
- // Drone application technology
- // New modalities for crop protection

Open Innovation Model

Technology Collaborations



Venture Capital



Customer-sponsored Research



Universities & Research Institutes



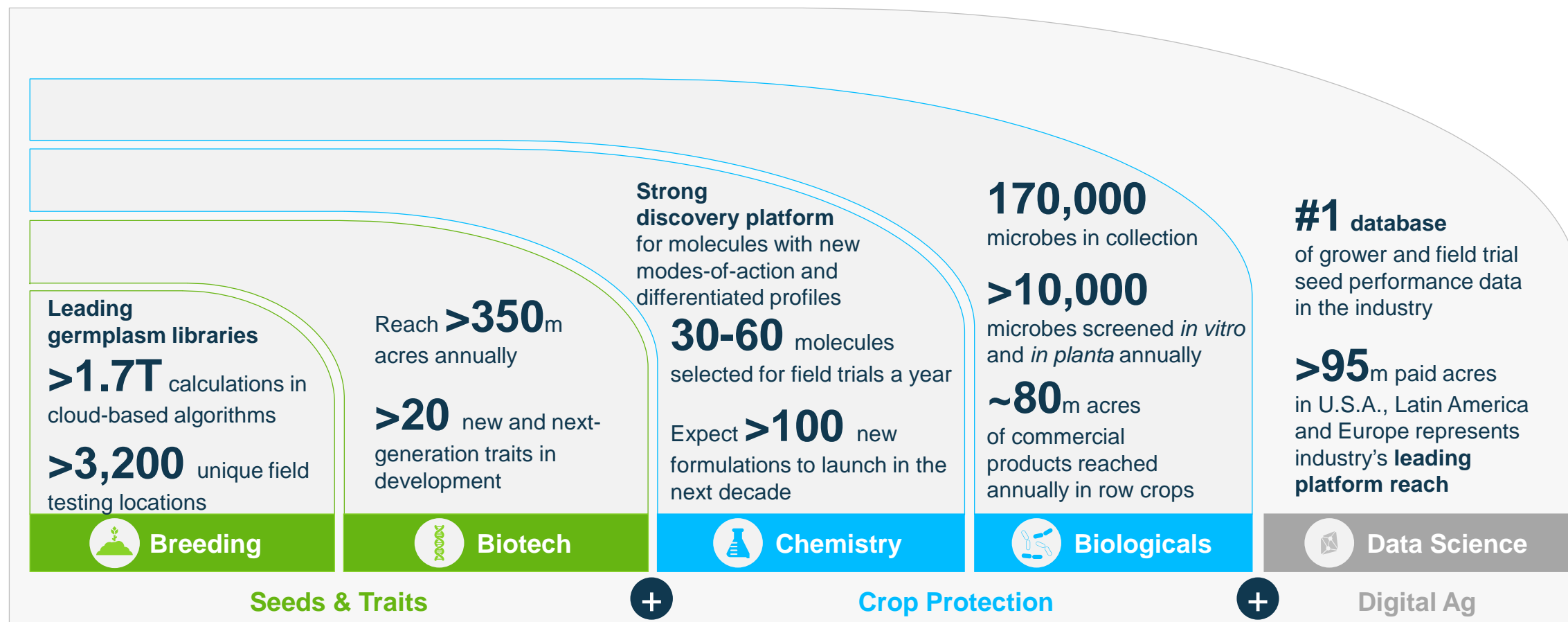
Crowdsourcing





Next Growth Opportunity: Convergence of Leading R&D Platforms

Continued Investment in Data Science and New Technologies are Driving Future Opportunity



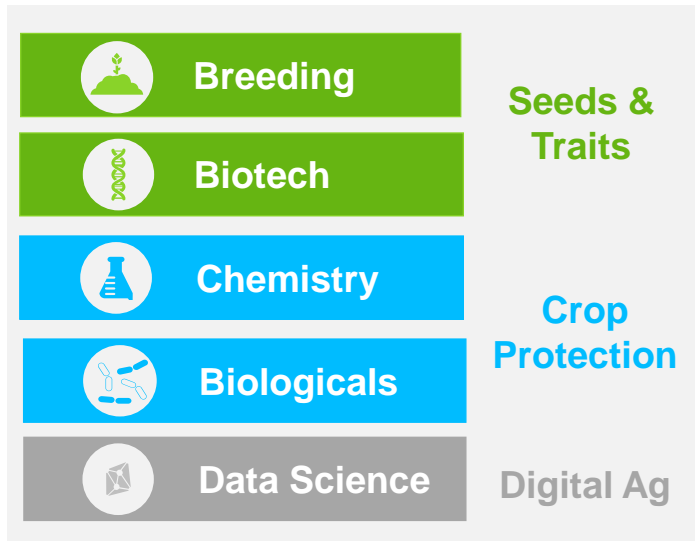
Best positioned to discover, combine and tailor solutions for growers



Driving the Largest and Most Valuable R&D Pipeline in Ag

Converting Investment into Meaningful Products for Farmers

Productive and Prolific Pipeline in 2019



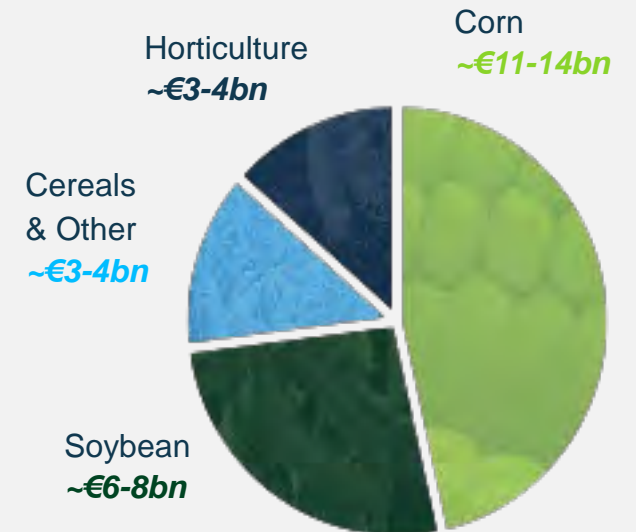
35 Advancements² generated by projects in seed & traits, crop protection and digital ag pipelines

450+ New hybrids and varieties commercialized

20 New crop protection formulations advanced

Value of Up to €30bn in Peak Sales¹

~45% Incremental



¹ Represents non-risk adjusted estimated peak sales for the combined breeding, biotech, crop protection and environmental science pipelines.

² Includes 8 biotech, 4 breeding, 5 chemistry and 18 data science advancements.



Advancing Agriculture with a Decade of Transformative Products

Key Product Highlights Featured Represent >€22bn³ of Peak Sales Potential

Select Planned Product Launches¹

	Expected Ongoing Refreshment	2020	2021	2022	2023	2027	2028	2029	2030
Herbicides	35+ New Formulation Launches in the next Decade				New Soybean Selective Herbicide Mixtures New Autumn Herbicides for Cereals		New Non-Selective PPO Herbicide ²		New Mode of Action Herbicide
Corn	150+ New Hybrids Commercialized Annually			FieldView Seed Advisor	FieldView Advanced Seed Scripting SmartStax ^{PRO} trait				3 rd , 4 th and 5 th Generation Herbicide Tolerance Traits Short Stature Corn Hybrids/Trait
Soybeans	150+ New Varieties Commercialized Annually			TENDFLEX ^{SOYBEANS}	PLATAFORMA INTACTA ² XTEND	FieldView Seed Placement			4 th and 5 th Generation Herbicide Tolerance Traits
Fungicides	20+ New Formulation Launches in the next Decade			DELARO Complete iblon ^{TECHNOLOGY}	(isoflucypram) for Cereals		Fox Supra (Indiflin®) for Soybeans ²		New Fungicide for Asian Soybean Rust
Insecticides	20+ New Formulation Launches in the next Decade			vayego [®]	(tetraniliprole) for Corn, Rice, Horticulture and Other Crops				Novel Mite Solution
Other, Vegetables, Environmental Science, Seed Growth	~150 Vegetable Hybrids/Varieties Commercialized Annually 20+ New Formulation Launches in the next Decade						3 rd Gen BioRise Microbial Seed Treatment		ThryvON [™] TECHNOLOGY Lygus & Thrips Control Cotton Trait

