

Business Strategy of the Health & Crop Sciences Sector

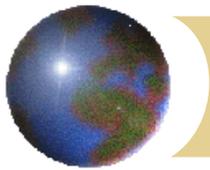
***Growth Strategy for the AgroSolutions
and Environmental Health Business***



Ray Nishimoto

**Representative Director &
Senior Managing Executive Officer**

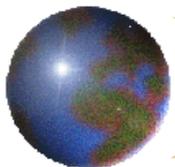
October 11, 2018



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* *Basic Information about the Crop Protection Business (appendix)*

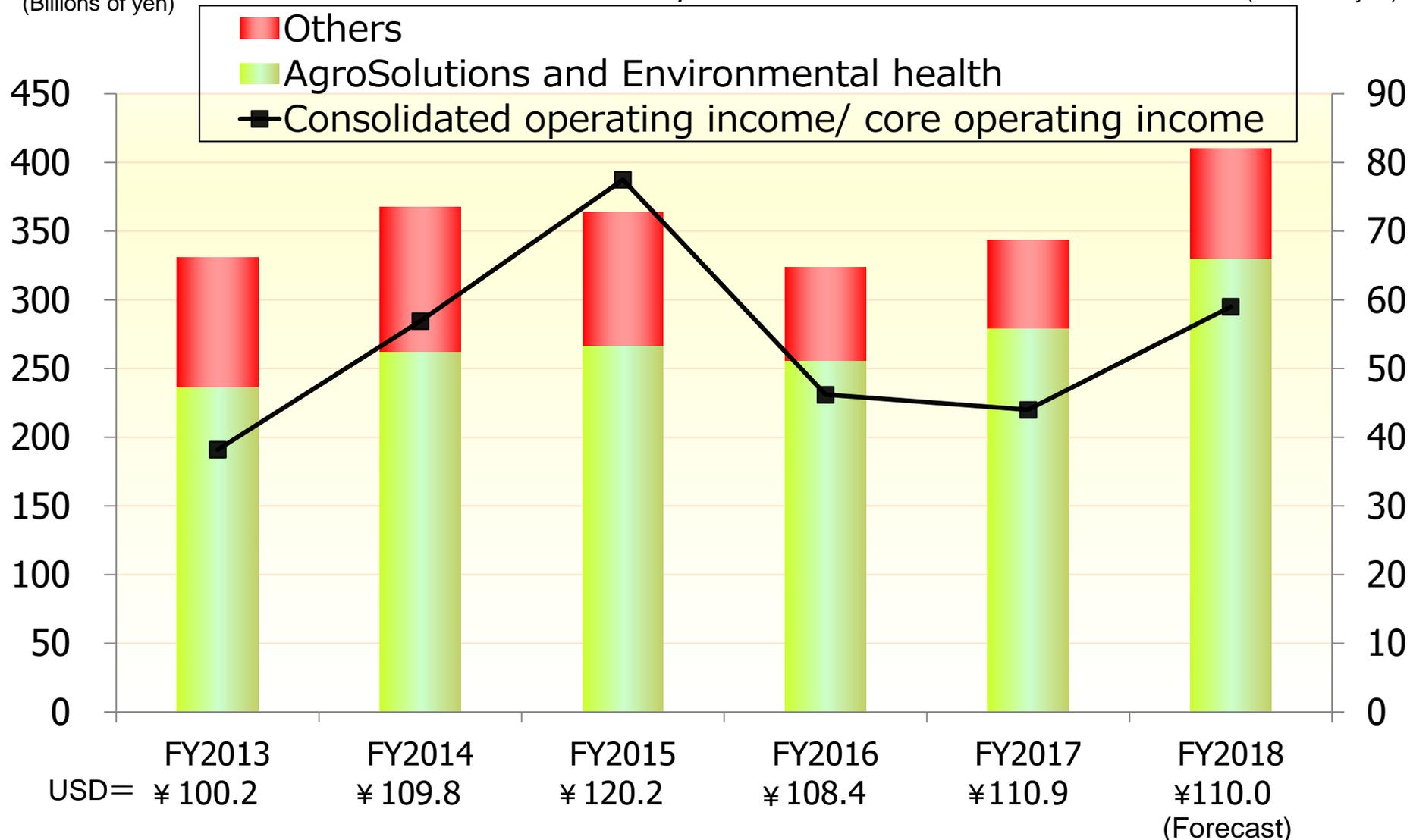


Consolidated Performance Trends of Health & Crop Sciences Sector

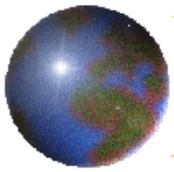
(Consolidated net sales/ sales revenue)

(Billions of yen)

(Billions of yen)



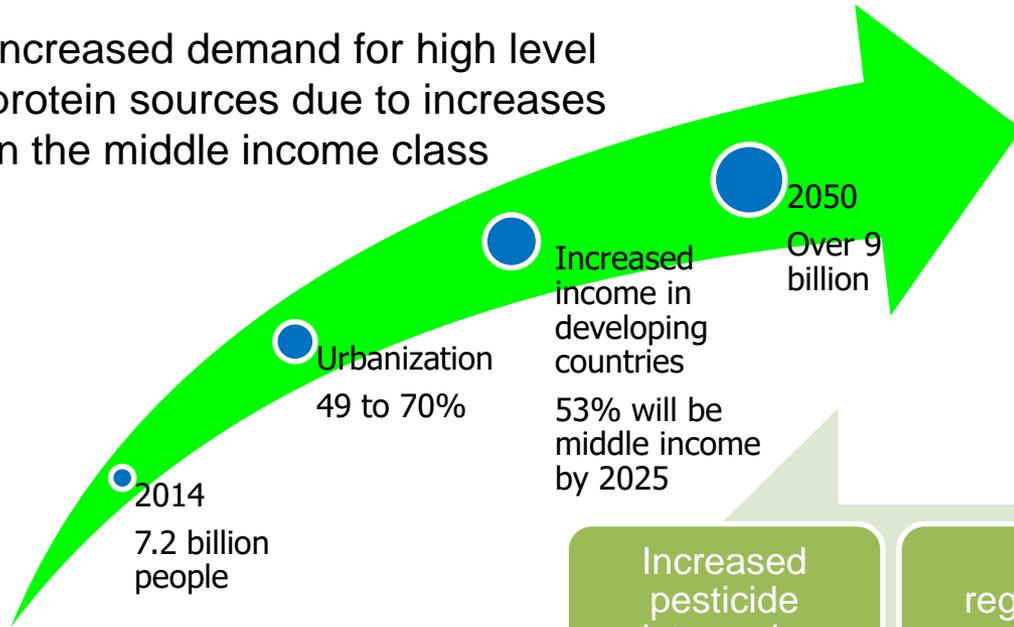
* J-GAAP used through FY2016, IFRS adopted from FY2017.



Issues in 2050: Food Supply, Improvement of Quality of Life

35% increase in population

Increased demand for high level protein sources due to increases in the middle income class



Necessary to increase food production by 70%

Increased demand for healthy and pleasant living environments

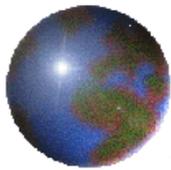
Increased pesticide resistance issue

Strict registration regulations

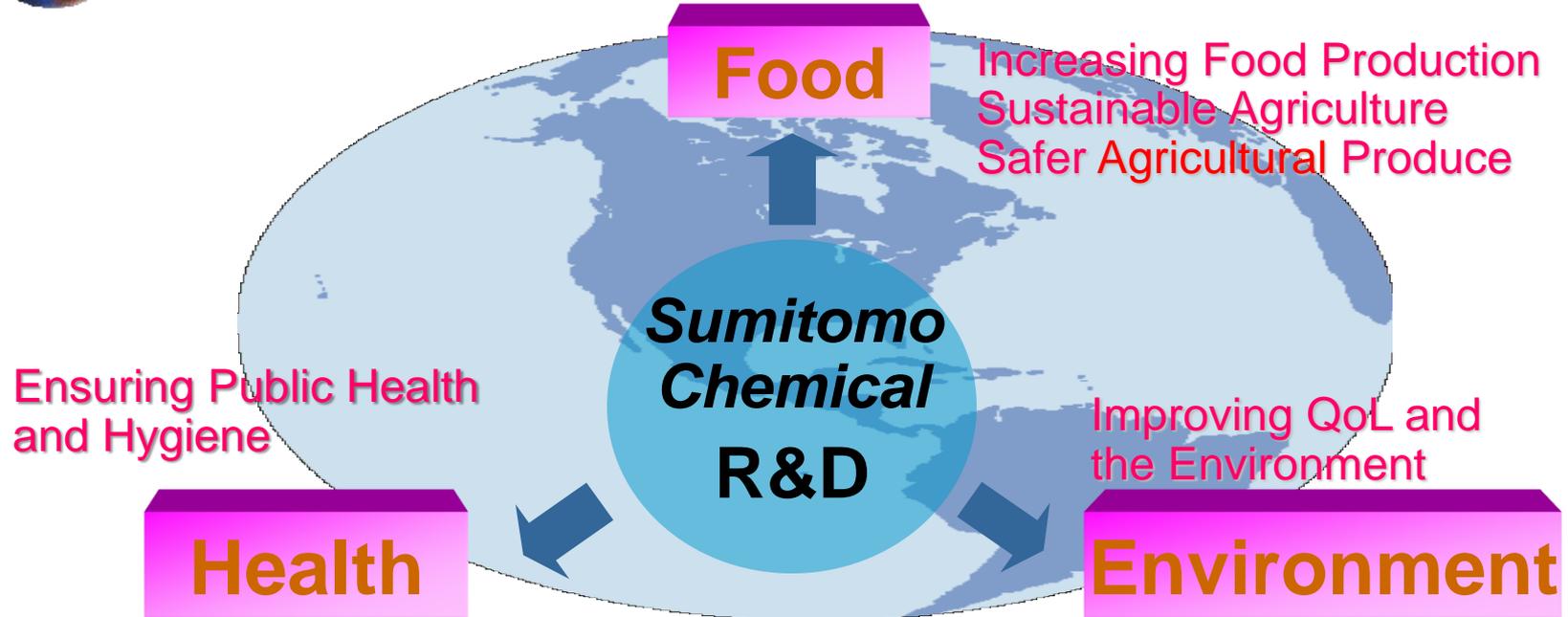
Sustainable agriculture

Climate change

Mission: 1. Contribute to further increased production of food, animal feed, textiles, and fuel using sustainable methods
2. Contribute to protection and improvement of living environments and quality of life



Long-Term Vision for the Health & Crop Sciences Sector

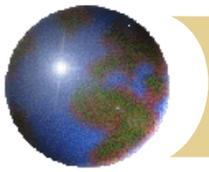


Strengthen high-profitability businesses
Expand business globally
Ensure compliance & maintain safe operations

Differentiation Differentiate our business from multinational and generic competitors

Business Creation Expand brand-name products business/Expand into downstream and related areas/Expand sales area to Central Europe and South America

Innovation R&D of compounds in pipeline/Expand sales of new products/Accelerate launch of new products/Strengthen intellectual property strategy/Establish a global research system/Establish global optimum production systems/Reduce SCM and all other costs/Improve asset efficiency



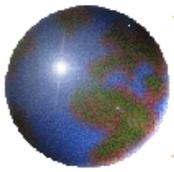
Status of the Health & Crop Sciences Sector

Long-term Vision

Contribute to solving global issues related to food, health, hygiene, and the environment by leveraging our excellent research and development capabilities

