Crop Science R&D Pipeline Update

Delivering World Class Innovation

FEBRUARY 13, 2020
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<td>Climate Chief Science Officer</td>
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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**
- 50% More food, feed & biofuel* needed
- ~10bn World population*
- 70% More meat in developing nations* needed

**Supply**
- 17% Harvest losses*
- 12m Ha of agricultural land loss annually
- 20% reduction in arable land per capita*

Source: FAO 2017, The Future of Food and Agriculture
* By 2050
We seek to deliver world-class innovation, new standards in sustainability and pioneer a digital transformation in agriculture to feed a growing global population.
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 employees\(^2\) in >50 countries

>20 large-scale R&D centers

Partner of choice

Technology provider to the industry

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**Ag R&D Investment (€bn)**\(^1\)

<table>
<thead>
<tr>
<th>Company</th>
<th>Ag R&amp;D Investment</th>
<th>Seed &amp; Traits</th>
<th>AgChem</th>
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<tbody>
<tr>
<td>Bayer Crop Science</td>
<td>2.3</td>
<td></td>
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<tr>
<td>Syngenta Group</td>
<td>1.2</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Corteva</td>
<td>1.0</td>
<td></td>
<td></td>
</tr>
<tr>
<td>BASF Ag</td>
<td>0.9</td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

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\(^1\) 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
Enabling Innovation and Effective Delivery on Industry-Leading Pipeline

Leveraging Open Model for Incremental and Disruptive Innovation

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

- Genethon
- Atomwise
- Pairwise
- elemental enzymes
- SECOND GENOME
- 2BLADES
- Meigenix

Customer-sponsored Research

- GRDC
- CRDF

Universities & Research Institutes

- JÜLICH
- Embrada

Venture Capital

- leaps

Crowdsourcing

- Grants4Targets™
- Grants4Traits™
- Grants4Biologicals™
Next Growth Opportunity: Convergence of Leading R&D Platforms

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

Leading germplasm libraries
- >1.7T calculations in cloud-based algorithms
- >3,200 unique field testing locations

Breeding

Reach >350m acres annually

Biotech

Strong discovery platform for molecules with new modes-of-action and differentiated profiles
- 30-60 molecules selected for field trials a year
- Expect >100 new formulations to launch in the next decade

Chemistry

170,000 microbes in collection
- >10,000 microbes screened *in vitro* and *in planta* annually
- ~80m acres of commercial products reached annually in row crops

Biologicals

Best positioned to discover, combine and tailor solutions for growers

Data Science

#1 database of grower and field trial seed performance data in the industry
- >95m paid acres in U.S.A., Latin America and Europe represents industry’s leading platform reach

Seeds & Traits

+ Crop Protection

+ Digital Ag

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

Next Growth Opportunity: Convergence of Leading R&D Platforms
Driving the Largest and Most Valuable R&D Pipeline in Ag
Converting Investment into Meaningful Products for Farmers

**Productive and Prolific Pipeline in 2019**

- **Breeding**
- **Biotech**
- **Chemistry**
- **Biologica**ls
- **Data Science**

**Seeds & Traits**

**Crop Protection**

**Digital Ag**

- **35** Advancements\(^1\) 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 Sales\(^1\)**

\(~45\%\) Incremental

- Horticulture ~€3-4bn
- Corn ~€11-14bn
- Soybean ~€6-8bn
- Cereals & Other ~€3-4bn
- Cereals & Other ~€3-4bn

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\(^1\) 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 >€22bn\(^3\) of Peak Sales Potential

<table>
<thead>
<tr>
<th>Product Category</th>
<th>Ongoing Refreshment</th>
</tr>
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<tbody>
<tr>
<td>Herbicides</td>
<td>New Formulation Launches in the next Decade</td>
</tr>
<tr>
<td>Corn</td>
<td>New Hybrids Commercialized Annually</td>
</tr>
<tr>
<td>Soybeans</td>
<td>New Varieties Commercialized Annually</td>
</tr>
<tr>
<td>Fungicides</td>
<td>New Formulation Launches in the next Decade</td>
</tr>
<tr>
<td>Insecticides</td>
<td>New Formulation Launches in the next Decade</td>
</tr>
<tr>
<td>Other, Vegetable,</td>
<td>Vegetable Hybrids/Varieties Commercialized Annually</td>
</tr>
<tr>
<td>Environmental Science</td>
<td>New Formulation Launches in the next Decade</td>
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<tr>
<td>Seed Growth</td>
<td>New Formulation Launches in the next Decade</td>
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</tbody>
</table>