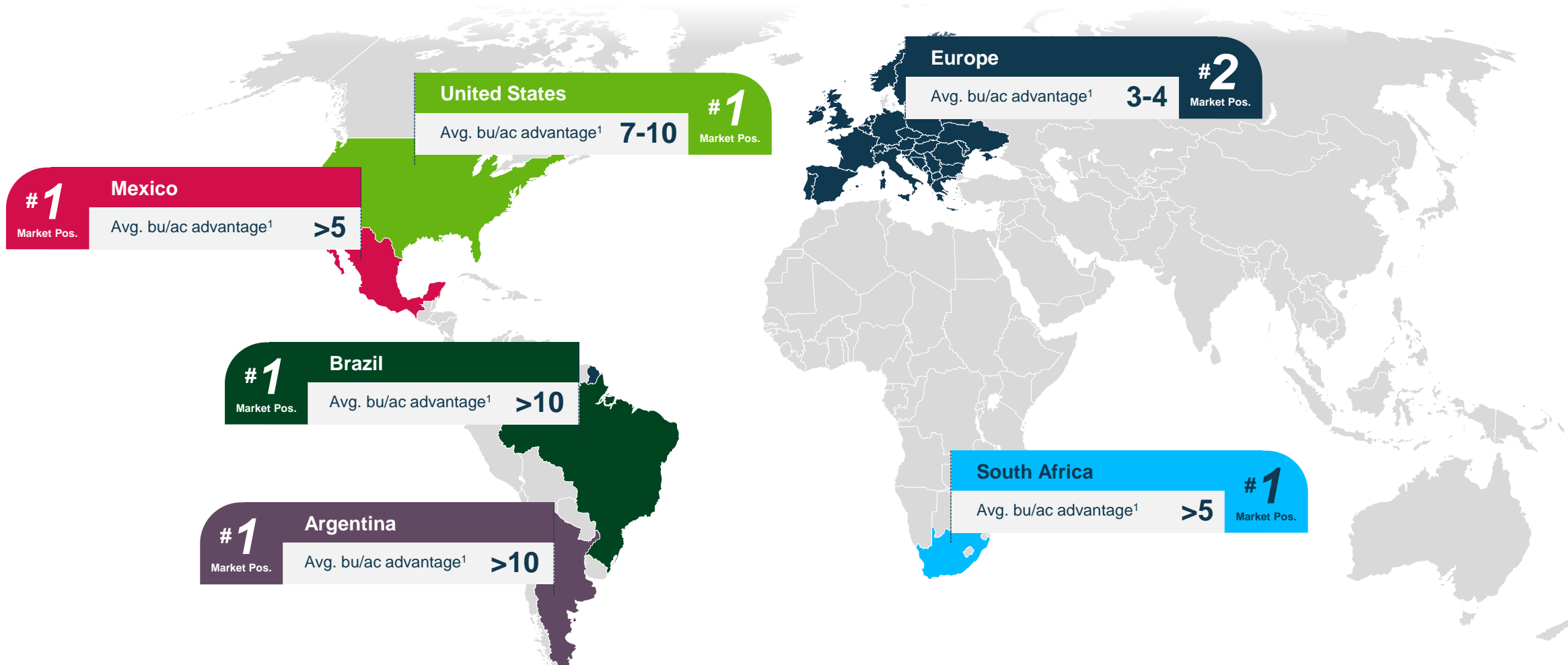
¹ Subject to regulatory approvals and pending registrations. Represents a subset of the pipeline. Launches are all approximates.

² In collaboration with Sumitomo. ³ Internal estimate; ~45% of the peak sales potential is incremental



Advanced Breeding Underpins Leadership in Corn Seed & Traits

Expect to Commercialize >150 Corn Hybrids a Year to Drive Growth in €4.8bn² Corn Seed & Traits Sales



¹ Range is either less than or inclusive of the current 3-year average yield advantage based on a comparison of yield data from new Bayer Crop Science products in their year of deployment against competitive market leaders for said region or country.

Averages weighted in countries/regions by hybrid market size and exclude non-grain market.

² 2018 proforma sales



Corn Product Design Center

Marana, AZ





Two Approaches to Short Stature Corn Advance

Genome Editing Reveals Promising Third Option

Three Development Approaches to Short Stature Corn Provide Options to Access Multiple Markets

// **Breeding: *ADVANCED TO PHASE 3***

Advanced breeding used to introgress naturally occurring short stature characteristic into elite germplasm.

 VITALA commercial beta in Mexico in 2020

// **Biotech: *ADVANCED TO PHASE 3***

In collaboration with BASF, uses transgene to shorten internodes; enables applicability across wide-array of germplasm.

NEW! // **Genome Editing: *DISCOVERY***

Multiple, elegant approaches to generate short-stature corn, creating potential for opportunities in multiple markets.





Short Stature Corn Field Trial

Sinaloa, MX Winter 2017/2018



VITALA



Short Stature Corn Offers Transformational Shift in Production

Benefits Include Plant Stability, Late Season Applications of Crop Inputs and Efficient Use of Key Nutrients



Reduced Crop Loss

- // Enabled by improved plant stability and lodging tolerance
- // Reduces crop loss from challenging environmental conditions
- // Annual yield losses due to stalk lodging in the U.S. range from 5% to 25%¹



Precision of Crop Input Applications

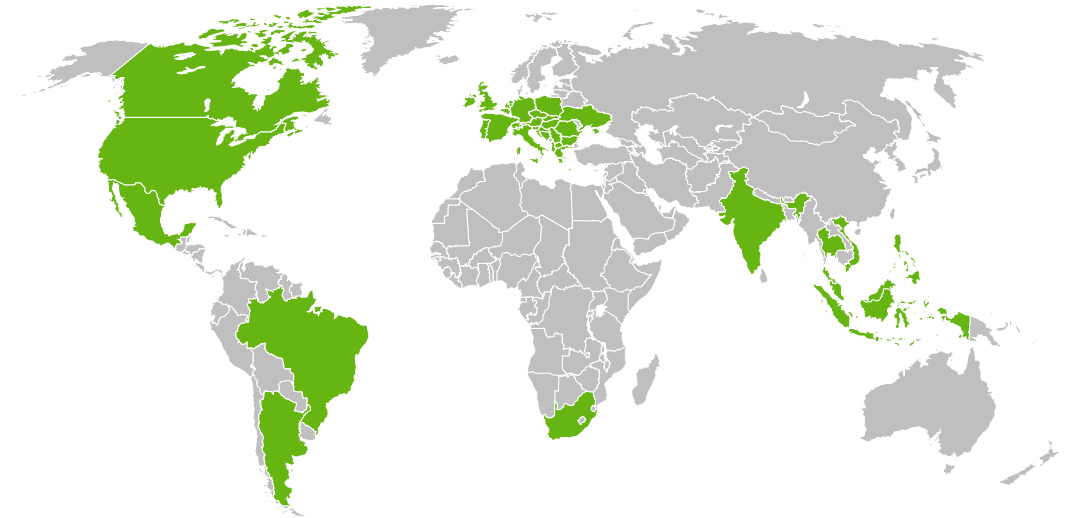
- // Extended in-season crop access due to shorter height
- // Supports tailored solutions with precise in-season crop protection



Increased Environmental Sustainability

- // Potential to optimize use of key nutrients like nitrogen, as well as reducing land and water requirements

Acre Opportunity Expanding



Potential Global Opportunity Across

>220m

Corn Acres

Americas Alone Account for 140m Acres

¹ Purdue University (<https://www.extension.purdue.edu/extmedia/ay/ay-262.html>)



Well Positioned to Create Value in Ag with Genome Editing

Tools and Capabilities Build on Existing Core Competencies to Usher in New Benefits in the Next Decade

Transformative Editing Tools

Numerous technology licenses and partnerships, including:

Broad Institute



RNA-guided nucleases:
CRISPR-Cas9 and CRISPR-Cpf1

Pairwise Plants



Base editing technology, which is the next-generation of editing capability

Differentiated Enablers

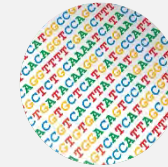
Germplasm

Plant genetics central to leading brand positions in key crops and countries



Genomics

Leading genome libraries and whole-genome sequencing capabilities



Testing Network

Leading field testing network, wraps around the globe twice



First Generation Products

NEW! Short Stature Corn created through genome editing



Other areas of focus include disease resistance, stress tolerance and plant growth and development



XtendFlex Soybeans Advancing to Launch Phase Spring 2020¹

Built on the Proven Performance Roundup Ready 2 Xtend Soybeans

ROUNDUP READY[®]
X TEND
 CROP SYSTEM

#1 Soybean system
 planted by farmers

ROUNDUP READY 2
X TEND
 SOYBEANS

Roundup
PowerMAX
 HERBICIDE

Glyphosate

X TENDIMAX
 With VaporGrip[®]
 Technology

Low-Volatility Dicamba

X TENDFLEX
 SOYBEANS

// Provides exceptional weed control and yield with a triple-stack herbicide-tolerance trait providing growers with the flexibility of three over-the-top herbicide options:

Glyphosate	Low-Volatility Dicamba	Glufosinate
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// Increases spectrum of control from 350 to 375 weed species; Enlist E3™ system only controls 260²

// Average 2019 yield and agronomic performance consistent with Roundup Ready 2 Xtend soybeans³

// Acres in the U.S. expected to be limited in first year



Enables continued use of conservation tillage and no-till systems which improve carbon sequestration and soil health

¹ Commercial availability pending regulatory approval

² Based on EPA labels for the chemistries.