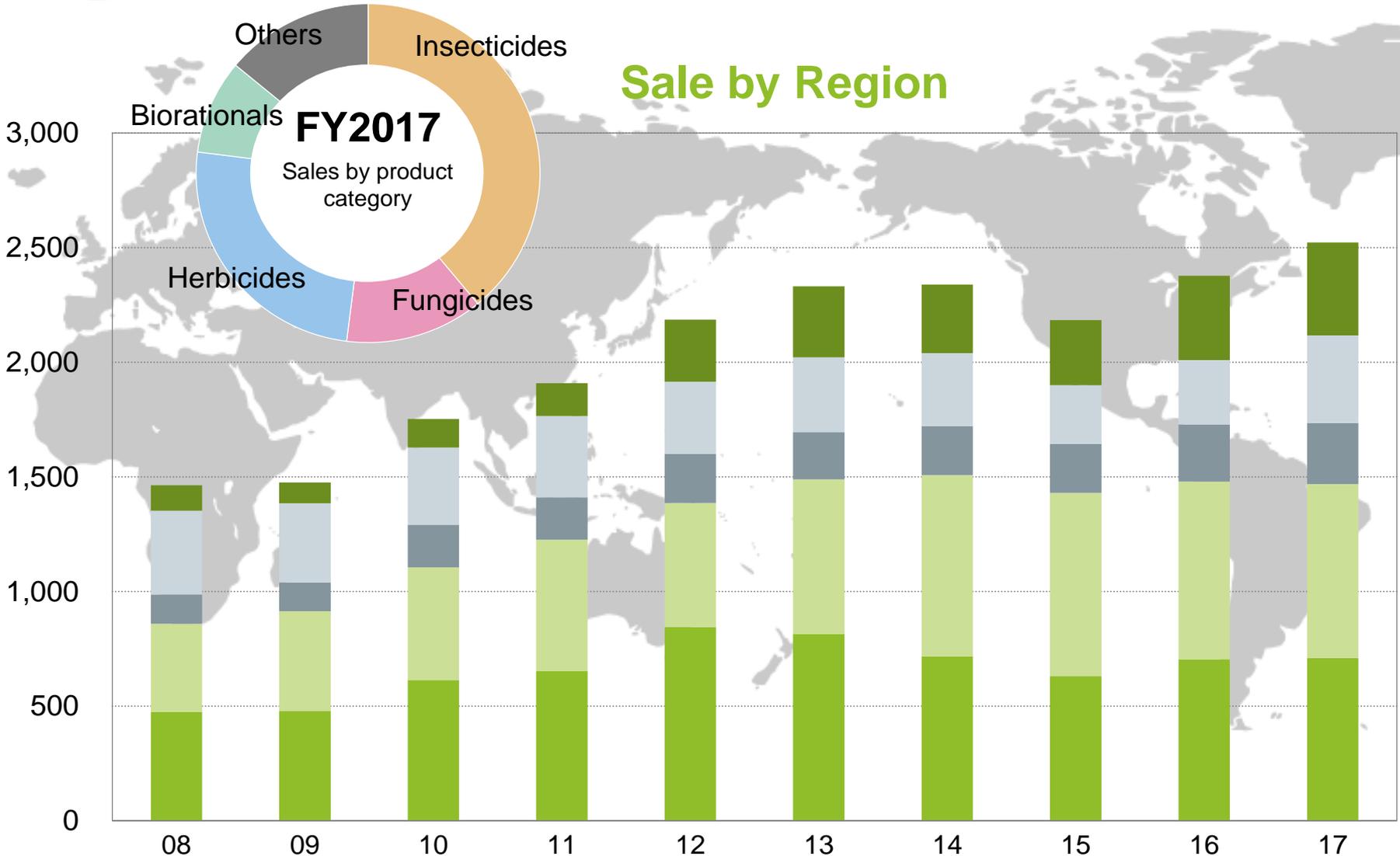
Status of the Major Businesses





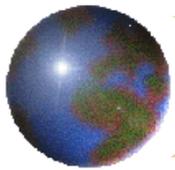
Current State of the AgroSolutions and Environmental Health Business

Sale by Region



■ Others
 ■ Asia
 ■ Europe
 ■ North America
 ■ Japan

* Including environmental health products
 Calendar year until 2011, April–March fiscal year after 2012



Research and Development Strategy of the Health & Crop Sciences Sector

Long-term Vision

Contribute to business growth and portfolio enhancement by providing value-added products and services through technological innovation

Strategic Investments in Research and Development

Commercialization of the Development Pipeline

- Advancing market and product development
- Product lifecycle management

Creation of Next-Generation Pipelines

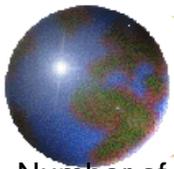
- Crop protection chemicals
- Biorationals • Botanicals

Development of Next-generation Technologies

- Precision agriculture
- Utilization of Biotech and IoT

Global Research and Development Network

- Enhancing infrastructure
- Operational excellence



Global Agrochemical Companies' Investments in R&D of Crop Protection Chemicals

Number of Patents Issued

2012

3648

2707

2166

2310

Number of New molecules Launched

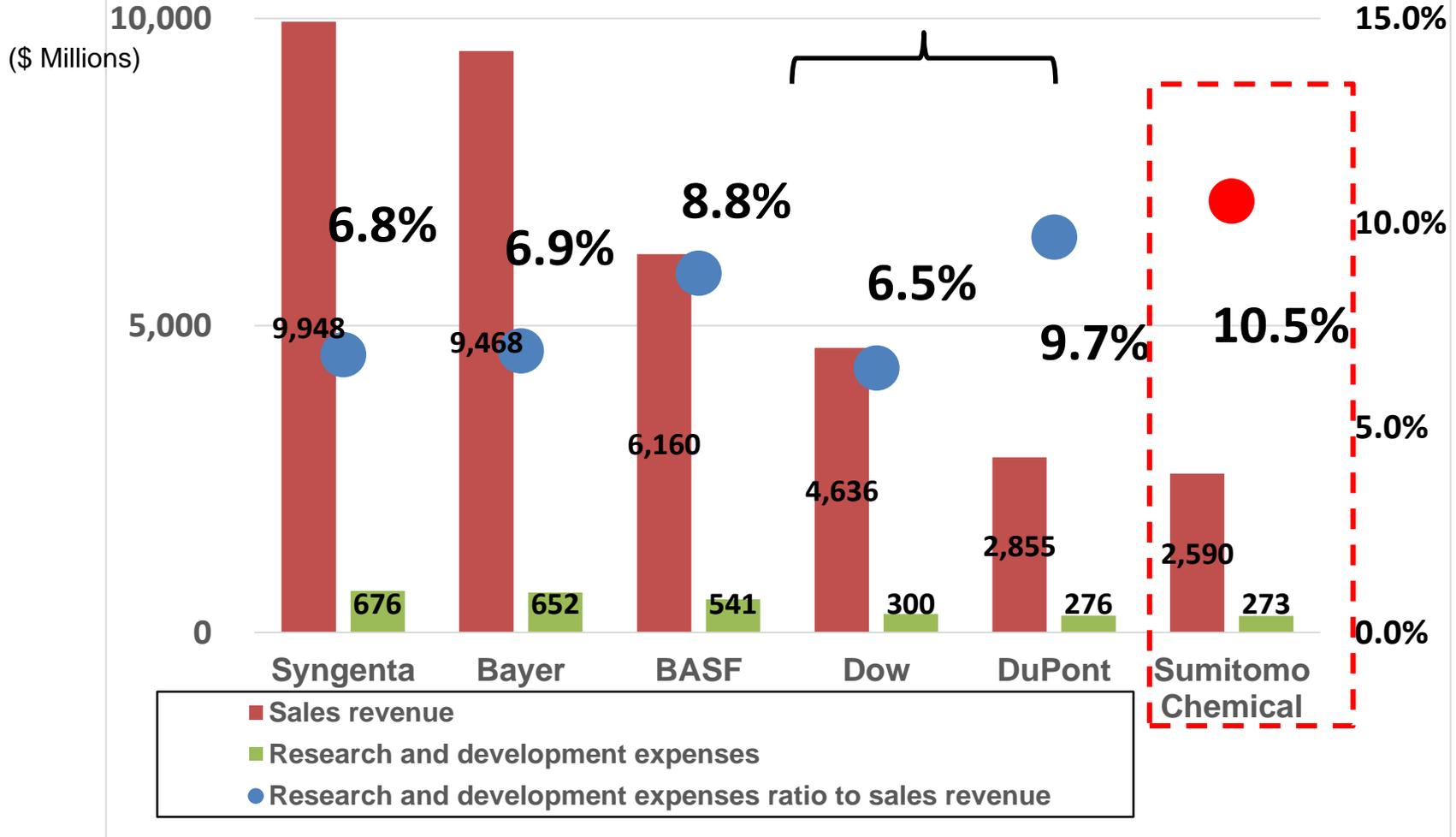
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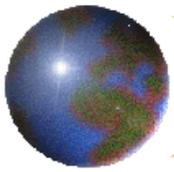
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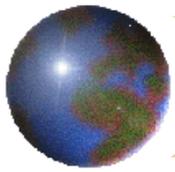


(Source) Sales revenue, research and development expenses: AgbiInvestor(2016)
 Number of patents issued (2010-2017): Derwent World Patent Index
 Number of new molecules launched (2012-2015): internal Sumitomo Chemical research



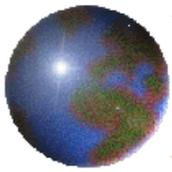
Our Robust Development Pipeline and New Products

Compounds	Use	Evaluation	Full Development	In-Registration	Launch
Project B2020: INDIFLIN™ PAVECTO™ ALLES™ Pyridaclomethyl	Agricultural fungicide Agricultural fungicide Agricultural insecticide Agricultural fungicide				
Project A2020: Pipeline A Pipeline B Pipeline C Pipeline D	Agricultural herbicide Agricultural PGR Botanical insecticide Agricultural insecticide				
New products: Mixtures and new formulations Biorationals Botanicals	Agricultural- and household hygiene-				



Progress in B2020 Pipeline Development

Compound	Use	Evaluation	Full Development	In-Registration
INDIFLIN™ (inpyrfluxam)	Agricultural fungicide Soybean rust etc.		✓ Completed	✓ Submitted in 2017
PAVECTO™ (metyltetraprole)	Agricultural fungicide Septoria etc.		✓ Completed	✓ Submitted in 2018
ALLES™ (oxazosulfyl)	Agricultural insecticide Major rice pests etc.		✓ Completed	✓ Plan to submit in Q1 2019
Product Name Undecided (pyridaclomethyl)	Agricultural fungicide Vegetable diseases etc.		✓ Completed	



Commercialization of the New Fungicide Pipeline

INDIFLIN™
(inpyrfluxam)

New fungicide for soybeans

Features: Highly effective against major diseases such as soybean rust

Registration: Submitted in Japan, North and South America in 2017. Followed by submission in other countries.