Select Planned Product Launches\(^1\)

<table>
<thead>
<tr>
<th>Year</th>
<th>Expected Launches</th>
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<tbody>
<tr>
<td>2020</td>
<td>35+</td>
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<tr>
<td>2021</td>
<td></td>
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<tr>
<td>2022</td>
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<td>2029</td>
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<tr>
<td>2030</td>
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</tr>
</tbody>
</table>

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 €4.8bn\(^2\) Corn Seed & Traits Sales

Mexico
- Market Pos.: #1
- Avg. bu/ac advantage\(^1\): >5

Brazil
- Market Pos.: #1
- Avg. bu/ac advantage\(^1\): >10

Argentina
- Market Pos.: #1
- Avg. bu/ac advantage\(^1\): >10

United States
- Market Pos.: #1
- Avg. bu/ac advantage\(^1\): 7-10

Europe
- Market Pos.: #2
- Avg. bu/ac advantage\(^1\): 3-4

South Africa
- Market Pos.: #1
- Avg. bu/ac advantage\(^1\): >5

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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
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
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

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.
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:

- Increases spectrum of control from 350 to 375 weed species; Enlist E3™ system only controls 260
- Average 2019 yield and agronomic performance consistent with Roundup Ready 2 Xtend soybeans
- Acres in the U.S. expected to be limited in first year

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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, 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

<table>
<thead>
<tr>
<th>Third-Gen Advances to Launch Phase¹</th>
<th>Fourth-Gen Advances to Phase 3</th>
<th>Fifth-Gen Advances to Phase 2</th>
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<tbody>
<tr>
<td>Glyphosate</td>
<td>Glyphosate</td>
<td>Glyphosate</td>
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<tr>
<td>Dicamba</td>
<td>Dicamba</td>
<td>Dicamba</td>
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<tr>
<td>Glufosinate</td>
<td>Glufosinate</td>
<td>Glufosinate</td>
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<tr>
<td>HPPD</td>
<td>HPPD</td>
<td>HPPD</td>
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<tr>
<td>2,4-D</td>
<td>2,4-D NEW!</td>
<td>2,4-D NEW!</td>
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<tr>
<td>3 herbicide tolerances</td>
<td>5 herbicide tolerances</td>
<td>6 herbicide tolerances</td>
</tr>
</tbody>
</table>

¹ Commercial availability pending regulatory approval
² In collaboration with Sumitomo

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

NEW!

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

Current Commercial PPO Herbicides

Flumioxazin 210g/ha
Sulfentrazone 840g/ha
Saflufenacil 100g/ha

New lower rate PPO Herbicide²
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

// Pending regulatory approvals

1 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.

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

Roundup Ready
Brazil – 2018/2019

// 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 2021

21 // Bayer Crop Science R&D Pipeline Update // February 13, 2020
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 2021

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.

1 Pending regulatory approvals. Always read and follow label instructions. Products not registered in all jurisdictions.
Enhancements to Identify and Optimize Small Molecule Candidates

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

- Biological Screening
- Target-based Screening
- Phenotyping
- Early Safety Testing

Differentiated Starting Points
Increased P (Success) = 2x

New Small Molecules Candidates in Discovery since 2015
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

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

Builds on #1 position in soybean fungicides1

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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 2020 in New Zealand
Novel Solution for Control of Leaf Diseases in Cereals; > €400m Peak Sales Opportunity

iblon Technology is an advanced chemistry behind a new family of products powered by Isoflucypram, the latest and most mature compound from the highly valued class of SDHIs.

- Wheat treated with iblon exceeded the standards with an 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
Always read and follow label instructions. Products not registered in all jurisdictions.
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 soybeans\(^1\)

- 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**

\(^1\) Internal estimates
Always read and follow label instructions. Products not registered in all jurisdictions.
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 herbicides\(^1\)

\(^1\) Internal estimates

- 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.
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

- FY 15: 5m
- FY 16: 15m
- FY 17: >35m
- FY 18: 60m
- FY 19: >95m

Growth Fueled by Platform Advantages

- Most Established, Scalable
digital farming infrastructure

- #1 Brand
in digital Ag space²

- Largest Database
of grower and field trial seed performance data in the industry

- >65 Partners
on the FieldView Platform

- New Business Models
enabling sharing of value and risk

- >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

+17,000 connected combines uploading data since Aug 2019

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

Connected Combines

Connected Planters & Sprayers

Months to Collect 10m Connected Hours

First 10m Hours: 32
Second 10m Hours: 9
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

- 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?