³ Derived from 26 site locations in SC, NE, IN, IL, WI, MO, IN, AR, IA, NC, KS, SD, OH & GA

Xtendimax with VaporGrip Technology is a Restricted Use Pesticide. Always read and follow label instructions. Products not registered in all jurisdictions. Enlist E3™ is trademark of Corteva



Three Generations of Soybean Herbicide Tolerance Traits Advance

Industry-Leading Pipeline: Expect Tolerances to Six Herbicide Classes in Soybeans by 2030

3 herbicide tolerances

Third-Gen Advances to Launch Phase¹

- // Glyphosate
- // Dicamba
- // Glufosinate

5 herbicide tolerances

Fourth-Gen Advances to Phase 3

- // Glyphosate
- // Dicamba
- // Glufosinate
- // HPPD
- // 2,4-D **NEW!**

6 herbicide tolerances

Fifth-Gen Advances to Phase 2

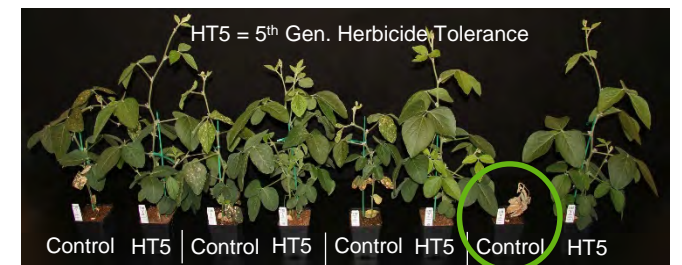
- // Glyphosate
- // Dicamba
- // Glufosinate
- // HPPD
- // 2,4-D **NEW!**
- // PPO



X-TENDFLEX
SOYBEANS



Demo trial, Jerseyville, July 2018
2x applications of 2,4-D and dicamba at V3 followed by glufosinate at V6 and mesotrione at R1



HT5 = 5th Gen. Herbicide Tolerance

Control	HT5	Control	HT5	Control	HT5	Control	HT5		
Flumioxazin 210g/ha							Sulfentrazone 840g/ha	Saflufenacil 100g/ha	New lower rate PPO Herbicide²

Current Commercial PPO Herbicides

¹ Commercial availability pending regulatory approval

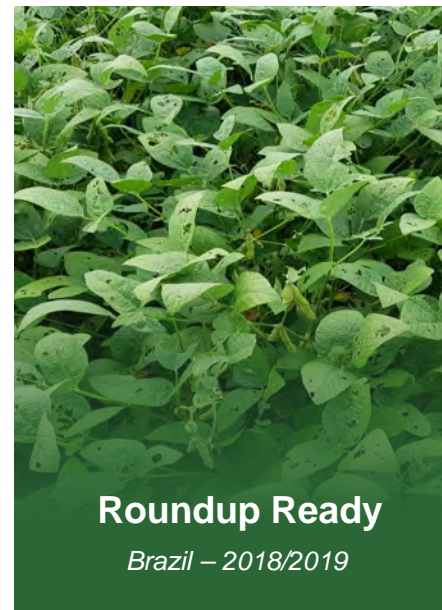
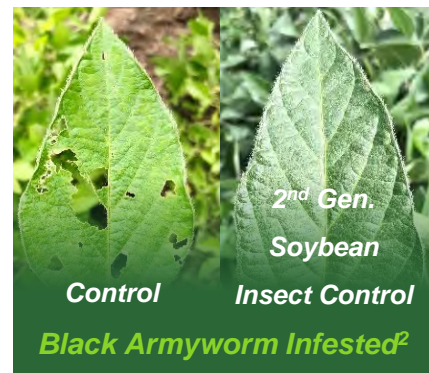
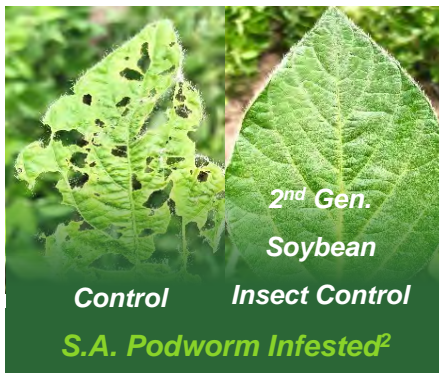
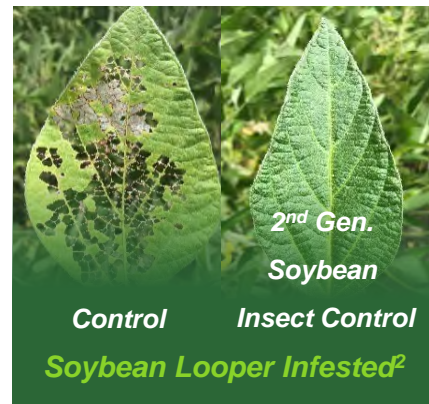
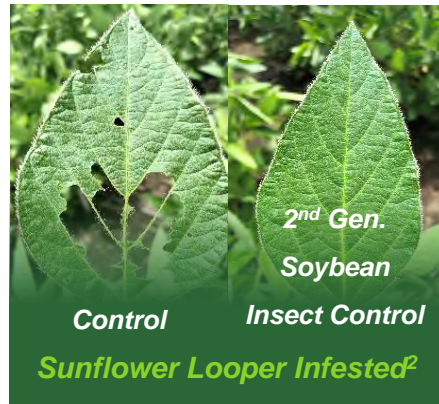
² In collaboration with Sumitomo

Always read and follow label instructions. Products not registered in all jurisdictions.



Intacta 2 Xtend to Broaden Insect and Weed Control Spectrum

Intacta RR2 PRO on >65m Acres in South America in 2018/2019; Intacta 2 Xtend in Phase 4



- // Intacta 2 Xtend trait technology to provide an additional mode of action for insect control and both glyphosate and dicamba tolerance for weed control
- // Stewarded trials expected in 2019/2020 and launch in 2021¹



Reduces insecticide use and the environmental impact of the crop protection program

¹ Pending regulatory approvals
² 2019 soybean screenhouse trials, various Bayer Crop Science Research Centers in the U.S. and Argentina
Always read and follow label instructions. Products not registered in all jurisdictions.



First-Ever Biotech Trait for Piercing and Sucking Insect Control

Lygus and Thrips Control Trait in Cotton in Phase Four with Expected U.S. Launch in 2021¹

- // Protein design and optimization resulted in a protein that **controls targeted piercing/sucking insect pests** through expression in the plant tissues they attack
- // Protects the plant from thrips and tarnished plant bugs, while **allowing beneficial insect population to survive**
- // Season-long protection from trait technology **expected to reduce foliar insecticide applications**, particularly in high pressure environments
- // **Expect to launch in 2021** in the U.S. in a stack with the proven Bollgard 3 XtendFlex Technology



Control

2019 University of TN Trials;
West TN Research and
Education Center



Lygus & Thrips Control Trait

ThryvON[™]
TECHNOLOGY



Reduces
insecticide use
and the
environmental
impact of the
crop
protection
program

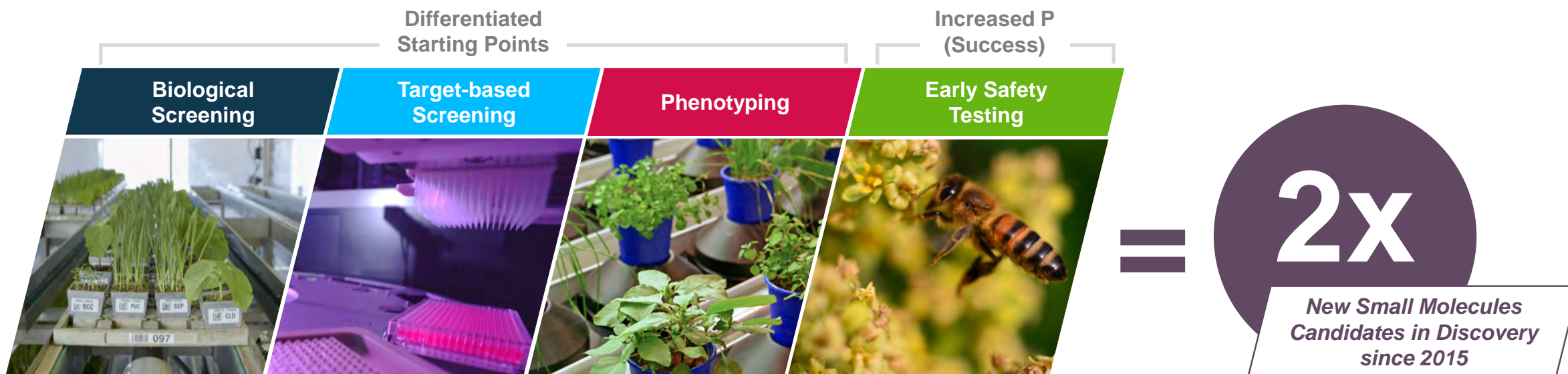
¹ Pending regulatory approvals
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Enhancements to Identify and Optimize Small Molecule Candidates