June 2017: Collaboration with Bayer (developing its mixtures in Brazil)

To be launched in 2020 or later

PAVECTO™
(metyltetraprole)

New fungicide

Features:

1. Highly effective against major plant diseases
2. Also effective against strains resistant to existing fungicides

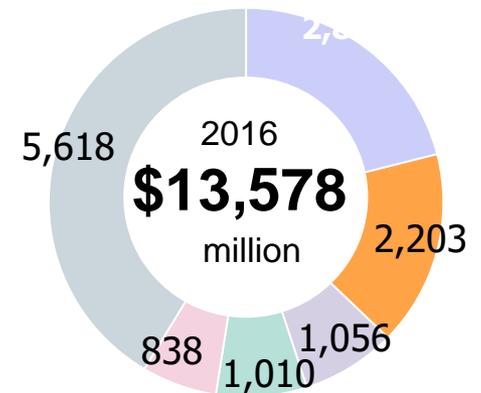
Registration: Submitted in Japan and Europe

June 2017: Collaboration with BASF (co-developing globally)

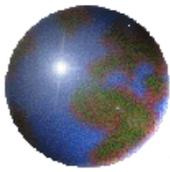
To be launched in 2020 or later

Global Fungicide Market

■ Cereals	■ Soybeans
■ Rice	■ Grapes
■ Tubers	■ Other

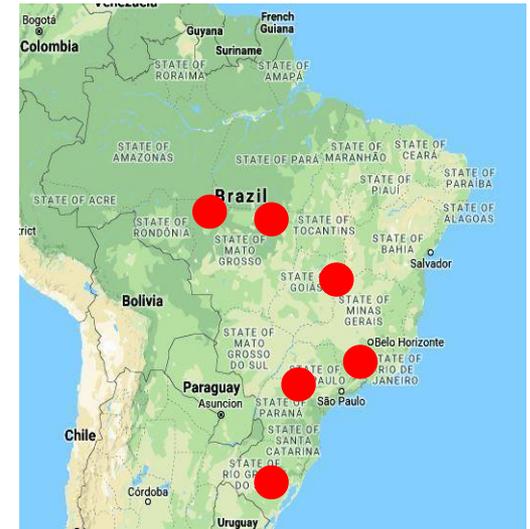


(Source) Phillips McDougall, Crop Section (Ex-Distributor)



Excellent Field Performance of INDIFLIN™ Product

- ✓ In the official trials in Brazil, INDIFLIN™ product showed excellent performance against Asian soybean rust
- ✓ It showed very good efficacy in conditions where benchmark product was ineffective

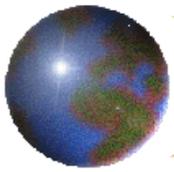


INDIFLIN™



Benchmark





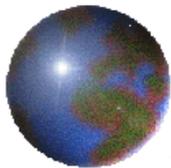
Excellent Field Performance of PAVECTO™

- PAVECTO™ has shown better field performance against wheat Septoria than the commercial products in Europe

PAVECTO™

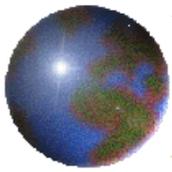


No Treatment



Expansion of Pipeline Portfolio - A2020 Projects

Compound	Application	Evaluation	Full Development	In-Registration
Pipeline A	Next Generation Herbicide effective against weeds having resistance issue	 ✓ Full-development started		
Pipeline B	Agricultural plant growth regulator	 Full-development in progress		
Pipeline C	Botanical insecticide for agriculture and household hygiene	 Full-development in progress		
Pipeline D	Agricultural insecticide to control resistant pests	 Evaluation in progress		



Next Generation Herbicide for control of Resistance Weed Species

Background

- In the course of our strategic partnership for the sale of Flumioxazin, Sumitomo Chemical and Bayer agreed to collaborate on the development of next-generation weed control solutions, utilizing their technical strengths (Sumitomo Chemical: the development of new herbicides, Bayer: the creation of resistant crops) in the field of development.

Sumitomo Chemical's Goals

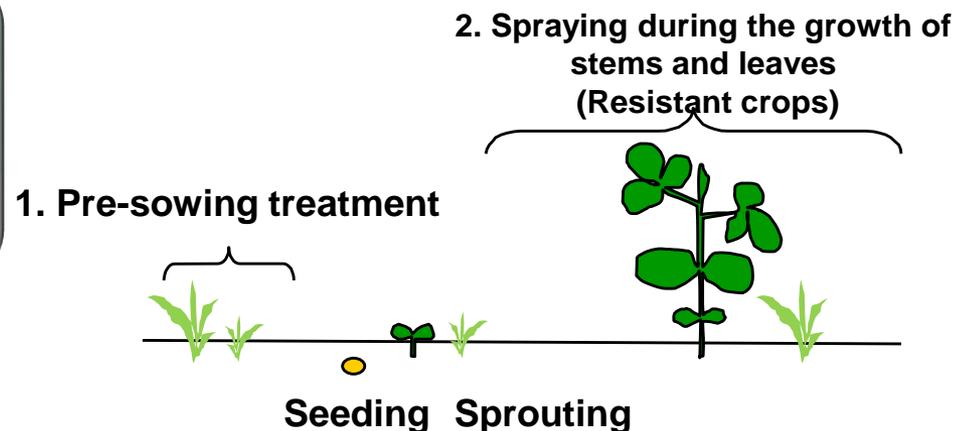
- Proactive support for next-generation GMOs and PPO-resistant crops (Bayer)
- Expand Sumitomo Chemical's herbicide portfolio
- Combine mutual insights to improve development success rates, shorten development times, and reduce development costs

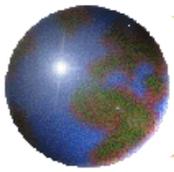
Features of the New Herbicide

- Broader herbicidal effect on grasses compared to existing PPO herbicide products
- Effective at lower rate than other types of herbicide
- Fast action

Protoporphyrinogen Oxidase (PPO) is an enzyme involved in the synthesis of chlorophyll, and PPO-inhibitor herbicides cause plants to wither by inhibiting the operation of PPO

Timing for Applying the New Herbicide





Excellent Performance of Next Generation Herbicide

The new herbicide was highly effective against weeds at lower rate than commercial products. It also controlled resistant weeds which becomes a serious issue in several States.



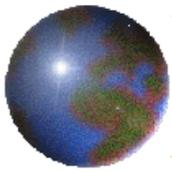
No Treatment



Sumitomo Chemical's New Herbicide



Commercial Products 17



Development of Biorational - New Plant Growth Regulators

The new plant growth regulator is derived from a natural product and showed high effectiveness in fruit and leaf thinning for fruit trees, contributing to labor saving in fruit and leaf thinning operations

Apples: Effect on Fruit Thinning

High fruit numbers,
lower quality

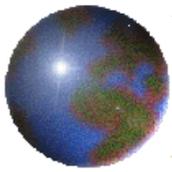


No Treatment



Treatment

Improvement
in fruit size
and quality



Botanical Insecticides

Values

- Solutions that meet the needs in organic agriculture and natural-oriented consumer market
- Utilizing the Sumitomo Chemical Group's manufacturing technology
- Broad business opportunities in the agriculture and household/hygiene fields

Features of the New Botanical Insecticides

- Effective against agricultural and household pests that have developed resistance to existing insecticides
- Less residual and preferable profiles in environmental fate

Consumer Household



Consumer Pet



Professional Pest Control



Food Animal

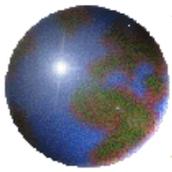


Public Health



Organic/Sustainable Ag





Expansion of the Botanical Business

- Integrating the Sumitomo Chemical Group's product portfolio:
Traditional Chemical + Biorational + Botanical (Plant-derived)
- Household and public hygiene fields ⇒ Expansion to agricultural uses (USA, Europe, etc.)
- Secured a stable production base and improvement in production efficiency for pyrethrum products by acquisition of Botanical Resources Australia
- Development of other botanical products



Household and Public Hygiene Business

- Insect control solutions for consumers who prefer natural products



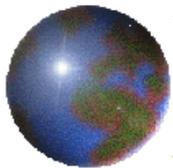
Crop Protection Business

- Insect control solutions for organic and sustainable agriculture



Botanical Technology

- New Trait development of pyrethrum
- know-how relating to production for natural products



Continued Development of Pipelines

To be
launched

2019~2021

2022~2024

2025~

Crop
Protection
Chemicals

- Inpyrfluxam
- Metyltetraprole
- Oxazosulfyl
- Pyridaclomethyl

- Next Generation
Herbicide for
resistant weed
control solutions

- Next-generation
Insecticide to control
resistant pests

- Next-generation
pipeline: 5 projects

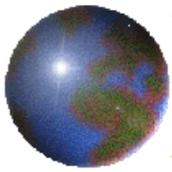
Biorationals
Botanicals

- Microbial pesticide
- PGR
- Botanical
insecticide

- PGR
- Botanical
insecticide

- Next-generation
pipeline:
More than 3 projects

Business Potential : approx. ¥150-200 billions 21



Strengthening of Our Global R&D Capabilities

Global R&D Network

Biorational Research Center (BRC)

Completion: July 2018

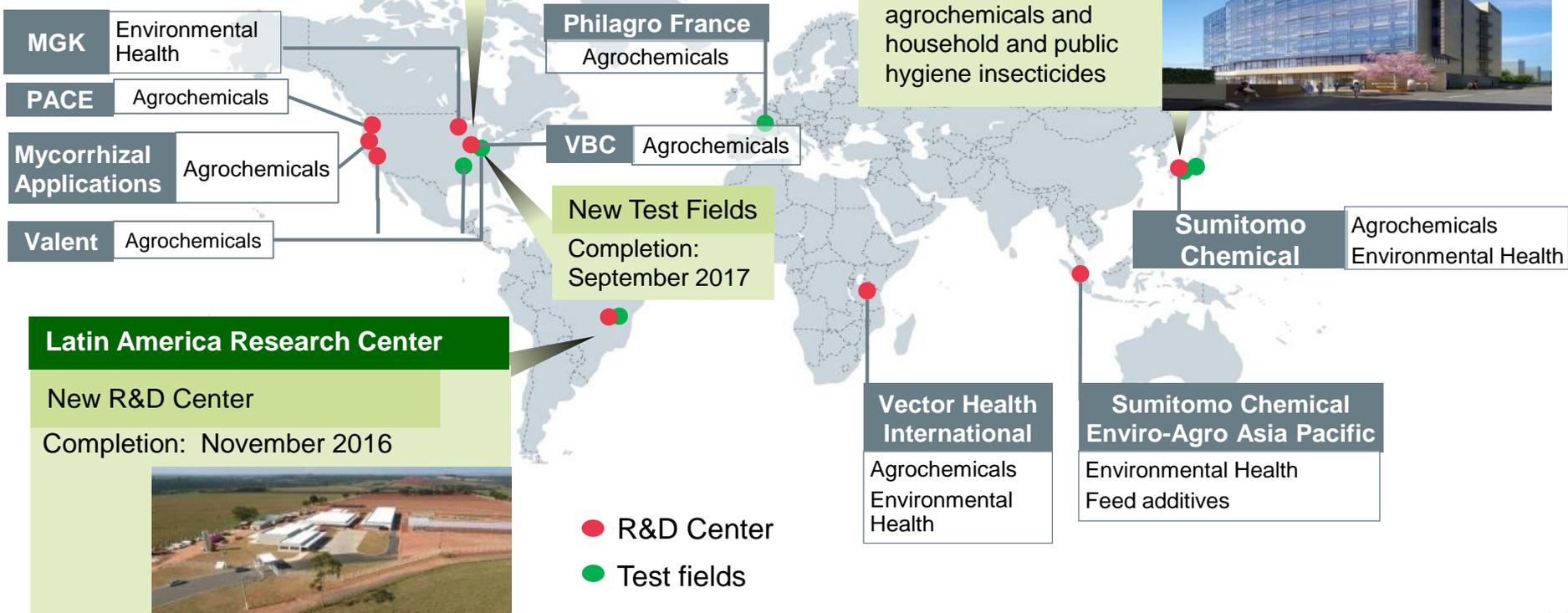
Alignment between research and marketing & sales
⇒ Enhanced biorational R&D capabilities



Chemistry Research Center (CRC) at Health & Crop Sciences Research Laboratory

Completion: May 2018

Consolidating organic synthesis research functions ranging from new compound discovery to commercial process development
⇒ more efficient and speedier development of agrochemicals and household and public hygiene insecticides

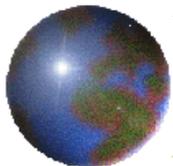


Latin America Research Center

New R&D Center

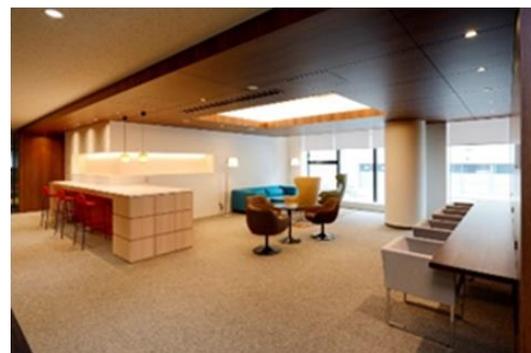
Completion: November 2016

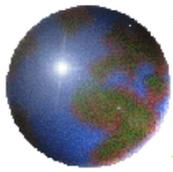




Opening of Chemistry Research Center (CRC) at Health & Crop Sciences Research Laboratory

- A global R&D base for the Health & Crop Science Sector.
- Integration of organic chemistry functions from discovery to process development to accelerate development of crop protection chemicals and household & public hygiene insecticides.
- Research environment where researchers can enjoy open communication and generate innovative ideas.