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

2019 Beta Launch for Corn Seed Advisor across seven states (IA, IL, IN, MN, MO, SD, WI)
Advanced Corn Seed Prescriptions Progresses; Europe, Brazil and Argentina in Phase Three

Advanced Seed Prescriptions Expected to Launch in LATAM in 2021

Advanced Seed Prescriptions Improve Productivity per Acre

- 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

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
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

Farmer Decision Points
- Seed Selection
- Choice of Seed + Treatment
- Soil/Fertility Management

Yield Protection
- Water Management
- Weed Management
- Pest Management
- Disease Management

BCS Current Market Position
- Leading share positions in corn, soybean, cotton and vegetable seeds

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

#### PEST MANAGEMENT – ~15% of Peak Sales Potential

<table>
<thead>
<tr>
<th>R&amp;D Target</th>
<th>Technology</th>
<th>Phase*</th>
<th>Enhancement**</th>
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</thead>
<tbody>
<tr>
<td>Above Ground (Lepidoptera)</td>
<td>Annual germplasm upgrades</td>
<td>✓</td>
<td>✓ NEW</td>
</tr>
<tr>
<td></td>
<td>Short Stature Corn</td>
<td>✓</td>
<td>✓ NEW</td>
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<tr>
<td></td>
<td>Short Stature Corn ¹</td>
<td>✓</td>
<td>✓ NEW</td>
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<tr>
<td></td>
<td>3rd generation BioRise microbial seed treatment</td>
<td>✓</td>
<td>✓ NEW</td>
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<tr>
<td>Early Pipeline</td>
<td>New Biological</td>
<td>✓</td>
<td>✓ NEW</td>
</tr>
</tbody>
</table>

**Product enhancement:** (Life Cycle Management activities)

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

### DISEASE MANAGEMENT – ~5% of Peak Sales Potential

<table>
<thead>
<tr>
<th>R&amp;D Target</th>
<th>Technology</th>
<th>Phase*</th>
<th>Enhancement**</th>
</tr>
</thead>
<tbody>
<tr>
<td>Plant Health Systems</td>
<td>Corn Disease Shield - Annual upgrades</td>
<td>✓</td>
<td>✓ NEW</td>
</tr>
<tr>
<td></td>
<td>Acceleron - Annual upgrades</td>
<td>✓</td>
<td>✓ NEW</td>
</tr>
<tr>
<td></td>
<td>Goss Wilt resistance</td>
<td>✓</td>
<td>✓ NEW</td>
</tr>
<tr>
<td></td>
<td>Delaro Complete</td>
<td>✓</td>
<td>✓ NEW</td>
</tr>
</tbody>
</table>

**Product enhancement:** (Life Cycle Management activities)

- Herbicide tolerance
- 3rd generation weed management system
- 4th generation weed management system
- 5th generation weed management system
- Improved Dicamba formulations
- Improved Dicamba & Glyphosate Premix
- Harness LCM

### WEED MANAGEMENT – ~15% of Peak Sales Potential

<table>
<thead>
<tr>
<th>R&amp;D Target</th>
<th>Technology</th>
<th>Phase*</th>
<th>Enhancement**</th>
</tr>
</thead>
<tbody>
<tr>
<td>Short Stature Corn</td>
<td>New Herbicide MOA</td>
<td>✓</td>
<td>✓ NEW</td>
</tr>
</tbody>
</table>

**Product enhancement:** (Life Cycle Management activities)

- New Biological
- Herbicide tolerance
- 3rd generation weed management system
- 4th generation weed management system
- 5th generation weed management system
- Improved Dicamba formulations
- Improved Dicamba & Glyphosate Premix
- Harness LCM

### YIELD & ABIOTIC STRESS – ~65% of Peak Sales Potential

<table>
<thead>
<tr>
<th>R&amp;D Target</th>
<th>Technology</th>
<th>Phase*</th>
<th>Enhancement**</th>
</tr>
</thead>
<tbody>
<tr>
<td>New Insecticide</td>
<td>Breeding – incl. native traits and molecular breeding</td>
<td>✓</td>
<td>✓ NEW</td>
</tr>
</tbody>
</table>