Early Safety Testing and Tailored Screening Approaches, Combined with New Data Tools, Collectively Contribute

To identify diverse development candidates with a higher probability of regulatory success with new modes-of-action, we constantly improve and tailor our approaches:



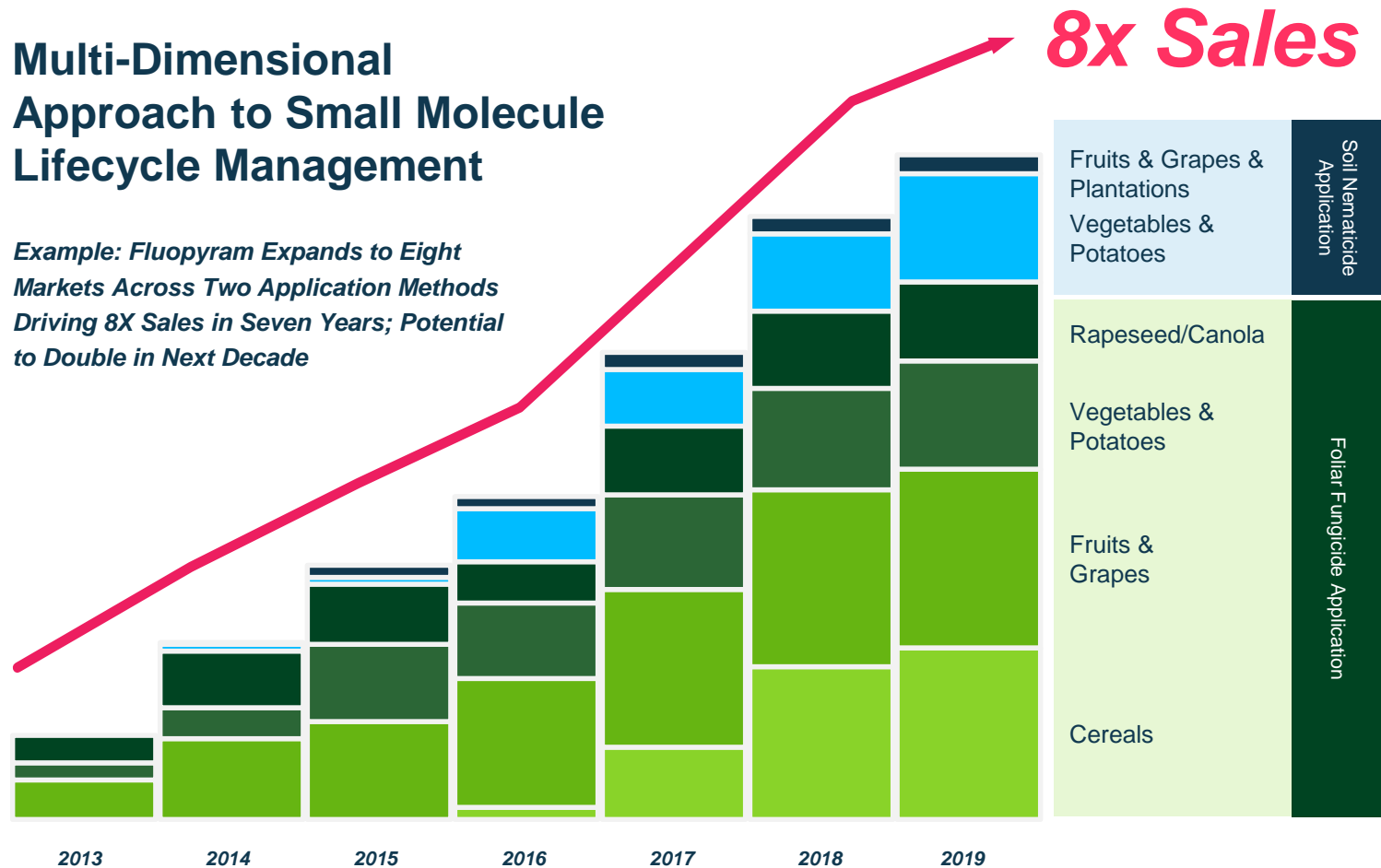


Scale, Innovation Underpin Excellent Life Cycle Management

Sustains Value Generation from Crop Protection Small Molecule Chemistry

Multi-Dimensional Approach to Small Molecule Lifecycle Management

Example: Fluopyram Expands to Eight Markets Across Two Application Methods Driving 8X Sales in Seven Years; Potential to Double in Next Decade



Enablers of Unique Life Cycle Management in Crop Protection

Active Ingredient Stewardship

- // Sustainable and consistent resistance management
- // Responsible maximum soil loading guidelines

Grower Convenience

- // Differentiated formulations for the application methods
- // Ready mixture solutions for built-in resistance management and broader spectrum of activity
- // Compatibility for tank mix and rotation in the program of treatment, especially with biologicals



Fox Xpro Fungicide Upgrades Fox Franchise in Brazil

Full Control of All Relevant Diseases in Soybeans; €600m Peak Sales Potential Opportunity



Builds on #1 position in soybean fungicides¹

- // Long-lasting solution to offer **full control of all relevant soybean diseases** including Asian Soybean Rust
- // Combines **three different actives** from different classes to provide excellent disease control and unmatched resistance management properties
- // AGROW Award 2019 “**Best Formulation Innovation**”:
Optimized formulation to boost performance and minimize environmental impact by reducing off-target losses
- // **Enables use in major crop rotation systems** with cotton, corn, cereals and sunflower
- // **Next-generation** technology, Fox Supra (Indiflin^{®2}), in Phase 4



Reduces environmental impact through innovative formulation

¹ Internal estimates

² In collaboration with Sumitomo.

Always read and follow label instructions. Products not registered in all jurisdictions.



iblon Fungicide for Cereals Launching in 2020³ in New Zealand

Novel Solution for Control of Leaf Diseases in Cereals; > €400m Peak Sales Opportunity



Builds on #1 position in cereal fungicides¹

- // iblon Technology is an advanced chemistry behind a new family of products powered by **Isolfucypram**, the latest and most mature compound from the highly valued class of **SDHIs²**
- // Wheat treated with iblon exceeded the standards with on average **2.2% higher yields**, at an **80% success rate**.
- // Offers the **most reliable control of the relevant leaf diseases** in cereals, along with beneficial physiological effects and activity for several weeks
- // Targeted markets: **Europe, Argentina, South Africa, Mexico, New Zealand and Australia**



Increases productivity through improved disease control

¹ Internal estimates

² succinate dehydrogenase inhibitor

³ Pending regulatory approvals

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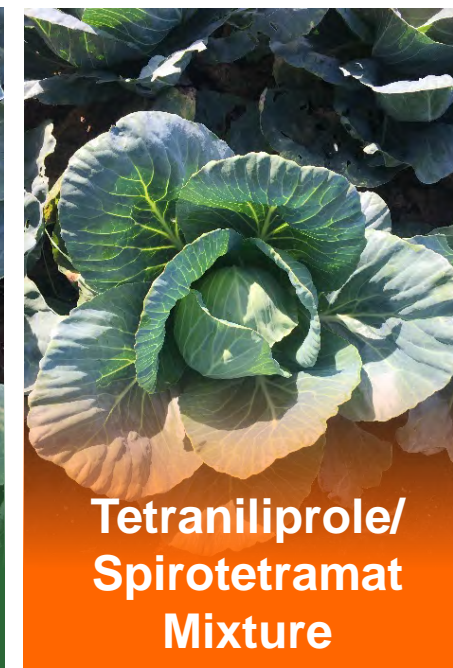
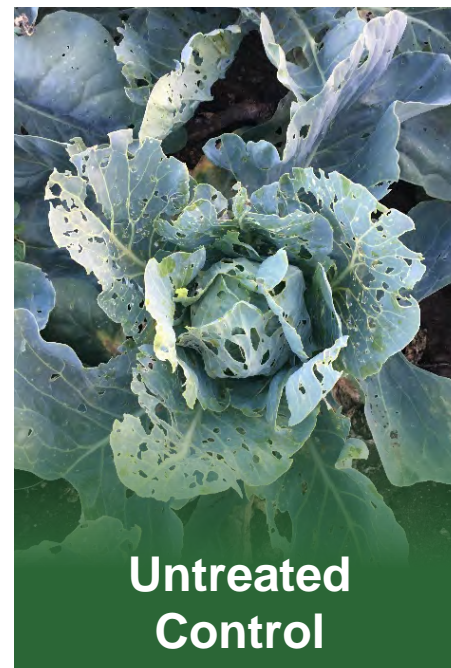
Vayego Launched; New Broad-Spectrum Insecticide