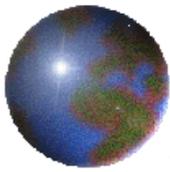




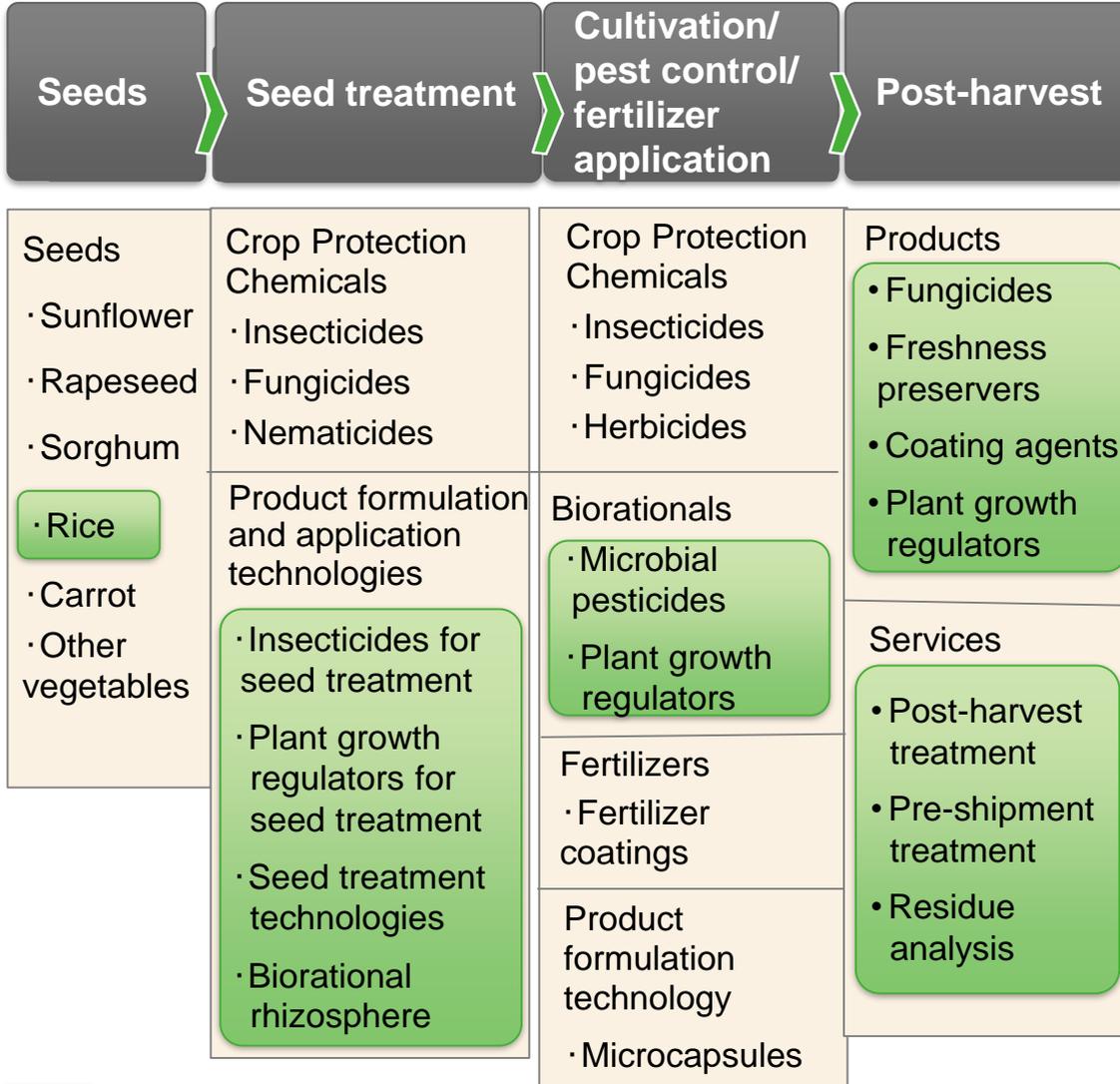
Opening of Biorational Research Center (BRC) at Valent BioSciences

- A global R&D base for Biorationals such as microbial pesticides, and plant growth regulators
- Broad range of R&D activities from basic to application and product development
- Enhanced alignment with marketing and sales team, and acceleration of product development



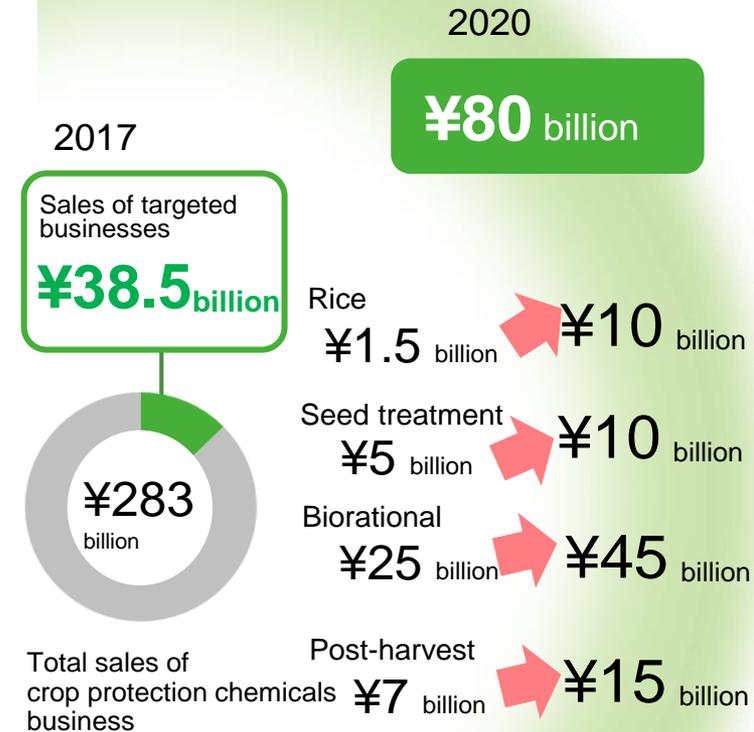


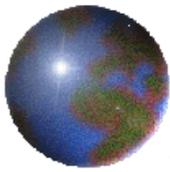
Expand the Scope of the AgroSolutions Businesses



 Targeted business areas for expansion

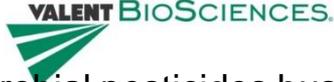
Expansion of targeted businesses





Expansion of Our Biorational Business

Business expansion through M&A



Purchased microbial pesticides business from Abbott laboratories
 ⇒ Established Valent Biosciences (VBC)



Purchased Mycorrhizal Applications



Signed a global licensing agreement and a development and commercialization cooperation agreement



Purchased Pace International (entered postharvest solution business)



KYOWA HAKKO BIO CO., LTD.

Purchased biorational business from Kyowa Hakko Bio



Market Size for Each Product

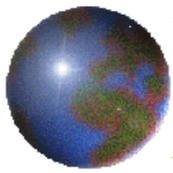
Built Valent Biosciences LLC, Osage Plant (Iowa)

Built Biorational Research Center



Expansion of biorational facilities

	Market size	VBC products
Microbial pesticides	For agricultural use: ¥50bil. Of which BT products: ¥20bil. For household and public hygiene: ¥11.7bil.	Dipel, Vectobac etc.
PGR	¥33 billion	AVG, GA3 ABA etc.
Biorational rhizosphere	¥28 billion	Mycorrhizal fungi, Nematicides etc.

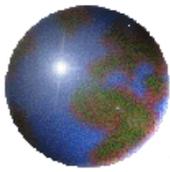


Acquisition and Development of New Biorational Products (1)

With the acquisition of Mycorrhizal Applications LLC, we acquired the technology related to growth promotion in soil and root.



Through long-term alliance with Rizobacter, expanded rhizobium technology (symbiotic bacteria that live in the roots of legume plants and provide nitrogen-fixing)



Acquisition and Development of New Biorational Products (2)

Actinovate® AG
BIOLOGICAL FUNGICIDE

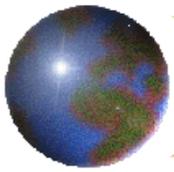


Developed and sell microbial nematode products through BioAg alliance programs

Expansion in Japanese Market

- Acquired plant growth regulator business from Kyowa Hakko Bio
- Inherited sales of gibberellin and forchlorfenuron products that have effects such as increasing the size of grapes and Asian pears and making grapes seedless





Expansion of the Value Chain



Market Size

US \$6 billion, growing 10% per year

Business

Provide crop protection chemicals for seed coating that improve crop yields (seed germination rates) and help make farm work more efficient

Initiatives to Expand Business Scope

- Agreement with Corteva Agriscience™ to collaborate on the development, registration and commercialization of seed-application technologies
- Plan to expand sales in North and South Americas and other areas

Market size

US \$400-500 million (as of 2013), growing 10% per year

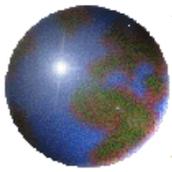
Business

Provide products and services that are used after harvest to help maintain the quality of crops

Initiative to Expand Business Scope

Acquired Pace International, a U.S. post-harvest solutions company, in December 2012

Expansion of Business Areas to Seed Treatment and Post-harvest



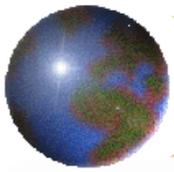
Collaboration with Corteva Agriscience™ on Seed Treatment Technologies