**Product enhancement:** (Life Cycle Management activities)

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

**Note:**

- 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

---

1 Bayer Crop Science R&D Pipeline Update // February 13, 2020
**Soybean R&D Pipeline – Peak Sales Potential: €6-8bn**

### Yield & Abiotic Stress (~20% of Peak Sales Potential)
- Annual germplasm upgrades
- High Yielding Soy
- New Biological

### Pest Management (~20% of Peak Sales Potential)
- Chewing Pests
  - INTACTA RR2 PRO
    - 2nd generation insect protection
    - 3rd generation insect protection
  - Belt Smart
- Sucking Pests
  - Aphid & Whitefly pipeline
    - Novel Sucking Pest Solution
  - Stinkbug Pipeline
    - ARVIS
  - Novel Mite Solution
- Nematodes
  - Plant health systems
    - 2nd generation Soy Cyst Nematode resistance
  - Next generation NemaStrike formulation
  - Seed Treatment
    - New Insecticide Seed Treatment
      - CropStar LCM

### Disease Management (~30% of Peak Sales Potential)
- Soy Disease Shield
- Acceleron Upgrades
- Delaro Complete
- Asian Soybean Rust
- Indiflin
- New Fungicide

### Weed Management (~30% of Peak Sales Potential)
- Herbicide tolerance
  - XtendFlex
  - 4th generation weed management system
  - 5th generation weed management system
- New Soybean selective herbicide 3-way mixture
- New Soybean selective herbicide 2-way mixture
- Improved Dicamba & Glyphosate Premix
- Improved Dicamba formulations
- Early Pipeline
  - Novel PPO Herbicide
  - New Herbicide MOA

### R&D Target Technology Phase* Enhancement**

#### PEST MANAGEMENT - ~20% of Peak Sales Potential
- **NEW**
- **NEW**
- **NEW**
- **NEW**
- **NEW**

#### DISEASE MANAGEMENT - ~30% of Peak Sales Potential
- **NEW**
- **NEW**
- **NEW**
- **NEW**
- **NEW**
- **NEW**

#### WEED MANAGEMENT - ~30% of Peak Sales Potential
- **NEW**
- **NEW**
- **NEW**

---

**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

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

---

**Key Life Cycle Management (blue) work.**
Cereals, Oilseed Rape, Cotton, Sugarbeets, Rice R&D Pipelines – Peak Sales Potential: €3-4bn

<table>
<thead>
<tr>
<th>R&amp;D Target</th>
<th>Technology</th>
<th>Phase*</th>
<th>Enhancement**</th>
</tr>
</thead>
<tbody>
<tr>
<td>Cereals</td>
<td></td>
<td>1</td>
<td></td>
</tr>
<tr>
<td></td>
<td></td>
<td>2</td>
<td></td>
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<tr>
<td></td>
<td></td>
<td>3</td>
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</tr>
<tr>
<td></td>
<td></td>
<td>4</td>
<td></td>
</tr>
<tr>
<td></td>
<td>Dev.</td>
<td></td>
<td></td>
</tr>
<tr>
<td></td>
<td>Subm.</td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

**YIELD & ABIOTIC STRESS**
- Annual germplasm upgrades
- Selective Herbicides
  - New Cereals Selective Herbicide
- Atlantis franchise extensions
- New Autumn Herbicides
- Pyrasulfotole LCM

**PEST MANAGEMENT**
- New Cereals Seed Treatment
- iblon
- New Bixafen extensions
- Delaro forte
- Redigo FS 25
- New Fungicidal Seed Treatment
- adv. to launch

**DISEASE MANAGEMENT**
- Disease package annual upgrade
- adv. to launch

<table>
<thead>
<tr>
<th>Cotton</th>
<th></th>
<th>1</th>
<th></th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td></td>
<td>2</td>
<td></td>
</tr>
<tr>
<td></td>
<td></td>
<td>3</td>
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</tr>
<tr>
<td></td>
<td></td>
<td>4</td>
<td></td>
</tr>
<tr>
<td></td>
<td>Dev.</td>
<td></td>
<td></td>
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<tr>
<td></td>
<td>Subm.</td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

**YEILD & ABIOTIC STRESS**
- Annual germplasm upgrades

**PEST MANAGEMENT**
- Chewing Pests
- Novel Mite solution
- New Insecticide
- Next generation NemaStrike formulation
- ThryvOn Technology
- Novel sucking pest solution
- Novel sucking pest solution
- Advanced formulation

**DISEASE MANAGEMENT**
- Disease package annual upgrade
- adv. to launch

\*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 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.)