Asia Pacific Focus with Initial Launch in Korea in 2019; >€300m Peak Sales Potential



Builds on #1 position in insecticides in horticulture and #3 in both corn and soybeans¹

- // Fast-acting and long-lasting control of all important **caterpillars** and selected **beetles** and **sucking pests** with this tetraniliprole diamide insecticide
- // Regulatory submissions planned or submitted across key markets of **India, China, Indonesia, Australia, Chile, Argentina**; up to **17** launches expected in 2020 and 2021
- // Expect use in a number of key crops; **corn, rice, potatoes, fruits & nuts and vegetables** via multiple application methods, including **foliar, drone, drip & drench and seed treatment**



Increases productivity per acre through improved insect control

¹ Internal estimates

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New Herbicide Molecule Unlocks Greater Flexibility

First New Post-Emergence Mode of Action for Broad Acre Weed Control in 30 Years

Potential to build on #1 position in global herbicides¹

- // Entirely new mode of action advanced to **Phase 2 early development**
- // Demonstrates effective control of key resistant grasses, including **Goosegrass and Sourgrass**
- // **Discovery** program launched in biotechnology to discover a matching **herbicide tolerant trait**; initial approaches under evaluation



Enables continued use of conservation tillage and no-till systems which improve carbon sequestration and soil health

¹ Internal estimates

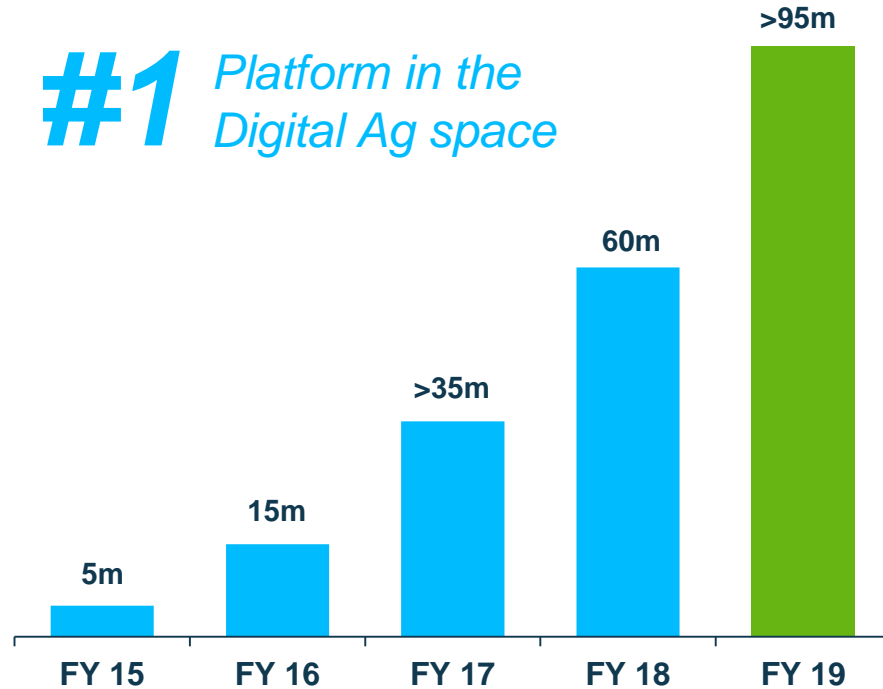


FieldView: The Leading Brand and Platform for Growers

Significant Opportunity to Expand Digital Ag Footprint

Global Paid Acres¹

#1 Platform in the Digital Ag space



Growth Fueled by Platform Advantages

Most Established, Scalable

digital farming infrastructure

>65 Partners

on the FieldView Platform

#1 Brand

in digital Ag space²

New Business Models

enabling sharing of value and risk

Largest Database

of grower and field trial seed performance data in the industry

>35 Next-Gen Projects

in the pipeline

Global

distribution footprint established

~1bn Global Acre

Opportunity for Corn, Soybean, Wheat³

¹ Internal estimates

² 2018 Brand Health Monitor

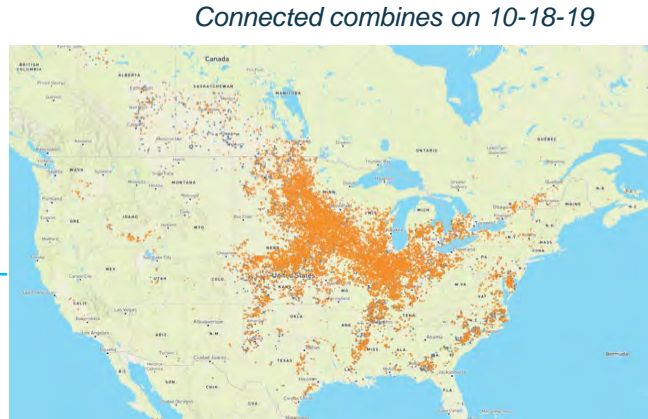
³ Harvested acres – USDA FAS 2018-10-11, ex China



Extensive Data Collection Capability Complements our R&D Data

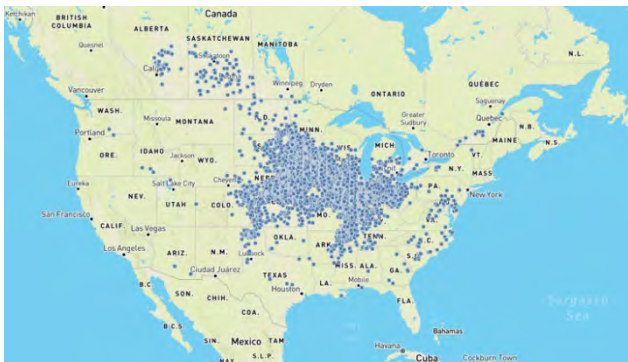
FieldView Drive Collects, Connects & Digitizes Farmer Activity; Informs, Improves Models & Digital Tools

Connected Combines



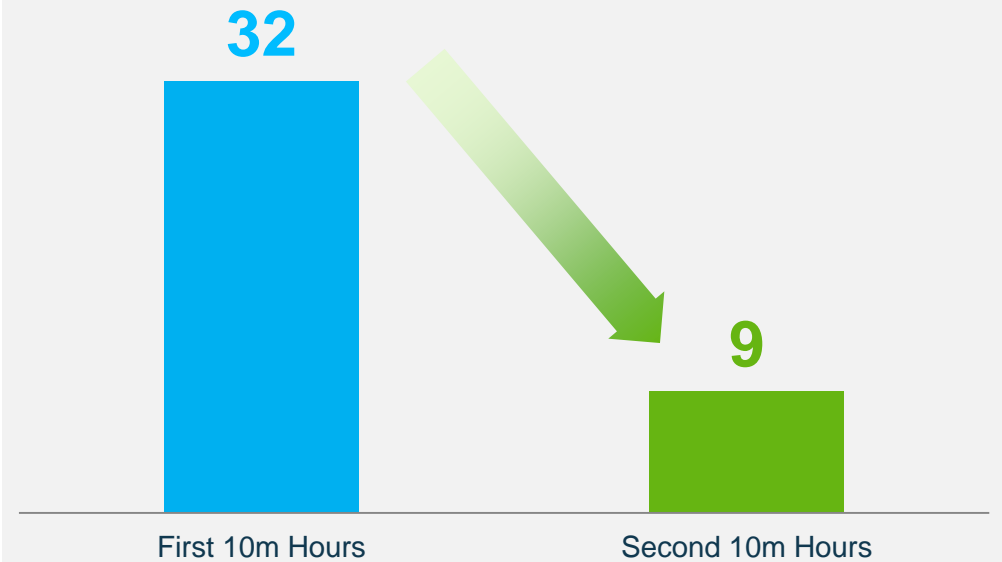
> +17,000 connected combines uploading data since Aug 2019

Connected Planters & Sprayers



> +16,000 planters and 4,500 sprayers uploading data since Jan 2019

Months to Collect 10m Connected Hours





FieldView Seed Advisor Advancing to Commercial Launch

Planning to Expand Corn Seed Advisor with Increased Acres in 2020

FieldView Corn Seed Advisor Optimizes Key Grower Decisions

Powered by Millions of Data Points



- // Algorithm powered by >6m data points from >7,700 hybrids and 60K+ fields from Bayer R&D and seed genetic library to develop and validate algorithm
- // Performance testing from 2017-2019 demonstrates consistent **6-9** bu/ac yield advantage
- // Product enhancements focused on improving field assignment accuracy using extensive FieldView data

Products & Portfolio

Which products should I purchase and how much of each?