Background and Values of Collaboration with Corteva Agriscience™

November 2017: Agreement on global collaboration

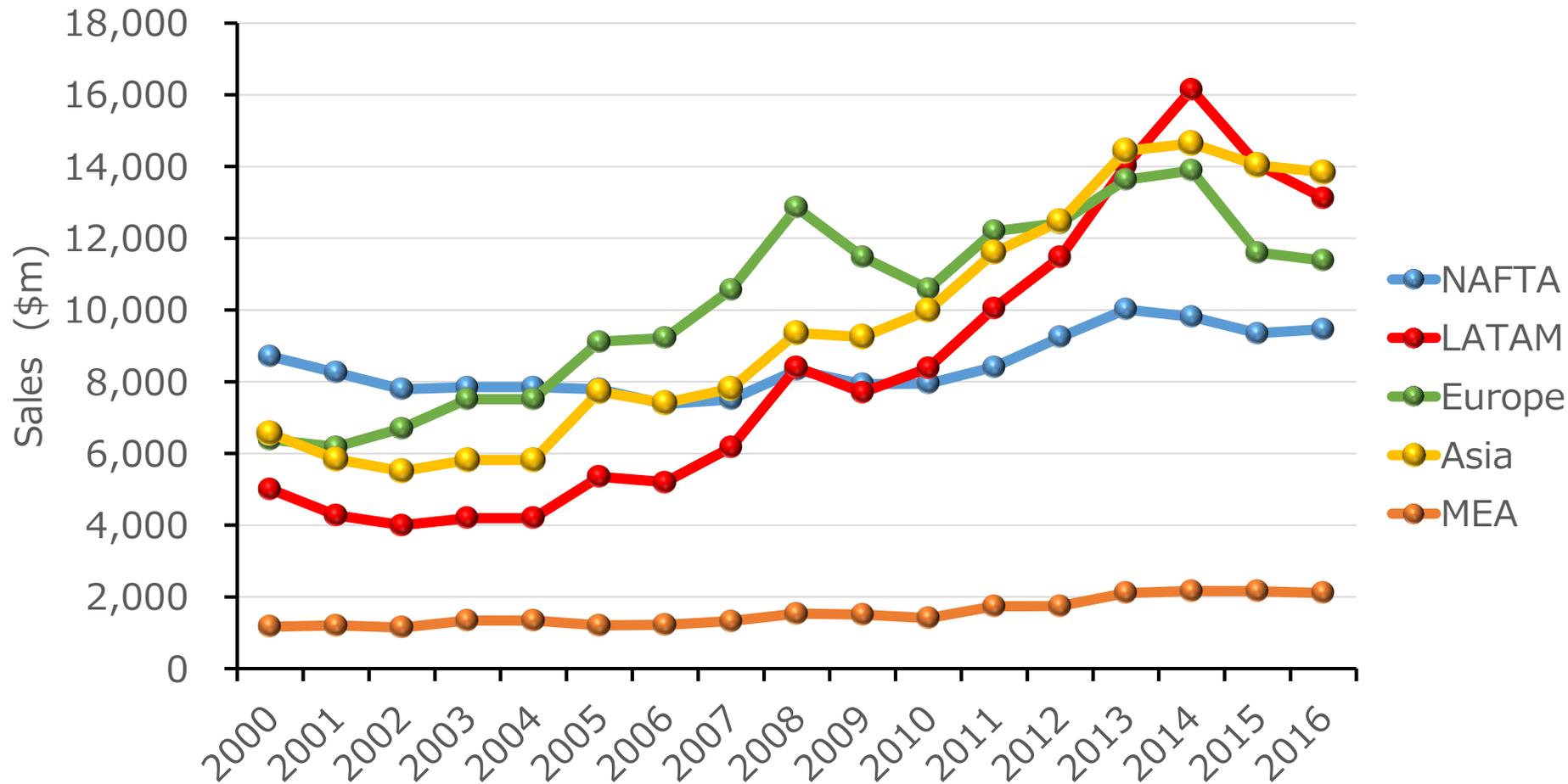


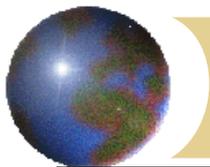
- Sumitomo Chemical entered the seed treatment business in North America in 2009
- Since then, Sumitomo Chemical have expanded both our target regions and product portfolio
- Through the collaboration with Corteva Agriscience™, we will accelerate the development and commercialization of advanced seed treatment technologies



Trends in the Crop Protection Market (by Region)

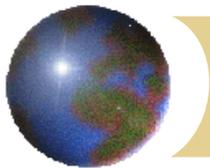
- Growth in the crop protection market (excluding non-crop uses) through 2014 was greatest in Latin America, on a dollar basis
- For the past 2-3 years, the crop protection market has shrunk, particularly in Latin America and Europe – possible recovery in 2018?





Global Footprint: Global Market Size and Sumitomo Chemical's Expansion

	Size of the Crop Protection Market (Millions of USD) and Percentage of the Global Total				Growth Rate (% per year)		Sumitomo Chemical's Global Footprint
	2017 (results)		2022 (forecast)		2017 /2012	2022 /2017	
1 Brazil	7,929	14%	8,521	13%	-3.1%	1.5%	
2 USA	7,868	14%	8,178	13%	3.6%	0.8%	○
3 China	5,975	11%	7,407	12%	1.4%	4.4%	
4 Japan	3,924	7%	3,362	5%	-5.6%	0.4%	○
5 Argentina	2,599	5%	2,974	5%	3.1%	2.7%	
6 India	2,417	4%	2,988	5%	6.7%	4.3%	○
7 France	2,320	4%	2,437	4%	-1.9%	1.0%	○
8 Germany	1,722	3%	1,861	3%	-1.2%	1.6%	
9 Australia	1,713	3%	1,818	3%	-1.3%	1.2%	○
10 Canada	1,709	3%	1,916	3%	0.4%	2.3%	
11 Russia	1,459	3%	1,958	3%	9.7%	6.1%	
12 Italy	1,132	2%	1,212	2%	1.4%	1.4%	○
13 Spain	1,046	2%	1,153	2%	5.4%	2.0%	○
14 Mexico	866	2%	1,038	2%	-2.4%	3.7%	○
15 Vietnam	729	1%	884	1%	5.5%	3.9%	○
16 UK	727	1%	757	1%	-1.7%	0.8%	
17 South Korea	698	1%	736	1%	1.1%	1.1%	
18 Poland	597	1%	712	1%	3.2%	3.6%	
TTL World	56,355		63,896		0.5%	2.5%	



Enhancement of Our Global Footprint

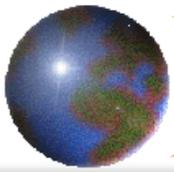
Established direct sales channels in prioritized countries

Strengthened sales channels through alliances with other companies

To date Initiatives

U.S. (2 nd)	Valent	1998	<ul style="list-style-type: none">▪ Investment in Nufarm (2010, 20%)▪ Alliances with major agrochemicals companies<ul style="list-style-type: none">- Flumioxazin (Bayer)- Chlotianidin (Corteva Agriscience™) etc.
Spain (13 th)	Kenogard	1992	
France (7 th)	Philagro	1993	
Italy (12 th)	SC Italia	2011	
India (6 th)	SC India, Excel Crop Care	2011/ 2016	





Share Acquisition in an Indian Agrochemical Company (Excel Crop Care Ltd.)

Share Acquisition Details

Acquired 65% of the shares of Excel Crop Care Ltd. (ECC), an Indian agrochemical company, and converted it to a consolidated subsidiary (October 2016)

Synergy Effects

- ◆ Improve agrochemical market share in India, where the market continues to grow (growing approx. 6% per annum, 6th largest market in the world)
- ◆ Developing mixtures with Sumitomo Chemical products, utilizing ECC's high brand recognition

Excel Crop Care Profile

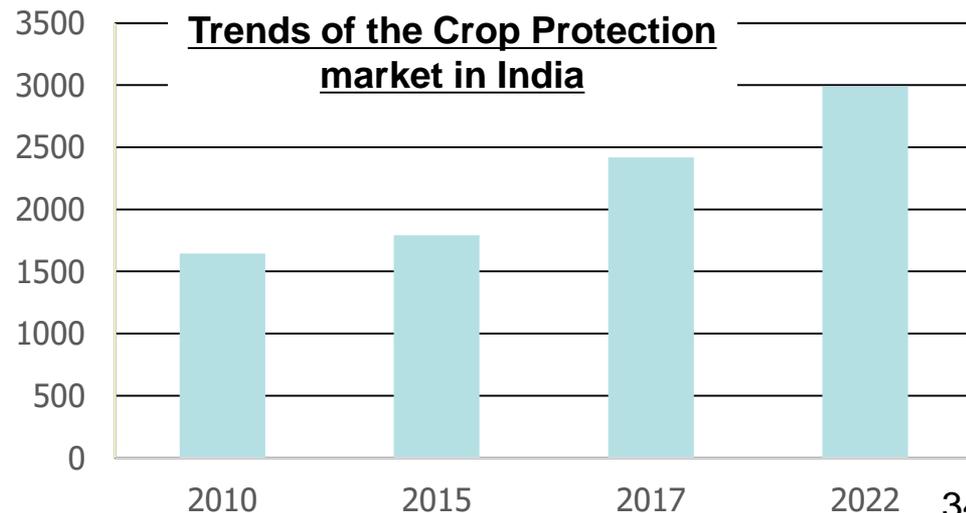
Headquarters: Mumbai, Maharashtra, India

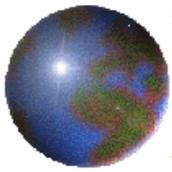
Established: 2003 (Founded in 1941)

Sales revenue: INR 10.1 billion (approx. ¥19 billion, 5th largest in India)

Business: Development, manufacture and sale of agrochemicals

\$M

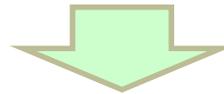




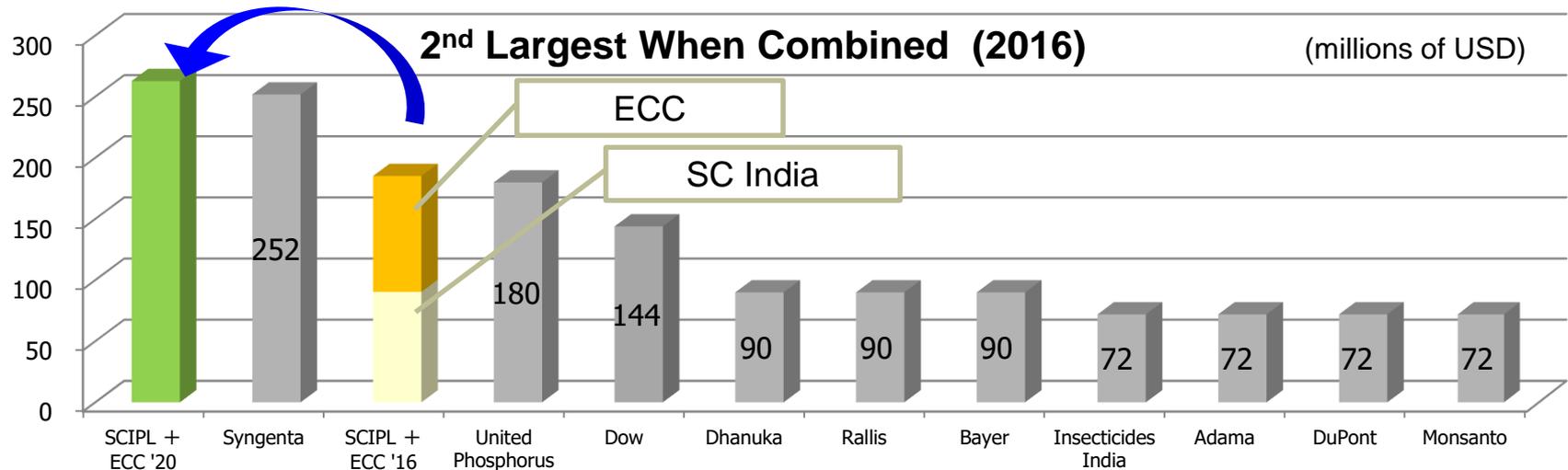
For the Growth of Our AgroSolutions Business in India

Oct. 2016: Converted ECC to a consolidated subsidiary

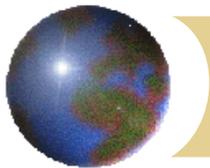
Aug. 2018: Decided a merger between ECC and SC India (SCIPL)



Aiming to be the largest player in the Indian crop protection market through future growth



(Source: Phillips McDougalls)



Strengthening the Alliance with Nufarm

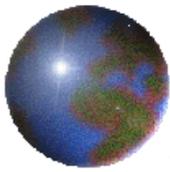


Pursuing Sales Synergies

- Distribution of products through each other's sales channels in 31 countries including Europe, North, Central and South America
- Agreed to extend business alliance contract in the turf and ornamental field in the US (through 2023)
- Agreed to collaboration on sales of new fungicides in Europe

Research and Development, Manufacturing etc.