<table>
<thead>
<tr>
<th>R&amp;D Target</th>
<th>Technology</th>
<th>Phase*</th>
<th>Enhancement**</th>
</tr>
</thead>
<tbody>
<tr>
<td>Cereals</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Oilseed Rape</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Sugarbeets</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Rice</td>
<td></td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th>R&amp;D Target</th>
<th>Technology</th>
<th>Phase*</th>
<th>Enhancement**</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

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

2 In collaboration with KWS

---

Progress achieved Phases 1 through 4

Status indication for Life Cycle Management Items

Strategic collaborations

Pipeline status highlighting significant development, progress or advancement in R&D Pipeline (pink) and Key Life Cycle Management (blue) work.
### Horticulture R&D Pipeline – Peak Sales Potential: €3-4bn

#### YIELD AND ABIOTIC STRESS - ~45% Peak Sales Potential

<table>
<thead>
<tr>
<th>R&amp;D Target</th>
<th>Technology</th>
<th>Phase*</th>
<th>Enhancement**</th>
</tr>
</thead>
<tbody>
<tr>
<td>~150 advancements to launch</td>
<td>✔️</td>
<td>✔️</td>
<td>✔️</td>
</tr>
<tr>
<td>Highlights include SVTH2900 Tomato, Shoreline Watermelon, Pinata Tomato, GALVIR Gala Melon and Hot Pepper (SVHA-1448)</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td></td>
<td>✔️</td>
<td>✔️</td>
<td>✔️</td>
</tr>
<tr>
<td></td>
<td>✔️</td>
<td>✔️</td>
<td>✔️</td>
</tr>
</tbody>
</table>

#### HIGHLY QUALITY

<table>
<thead>
<tr>
<th>R&amp;D Target</th>
<th>Technology</th>
<th>Phase*</th>
<th>Enhancement**</th>
</tr>
</thead>
<tbody>
<tr>
<td>Novel concentrated Biological</td>
<td>✔️</td>
<td>✔️</td>
<td>✔️</td>
</tr>
<tr>
<td>Pest Management - ~20% of Peak Sales Potential</td>
<td>✔️</td>
<td>✔️</td>
<td>✔️</td>
</tr>
</tbody>
</table>

#### PEST MANAGEMENT - ~20% of Peak Sales Potential

<table>
<thead>
<tr>
<th>R&amp;D Target</th>
<th>Technology</th>
<th>Phase*</th>
<th>Enhancement**</th>
</tr>
</thead>
<tbody>
<tr>
<td>Aphid &amp; Whitefly pipeline</td>
<td>✔️</td>
<td>✔️</td>
<td>✔️</td>
</tr>
<tr>
<td>Novel Sucking Pest Solution</td>
<td>✔️</td>
<td>✔️</td>
<td>✔️</td>
</tr>
<tr>
<td>SVANTO brand family extension</td>
<td>✔️</td>
<td>✔️</td>
<td>✔️</td>
</tr>
<tr>
<td>Novel Mite Solution</td>
<td>✔️</td>
<td>✔️</td>
<td>✔️</td>
</tr>
<tr>
<td>Nematodes</td>
<td>✔️</td>
<td>✔️</td>
<td>✔️</td>
</tr>
<tr>
<td>BioAct DC</td>
<td>✔️</td>
<td>✔️</td>
<td>✔️</td>
</tr>
<tr>
<td>Yelum</td>
<td>✔️</td>
<td>✔️</td>
<td>✔️</td>
</tr>
<tr>
<td>Next gen nematode resistant tomato</td>
<td>✔️</td>
<td>✔️</td>
<td>✔️</td>
</tr>
</tbody>
</table>