Assignment

Which fields do I optimally place each product?

Density

What's the right density? Should I redistribute seeds in this field?

➤ 2019 Beta Launch for Corn Seed Advisor across seven states (IA, IL, IN, MN, MO, SD, WI)



Improves productivity per acre through optimized seed placement



Advanced Seed Prescriptions Expected to Launch in LATAM in 2021

Advanced Corn Seed Prescriptions Progresses; Europe, Brazil and Argentina in Phase Three



Advanced Seed Prescriptions Improve Productivity per Acre

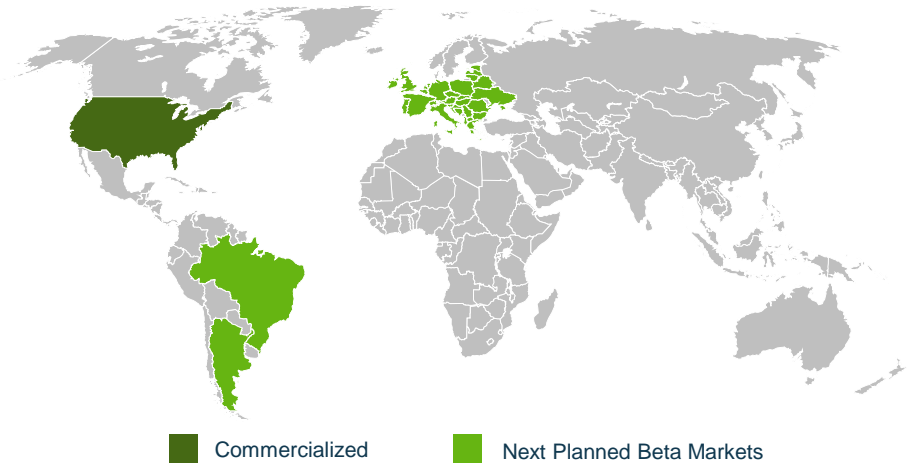


It's impressive how FieldView generated the scripts for me, without ever stepping on my field. It was very good, and very similar to what I would do and recommend.

Cassio Kossatz, Paraná, Brazil

- // Positive yield response from both variable rate seeding scripts and increased planting density
- // Trials demonstrate average yield benefit of **3.2 bu/acre** across Brazil (both seasons) and Argentina
- // Expected increase of seeding rate density of ~1,200 seeds/ac

Global Expansion Opportunity



- // FieldView Seed Scripts will be the commercial offering in the U.S. in 2020
- // Expect to beta launch in Brazil, Argentina and the E.U. in 2021



Growers Seek Tailored Season-Long Solutions

Combined R&D Pipeline to Advance and Enhance Grower Experience Throughout the Season



Providing the science and tools to make season-long recommendations

>35 pipeline projects/models to fuel continual improvements in FieldView recommendations

Yield Establishment

Yield Protection

Farmer Decision Points

Seed Selection

Choice of Seed + Treatment

Soil/Fertility Management

Water Management

Weed Management

Pest Management

Disease Management

BCS Current Market Position

Leading share positions in corn, soybean, cotton and vegetable seeds

Global leader in biotech traits that provide insect and weed control; >350m acres/year
Leading global positions in herbicides, insecticides and fungicides

Pipeline Growth Drivers

>450 new hybrids/varieties expected to launch annually across corn, soybeans, vegetables, cotton and other crops

Expect >20 new Seed Growth formulations to launch in the next decade, as well as 3rd Gen. BioRise microbial seed treatment in corn

Expect >75 new CP formulations to launch across the next decade; >35 in herbicides, >20 in fungicides and >20 in insecticides

New molecules providing new CP modes of action anticipated in the next decade, including Vayego insecticide, iblon fungicide and a new mode-of-action herbicide

Several key new biotech traits planned for launch in the next decade, including XtendFlex, Intacta 2 Xtend, HT4 and HT5 in soybeans, ThryvOn in cotton, SmartStax PRO, HT3, HT4, HT5 and short-stature in corn.



Key Takeaways

Delivering World Class Innovation

1

Pursuing sustainable innovation to shape the future of agriculture

2

Delivering the leading R&D pipeline in scale, productivity and value

3

Optimizing large and diverse germplasm library with advanced breeding technologies

4

Leading the development of next-generation biotech traits; technology provider to the industry

5

Advancing new approaches in small molecule discovery and biologicals

6

Unlocking new potential by combining R&D platforms, powered by data science



Appendix: Crop Science Pipeline





Corn R&D Pipeline – Peak Sales Potential: €11-14bn

R&D Target	Technology			Phase*				Enhancement**	
	Br	PBt	CP	1	2	3	4	Dev.	Subm.
YIELD & ABIOTIC STRESS – ~65% of Peak Sales Potential									
// Annual germplasm upgrades	✓								
// Short Stature Corn	✓								
// Short Stature Corn ¹		✓							
// 3 rd generation BioRise microbial seed treatment			✓						
<i>Early Pipeline</i>									
// New Biological			✓						
PEST MANAGEMENT – ~15% of Peak Sales Potential									
<i>Chewing Pests</i>									
// Above Ground (Lepidoptera)									
// 4 th generation Lepidoptera protection		✓							
// 5 th generation Lepidoptera protection		✓							
// Vayego			✓						
// Belt Smart			✓						
// Below Ground (Coleoptera)									
// SmartStax Pro		✓							
// 4 th generation Coleoptera protection		✓							
<i>Sucking Pests</i>									
// Stinkbug pipeline									
// ARVIS			✓						
<i>Nematodes</i>									
// Next generation NemaStrike formulation			✓						
<i>Early Pipeline</i>									
// New Insecticide			✓						

R&D Target	Technology			Phase*				Enhancement**	
	Br	PBt	CP	1	2	3	4	Dev.	Subm.
DISEASE MANAGEMENT – ~5% of Peak Sales Potential									
<i>Plant Health Systems</i>									
// Corn Disease Shield - Annual upgrades	✓								
// Acceleron - Annual upgrades			✓						
// Goss Wilt resistance	✓								
// Delaro Complete			✓						
WEED MANAGEMENT – ~15% of Peak Sales Potential									
// Herbicide tolerance									
// 3 rd generation weed management system		✓							
// 4 th generation weed management system with RHS2		✓							
// 5 th generation weed management system		✓							
// Improved Dicamba formulations			✓						
// Improved Dicamba & Glyphosate Premix			✓						
// Harness LCM			✓						
<i>Early Pipeline</i>									
// Novel PPO Herbicide ²			✓						
// New Herbicide MOA			✓						

*R&D Phases:
1 – Research, 2 – Early Development, 3 – Late Development, 4 – Registrations Filed

**Product enhancement: (Life Cycle Management activities)
Dev. – Under development; Subm. – Submitted for Registration

RHS2 = Second Generation Roundup Hybridization System ¹ In collaboration with BASF ² In collaboration with Sumitomo

- Br** Breeding – incl. native traits and molecular breeding
- PBt** Plant Biotech – biotechnology traits
- CP** Crop Protection – chemical and biological solutions applied as seed treatment, foliar or via soil

- Progress achieved Phases 1 through 4
- Status indication for Life Cycle Management Items
- Strategic collaborations
- Represents annual advancements and upgrades
- Pipeline status highlighting significant development, progress or advancement in R&D Pipeline (pink) and Key Life Cycle Management (blue) work.