- Launch and distribution of mixtures of Sumitomo Chemical and Nufarm products
- Promotion of joint R&D in the field of new treatments
- Promotion of collaboration in other fields, such as outsourcing formulation



Development of Differentiated Businesses – Environmental Health Business

Development and Global Expansion of New Products

Household insecticides

Public hygiene insecticides

**Botanical products
(pyrethrum, etc.)**

Sprays, bait, mosquito nets

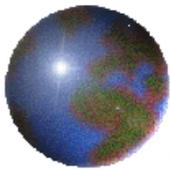
Consumer products
(Outdoor insect repellent, etc.)

**Development of unique
formulations and devices**

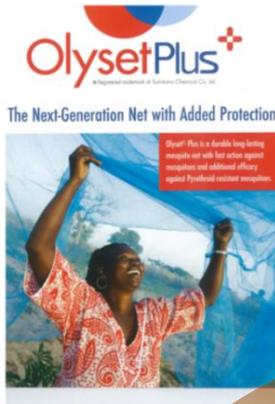
**Shared technology platform and
synergy with Ag-related business**

Biorationals

Crop protection chemicals



Integrated Vector Management



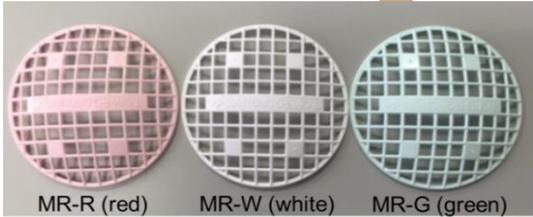
Long-lasting Insecticidal Nets
Olyset Net
Olyset Plus



Indoor Residual Spray
SumiShield

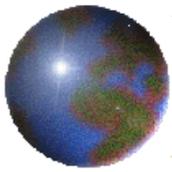
- **Contributing to the elimination of diseases such as malaria, dengue fever, West Nile, and Zika**
- Broad technology portfolio “Chemical, Biorational, Botanical”
- Offering integrated products and solutions

Larvicide
Biorationals
SLV0.5G, 2MR



Space Spray, Misting
Botanicals
SumiPro





Development of New Products in the Environmental Health Business

Launch year

2019~2021

2022~2024

2025~

Household



- 2 new devices

- 2 new devices

Public hygiene



- Cockroach bait
- Ant bait
- Fly bait
- Surface sprays
- Space sprays

- Products for resistant pests
- Bed bug products
- Outdoor repellent products
- Products for food factories
- Vector control products

- Next-generation pipeline: 4 projects

Botanicals

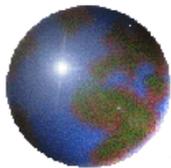


- Botanical insecticides

- Botanical insecticides – new uses

- Next-generation botanicals

Business Potential: approx. ¥100-150 billions



Growth Strategy of the AgroSolutions and Environmental Health Business - Conclusion -

Research and Development

- Commercialization of pipeline products
- Developing next-generation pipelines
- Effective operation of global research and development facilities

Expanding Business Areas

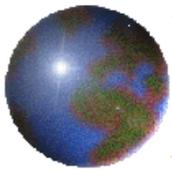
- Further expansion of our biorational business
- Expanded value chain for products such as seed treatments and post-harvest

Promoting Global Expansion

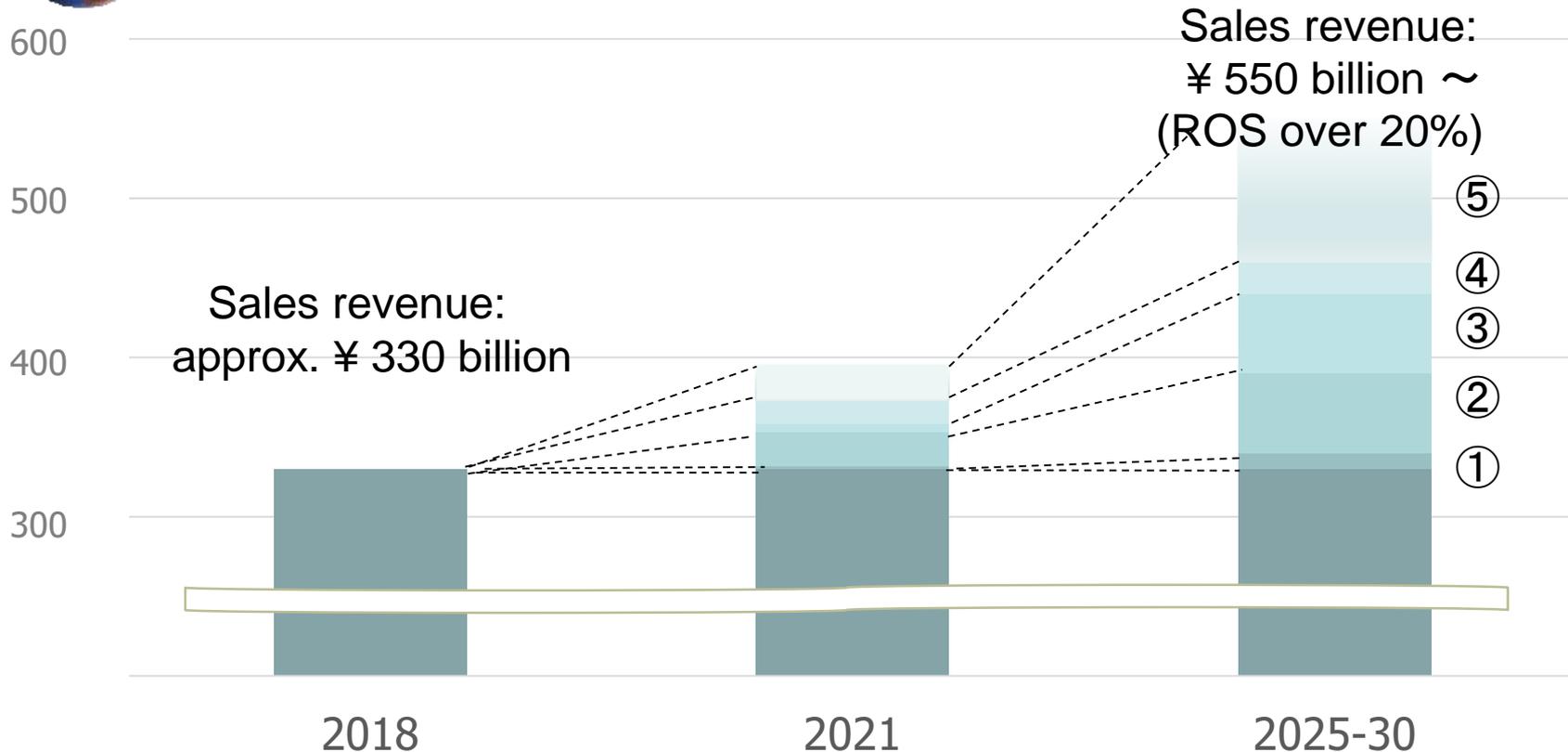
- Expansion of our global footprint
- Strategic M&A and licensing-in
- Strengthening alliances with major agrochemical companies

Developing Differentiated Businesses

- Expansion of rice business
- Expansion of Environmental Health Business



Future Size of the AgroSolutions and Environmental Health Business



- ① Sales expansion of existing products (PLCM)
- ② Expanding business areas
- ③ Launch and sales expansion of new products
- ④ Expanding business in India
- ⑤ M&A (companies/products)

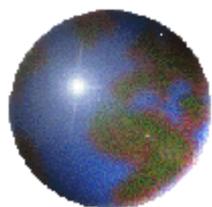
Creative Hybrid Chemistry



Cautionary Statement

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The important factors that could cause actual results to differ materially from those discussed in the forward-looking statements include, but are not limited to, general economic conditions in Sumitomo Chemical's markets; demand for, and competitive pricing pressure on, Sumitomo Chemical's products in the marketplace; Sumitomo Chemical's ability to continue to win acceptance for its products in these highly competitive markets; and movements of currency exchange rates.

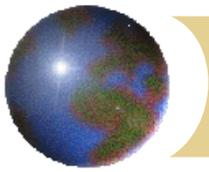


Business Strategy of the Health & Crop Sciences Sector

*Basic Information
about the Crop Protection Business*

 **SUMITOMO CHEMICAL**

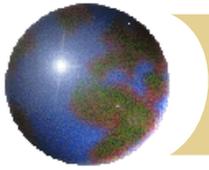
October 11, 2018



Basic Information

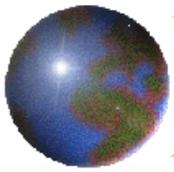
about the Crop Protection Business

- (1) Growth Rate by Region and Market Segment**
- (2) Product Development Process**
- (3) Regulatory Trends, Patents and Data Protection**
- (4) Status of Competitors**



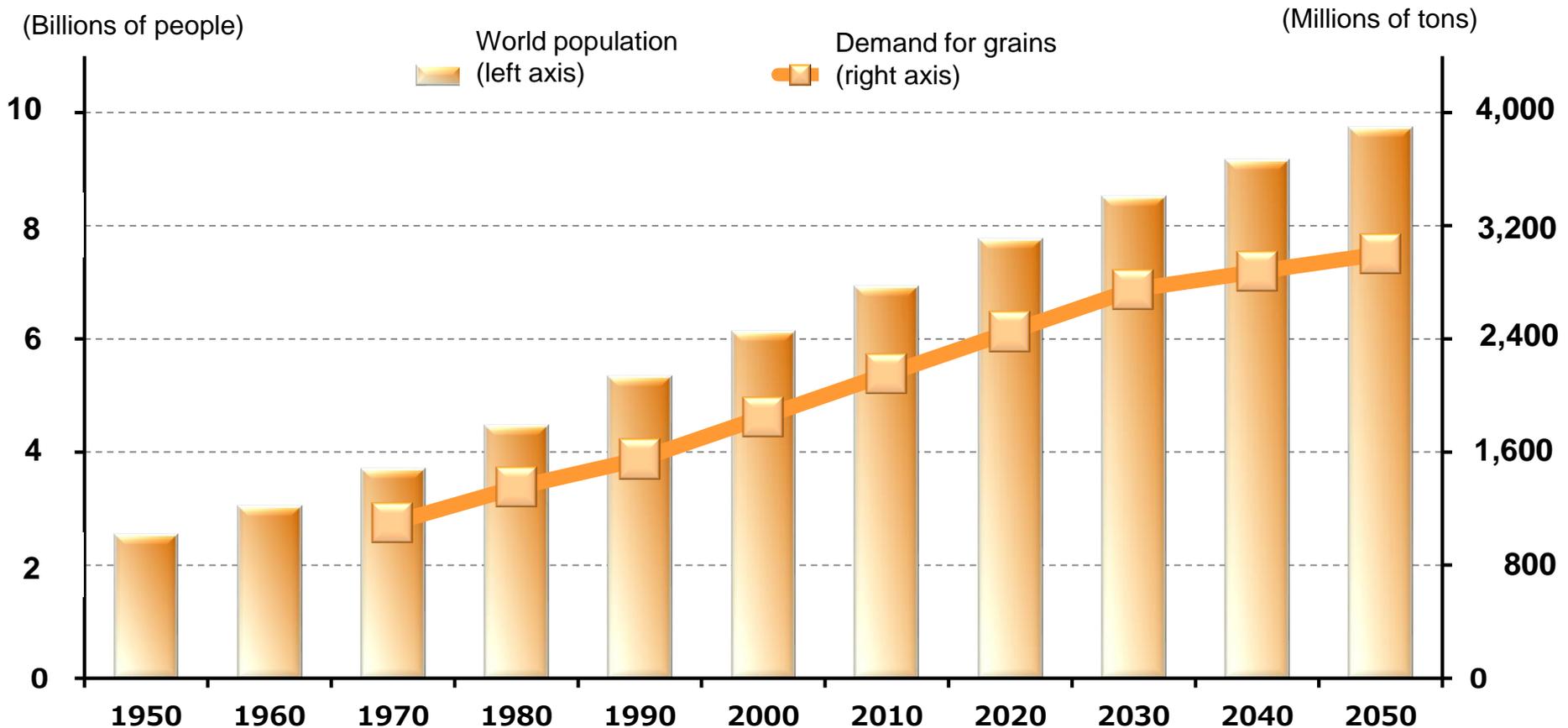
Basic Information about the Crop Protection Business