#### Early Pipeline

- New Biological Insecticide
- New Insecticide

#### Early Pipeline

- New Biological Insecticide
- New Insecticide

#### DISEASE MANAGEMENT - ~25% of Peak Sales Potential

<table>
<thead>
<tr>
<th>R&amp;D Target</th>
<th>Technology</th>
<th>Phase*</th>
<th>Enhancement**</th>
</tr>
</thead>
<tbody>
<tr>
<td>Plant Health Systems</td>
<td>✔️</td>
<td>✔️</td>
<td>✔️</td>
</tr>
<tr>
<td>Geminivirus resistant tomato</td>
<td>✔️</td>
<td>✔️</td>
<td>✔️</td>
</tr>
<tr>
<td>Downy Mildew resistant lettuce</td>
<td>✔️</td>
<td>✔️</td>
<td>✔️</td>
</tr>
<tr>
<td>Dicots Leaf &amp; Fruit Diseases</td>
<td>✔️</td>
<td>✔️</td>
<td>✔️</td>
</tr>
<tr>
<td>LUNA brand family extension</td>
<td>✔️</td>
<td>✔️</td>
<td>✔️</td>
</tr>
<tr>
<td>Serenade ASO</td>
<td>✔️</td>
<td>✔️</td>
<td>✔️</td>
</tr>
<tr>
<td>Oomycetes</td>
<td>✔️</td>
<td>✔️</td>
<td>✔️</td>
</tr>
<tr>
<td>Fluoxapiprolin</td>
<td>✔️</td>
<td>✔️</td>
<td>✔️</td>
</tr>
<tr>
<td>Bacteria</td>
<td>✔️</td>
<td>✔️</td>
<td>✔️</td>
</tr>
<tr>
<td>Serenade ASO</td>
<td>✔️</td>
<td>✔️</td>
<td>✔️</td>
</tr>
<tr>
<td>Seed &amp; Soil-borne Diseases</td>
<td>✔️</td>
<td>✔️</td>
<td>✔️</td>
</tr>
<tr>
<td>High concentrated Biological</td>
<td>✔️</td>
<td>✔️</td>
<td>✔️</td>
</tr>
</tbody>
</table>

#### Early Pipeline

- New Biological Fungicide

- New Biological Fungicide

#### WEED MANAGEMENT - ~10% of Peak Sales Potential

<table>
<thead>
<tr>
<th>R&amp;D Target</th>
<th>Technology</th>
<th>Phase*</th>
<th>Enhancement**</th>
</tr>
</thead>
<tbody>
<tr>
<td>Allon LCM</td>
<td>✔️</td>
<td>✔️</td>
<td>✔️</td>
</tr>
<tr>
<td>Roundup LCM</td>
<td>✔️</td>
<td>✔️</td>
<td>✔️</td>
</tr>
<tr>
<td>Early Pipeline</td>
<td>✔️</td>
<td>✔️</td>
<td>✔️</td>
</tr>
<tr>
<td>New Herbicide MOA</td>
<td>✔️</td>
<td>✔️</td>
<td>✔️</td>
</tr>
</tbody>
</table>

#### Key Life Cycle Management

- Bayer (B): Breeding – incl. native traits and molecular breeding
- Plant Biotech (PB): Biotechnology traits
- Crop Protection (CP): Chemical and biological solutions applied as seed treatment, foliar or via soil

*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

- Status indication for Life Cycle Management Items

- Strategic collaborations

- Progress achieved Phases 1 through 4

- 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.
## Digital R&D Pipeline

### SEEDS AND PLANTING
- **Seed Selection (US, Corn)**
- **Seed Advisor (US, Corn)**
- **Designed Hybrid Side-by-Sides (US, Corn)**
- **Seed Selection (US, Soy)**
- **Advanced Seed Prescriptions (Argentina, Corn)**
- **Advanced Seed Prescriptions (EU, Corn)**
- **Advanced Seed Prescriptions (Brazil, Corn)**
- **Advanced Seed Prescriptions (US, Soy)**

### FIELD INSIGHTS
- **Field Health and Scouting Insights (EU, Corn)**
- **Advanced Irrigation Recommendations (US, Corn)**
- **Disease Identification (US, Soy)**
- **Disease Identification (US, Corn)**
- **Disease Identification (Global, Wheat)**
- **Disease Vulnerability (US, Corn)**
- **Disease Vulnerability (EU, Wheat)**
- **Fungicide ROI (Canada, Canola)**
- **Fungicide ROI (US, Soy)**
- **Fungicide ROI (EU, Wheat)**
- **Fungicide ROI (US, Corn)**

### YIELD ANALYTICS
- **Automated Experiment Design (Global, All Crops)**
- **Automated Experiment Analysis (Global, All Crops)**
- **Yield Prediction (US, Corn)**
- **Yield Prediction (EU, Wheat)**
- **Yield Prediction (US, Soy)**
- **Field Productivity V2 (US, Corn)**
- **Replant Models (US, Corn)**
- **Seed Supply Planning (US, Corn)**

### 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**

### 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**

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**P = Phosphorus**

**K = Potassium**

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