Soybean R&D Pipeline – Peak Sales Potential: €6-8bn

R&D Target	Technology			Phase*				Enhancement**	
	Br	PBt	CP	1	2	3	4	Dev.	Subm.
YIELD & ABIOTIC STRESS - ~20% of Peak Sales Potential									
// Annual germplasm upgrades	✓			▶	▶	▶	▶		
// High Yielding Soy ¹		✓		▶					
<i>Early Pipeline</i>									
// New Biological			✓	▶					
PEST MANAGEMENT - ~20% of Peak Sales Potential									
<i>Chewing Pests</i>									
// INTACTA RR2 PRO									
// 2 nd generation insect protection		✓							
// 3 rd generation insect protection		✓							
// Belt Smart			✓						▶
<i>Sucking Pests</i>									
// Aphid & Whitefly pipeline									
// Novel Sucking Pest Solution			✓						
// Stinkbug Pipeline									
// ARVIS			✓						▶
// Novel Mite Solution			✓						
<i>Nematodes</i>									
// Plant health systems									
// 2 nd generation Soy Cyst Nematode resistance		✓							
// Next generation NemaStrike formulation			✓						▶
<i>Seed Treatment</i>									
// New Insecticide Seed Treatment			✓						▶
// CropStar LCM			✓						▶

***R&D Phases:**
 1 – Research, 2 – Early Development, 3 – Late Development, 4 – Registrations Filed

****Product enhancement:** (Life Cycle Management activities)
 Dev. – Under development; Subm. – Submitted for Registration

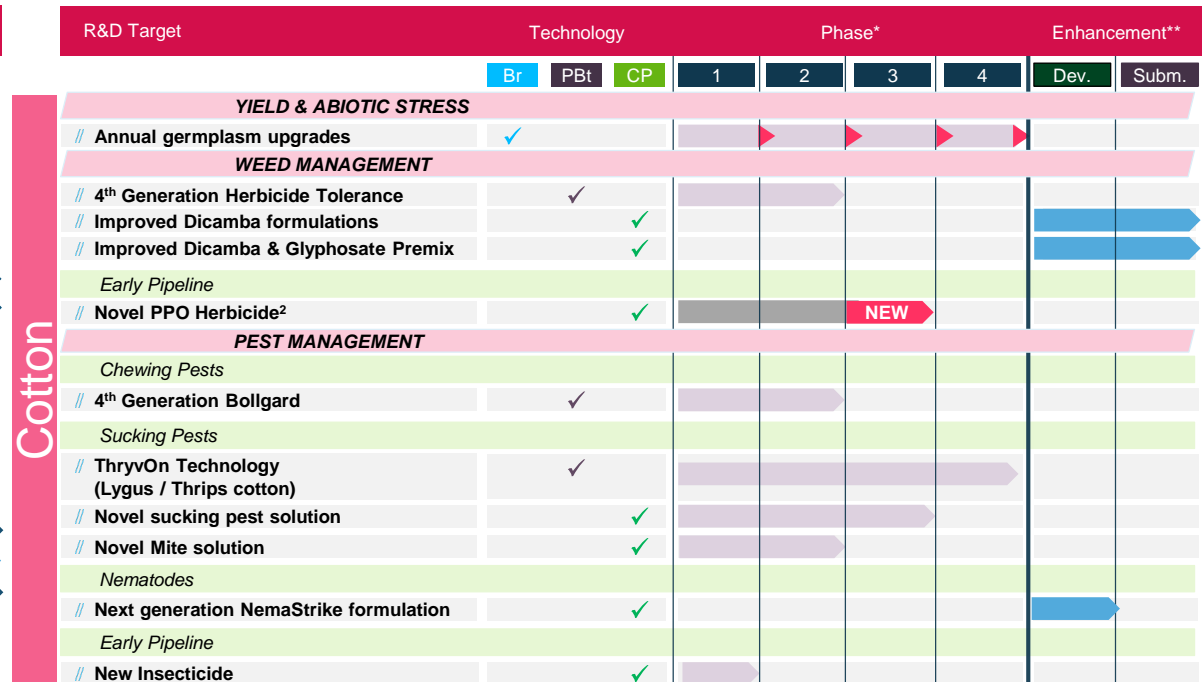
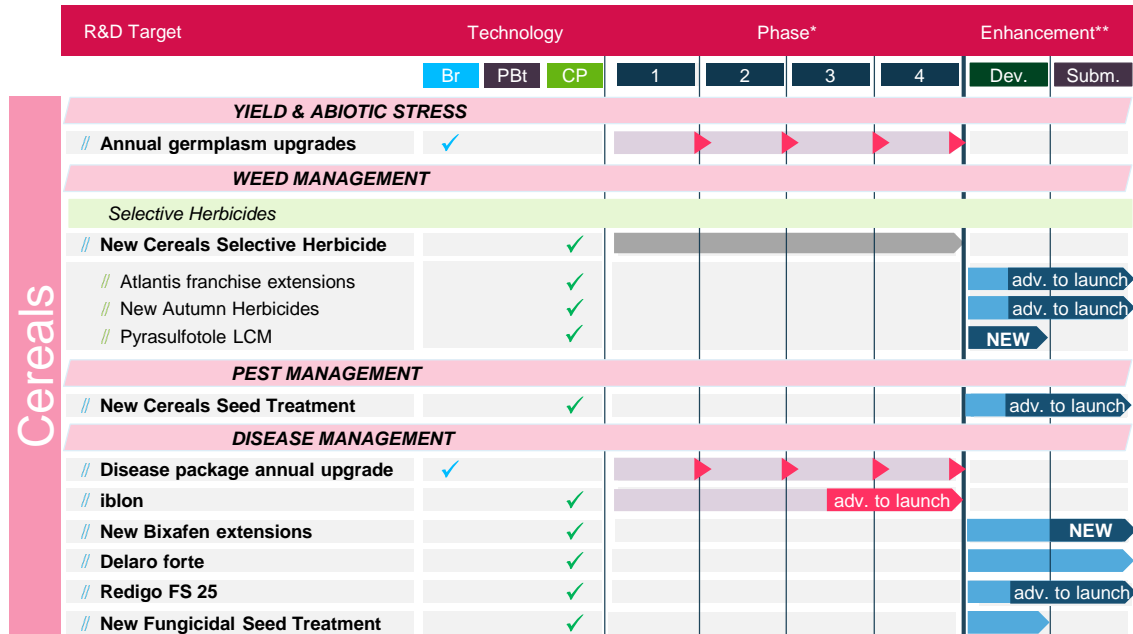
¹ In collaboration with BASF ² In collaboration with Sumitomo

R&D Target	Technology			Phase*				Enhancement**	
	Br	PBt	CP	1	2	3	4	Dev.	Subm.
DISEASE MANAGEMENT - ~30% of Peak Sales Potential									
// Soy Disease Shield	✓								
// Acceleron Upgrades			✓						
// Delaro Complete			✓						▶
<i>Asian Soybean Rust</i>									
// Indiflin@ ²			✓						
// New Fungicide			✓			NEW			
WEED MANAGEMENT - ~30% of Peak Sales Potential									
// Herbicide tolerance		✓							
// XtendFlex		✓							
// 4 th generation weed management system		✓							
// 5 th generation weed management system						NEW			
// New Soybean selective herbicide 3-way mixture			✓						▶
// New Soybean selective herbicide 2-way mixture			✓						▶
// Improved Dicamba & Glyphosate Premix			✓						▶
// Improved Dicamba formulations			✓						▶
<i>Early Pipeline</i>									
// Novel PPO Herbicide ²			✓						▶
// New Herbicide MOA			✓			NEW			

- Progress achieved Phases 1 through 4
- Status indication for Life Cycle Management Items
- Strategic collaborations
- Represents annual advancements and upgrades
- Pipeline status highlighting significant development, progress or advancement in R&D Pipeline (pink) and Key Life Cycle Management (blue) work.