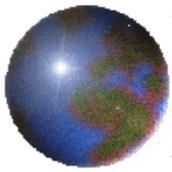
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World Population and Demand for Grain

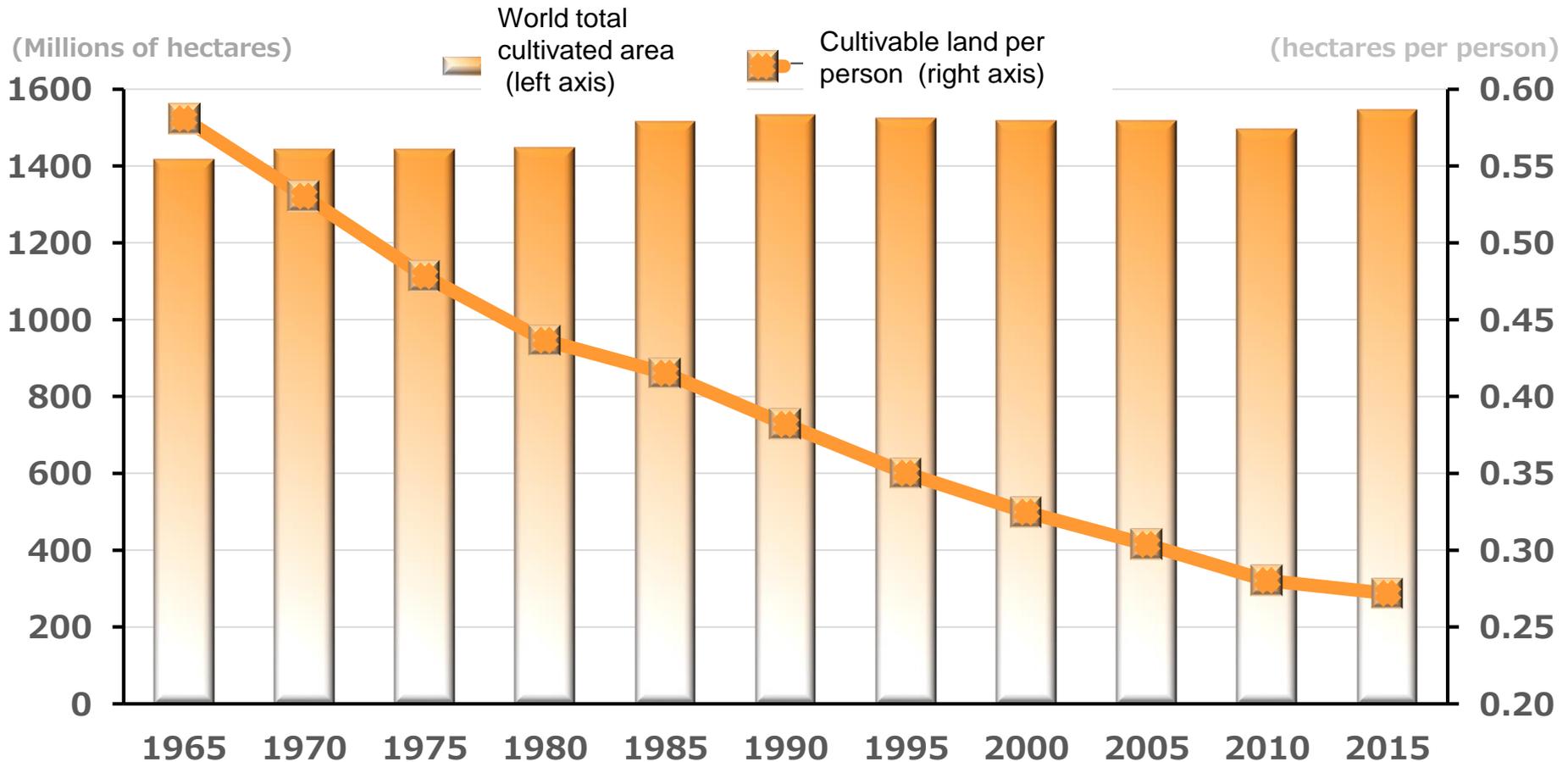
- The world population is expected to grow from the current 7.6 billion to 9.8 billion by 2050.
- Demand for grain is expected to increase by a factor of 2.2 from 1970 to 2.5 billion tons in 2020.

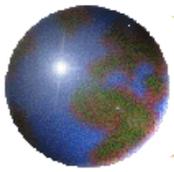




World Total Cultivated Area and Cultivated Area per Person

- The world's cultivated area has barely increased.
- Cultivated area per person has continued to decrease due to population growth

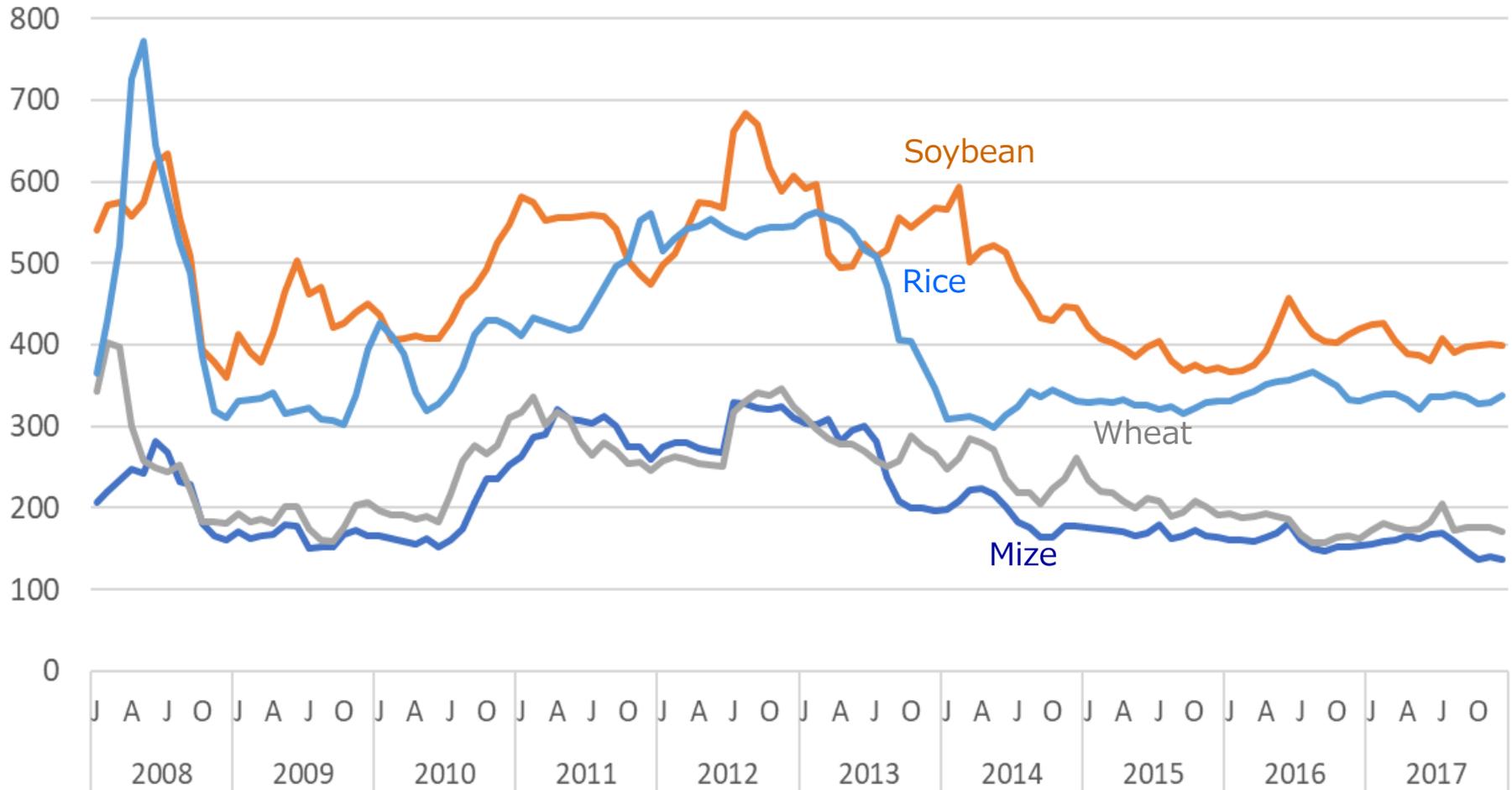


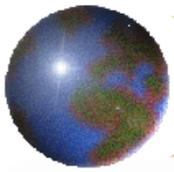


Grain Prices (2008~2017)