Cereals, Oilseed Rape, Cotton, Sugarbeets, Rice R&D Pipelines – Peak Sales Potential: €3-4bn¹



***R&D Phases:**
 1 – Research, 2 – Early Development, 3 – Late Development, 4 – Registrations Filed

****Product enhancement:** (Life Cycle Management activities)
 Dev. – Under development; Subm. – Submitted for Registration

Br Breeding – incl. native traits and molecular breeding

PBt Plant Biotech – biotechnology traits

CP Crop Protection – chemical and biological solutions applied as seed treatment, foliar or via soil

Progress achieved Phases 1 through 4

Status indication for Life Cycle Management Items

Strategic collaborations

▶ Represents annual advancements and upgrades

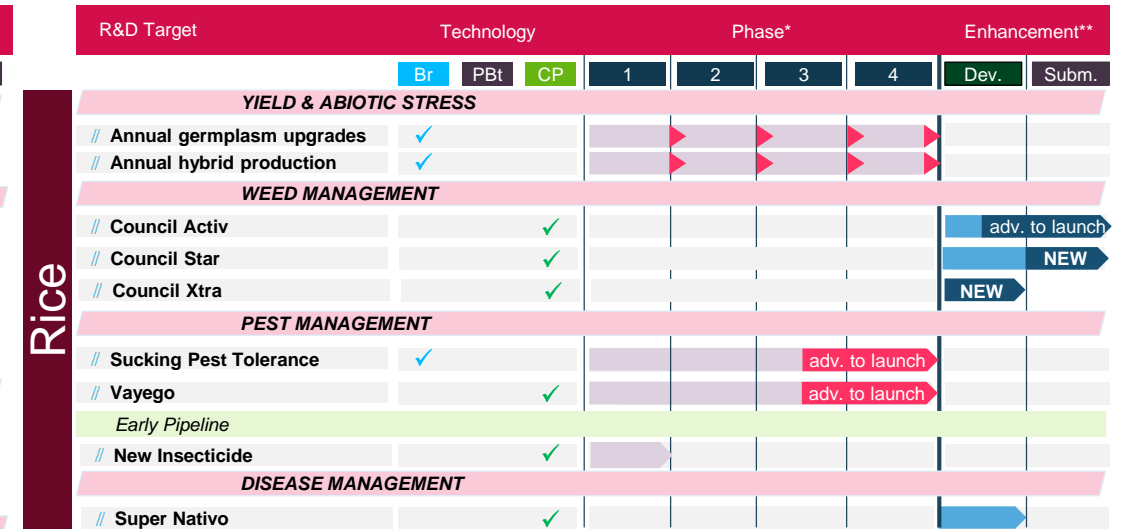
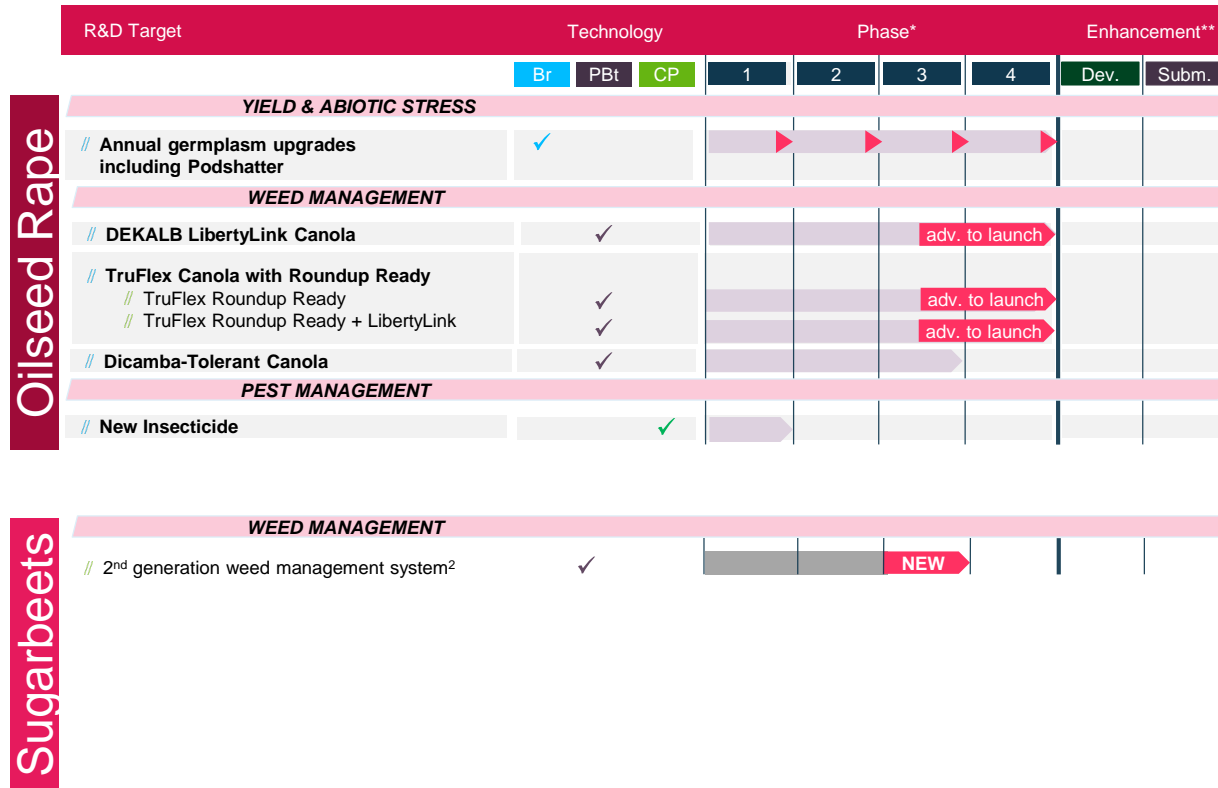
NEW Pipeline status highlighting significant development, progress or advancement in R&D Pipeline (pink) and Key Life Cycle Management (blue) work.

¹ Peak Sales Potential Split: Yield & Abiotic stress = ~15%, Pest Management = ~20%, Disease Management = ~25%, Weed Management = ~40%

² In collaboration with Sumitomo



Cereals, Oilseed Rape, Cotton, Sugarbeets, Rice R&D Pipelines (con't.)



***R&D Phases:**
 1 – Research, 2 – Early Development, 3 – Late Development, 4 – Registrations Filed

****Product enhancement:** (Life Cycle Management activities)
 Dev. – Under development; Subm. – Submitted for Registration

Br Breeding – incl. native traits and molecular breeding

PBt Plant Biotech – biotechnology traits

CP Crop Protection – chemical and biological solutions applied as seed treatment, foliar or via soil

Progress achieved Phases 1 through 4

Status indication for Life Cycle Management Items

Strategic collaborations

Represents annual advancements and upgrades

Pipeline status highlighting significant development, progress or advancement in R&D Pipeline (pink) and Key Life Cycle Management (blue) work.

¹ Peak Sales Potential Split: Yield & Abiotic stress = ~15%, Pest Management = ~20%, Disease Management = ~25%, Weed Management = ~40%

² In collaboration with KWS



Digital R&D Pipeline

R&D Target	Phase*				
	1	2	3	4	5
SEEDS AND PLANTING					
// Seed Advisor (US, Corn)					NEW
// Seed Selection (US, Corn)					
// Designed Hybrid Side-by-Sides (US, Corn)			NEW		
// Seed Selection (US, Soy)					
// Advanced Seed Prescriptions (Argentina, Corn)			NEW		
// Advanced Seed Prescriptions (EU, Corn)			NEW		
// Advanced Seed Prescriptions (Brazil, Corn)					
// Advanced Seed Prescriptions (US, Soy)					
FIELD INSIGHTS					
// Field Health and Scouting Insights (EU, Corn)					NEW
// Advanced Irrigation Recommendations (US, Corn)					
// Disease Identification (US, Soy)			NEW		
// Disease Identification (US, Corn)					
// Disease Identification (Global, Wheat)					
// Disease Vulnerability (US, Corn)					
// Disease Vulnerability (US, Soy)	NEW				
// Disease Vulnerability (EU, Wheat)	NEW				
// Fungicide ROI (Canada, Canola)	NEW				
// Fungicide ROI (US, Soy)	NEW				
// Fungicide ROI (EU, Wheat)	NEW				
// Fungicide ROI (US, Corn)					

R&D Target	Phase*				
	1	2	3	4	5
YIELD ANALYTICS					
// Automated Experiment Design (Global, All Crops**)				NEW	
// Automated Experiment Analysis (Global, All Crops**)				NEW	
// Yield Prediction (US, Corn)			NEW		
// Yield Prediction (EU, Wheat)	NEW				
// Yield Prediction (US, Soy)					
// Field Productivity V2 (US, Corn)	NEW				
// Replant Models (US, Corn)					
// Seed Supply Planning (US, Corn)	NEW				
FERTILITY					
// P & K Scripting (US, All Crops**)					
// P & K Scripting (Brazil and Argentina, Corn)					
// Advanced Nitrogen Scripting (US, Corn)					
// Advanced Nitrogen Scripting (US, Wheat)					
// Short Corn Fertility	NEW				
MEASUREMENTS					
// On-Equipment Soil Mapping (US, All Crops**)					
// On-Equipment Imaging (US, Corn)					
// On-Equipment Spray Sensing (US, All Crops**)					


***R&D Phases:**


1 – Proof of Concept, 2 – Development, 3 – Pre-Commercial, 4 – Commercial / Launch, 5 – Post-Commercial / Enhancement

** All crops and/or regions enabled in FieldView

P = Phosphorus

K = Potassium

 Progress achieved Phases 1 through 5

 Pipeline status with color highlighting significant development, progress or advancement in R&D and commercial work