◆ Grain prices have been trending down since 2013

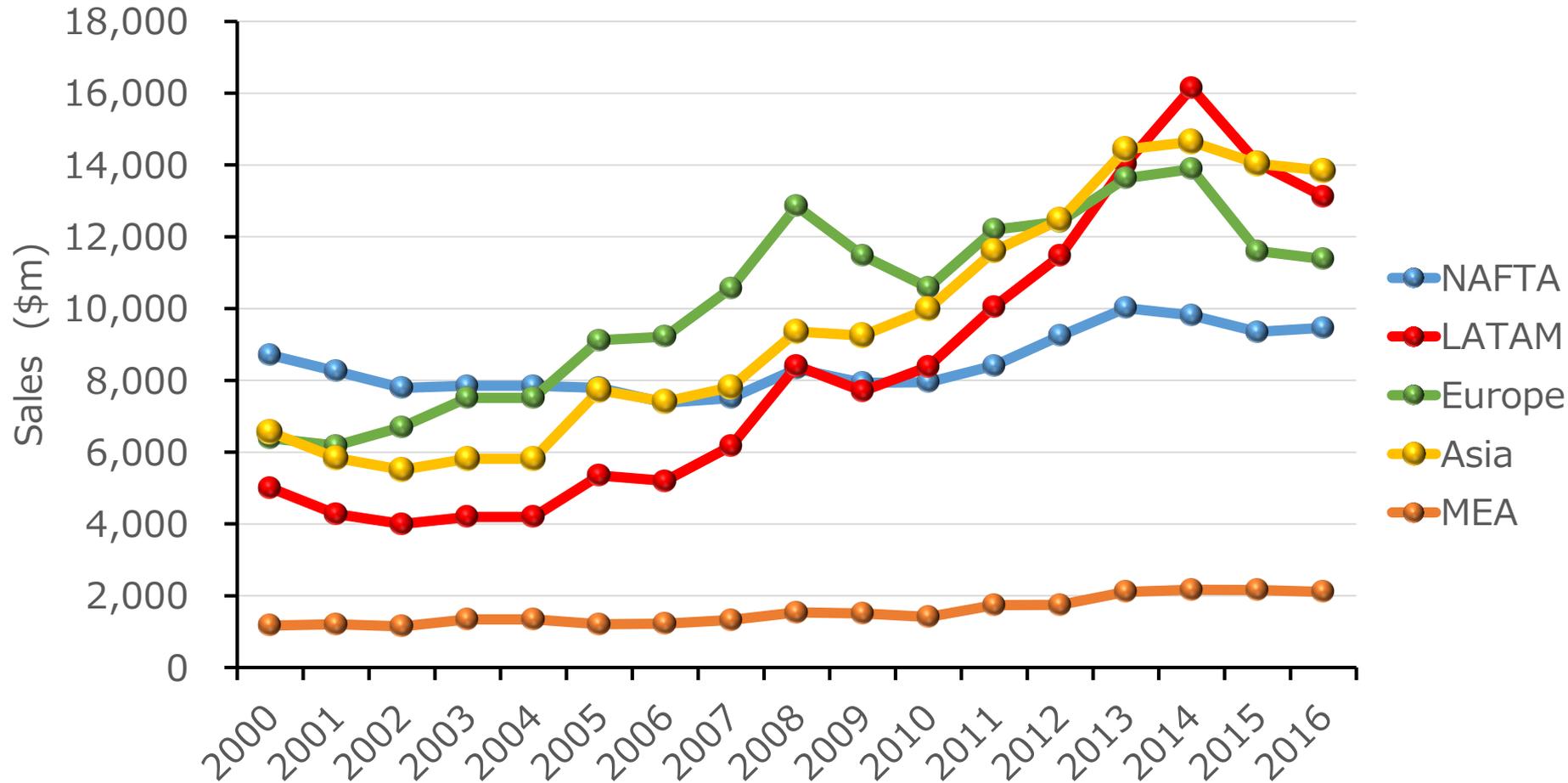
(Prices rose in 2008 due to speculative investment in grain due to the increase in oil prices)





Trends in the Crop Protection Market (by Region)

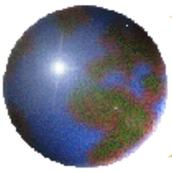
- Growth in the crop protection market (excluding non-crop uses) through 2014 was greatest in Latin America, on a dollar basis
- For the past 2-3 years, the crop protection market has shrunk, particularly in Latin America and Europe – possible recovery in 2018?



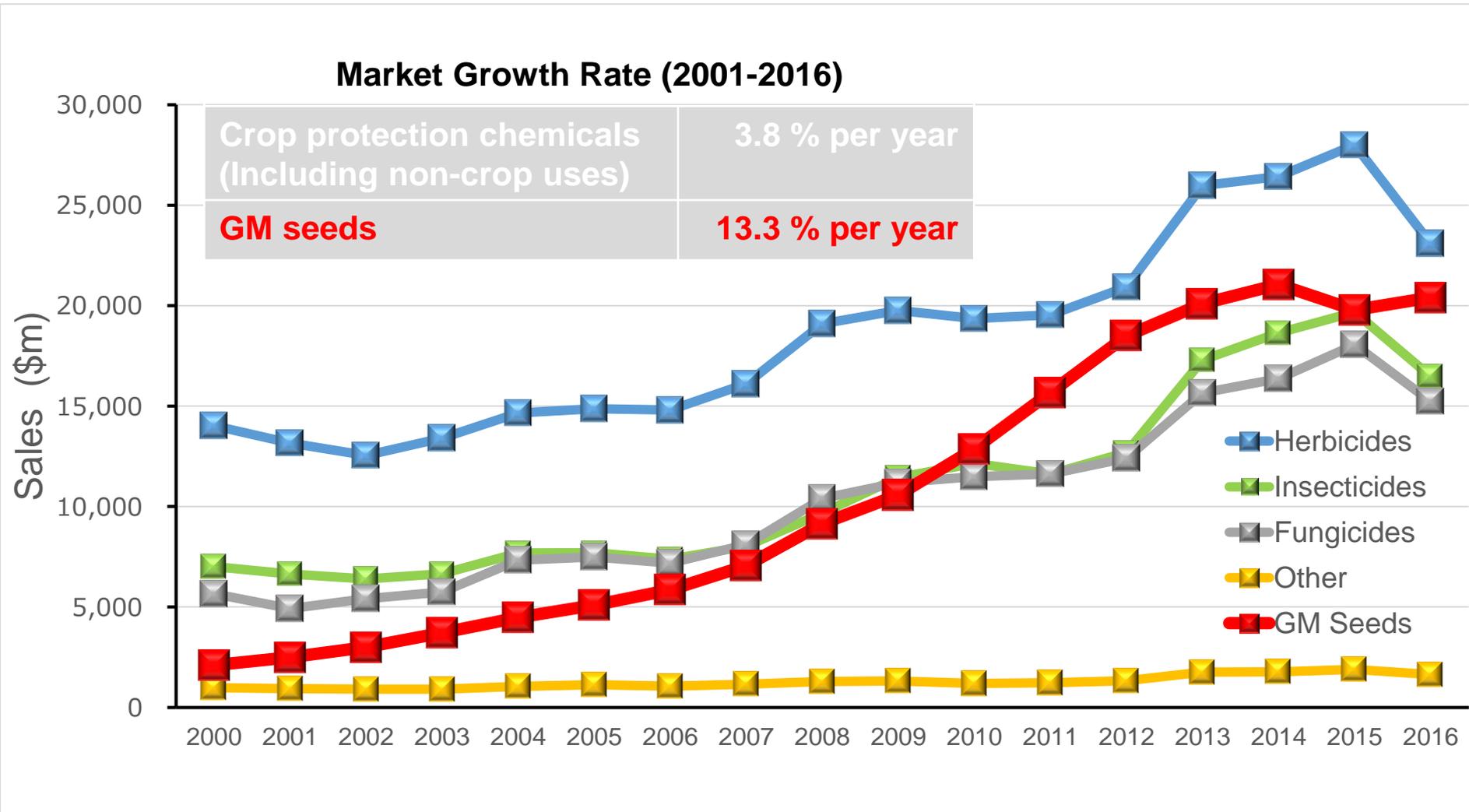


Size of Crop Protection Market by Country

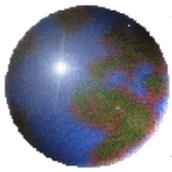
	Size of Crop Protection Market (Millions of USD) and Percentage of the Global Total				Growth Rate (% per year)	
	2017 Results		2022 Forecast		2017 /2012	2022 /2017
1 Brazil	7,929	14%	8,521	13%	-3.1%	1.5%
2 USA	7,868	14%	8,178	13%	3.6%	0.8%
3 China	5,975	11%	7,407	12%	1.4%	4.4%
4 Japan	3,924	7%	3,362	5%	-5.6%	0.4%
5 Argentina	2,599	5%	2,974	5%	3.1%	2.7%
6 India	2,417	4%	2,988	5%	6.7%	4.3%
7 France	2,320	4%	2,437	4%	-1.9%	1.0%
8 Germany	1,722	3%	1,861	3%	-1.2%	1.6%
9 Australia	1,713	3%	1,818	3%	-1.3%	1.2%
10 Canada	1,709	3%	1,916	3%	0.4%	2.3%
11 Russia	1,459	3%	1,958	3%	9.7%	6.1%
12 Italy	1,132	2%	1,212	2%	1.4%	1.4%
13 Spain	1,046	2%	1,153	2%	5.4%	2.0%
14 Mexico	866	2%	1,038	2%	-2.4%	3.7%
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18 Poland	597	1%	712	1%	3.2%	3.6%
TTL World	56,355		63,896		0.5%	2.5%



Expansion of the GM Seed Market

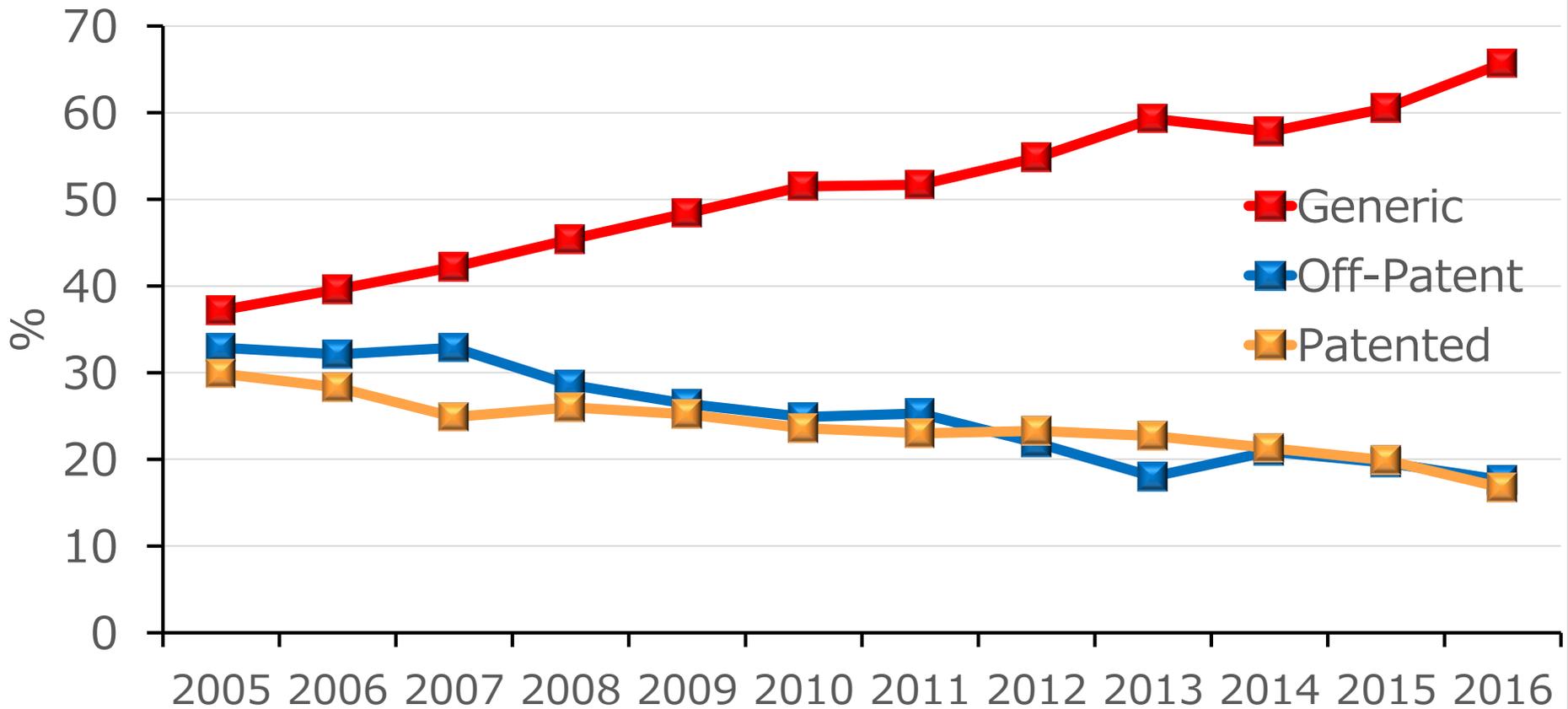


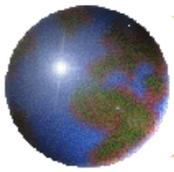
Source: Phillips McDougall, AgriService 2016 Industry Overview (2017)



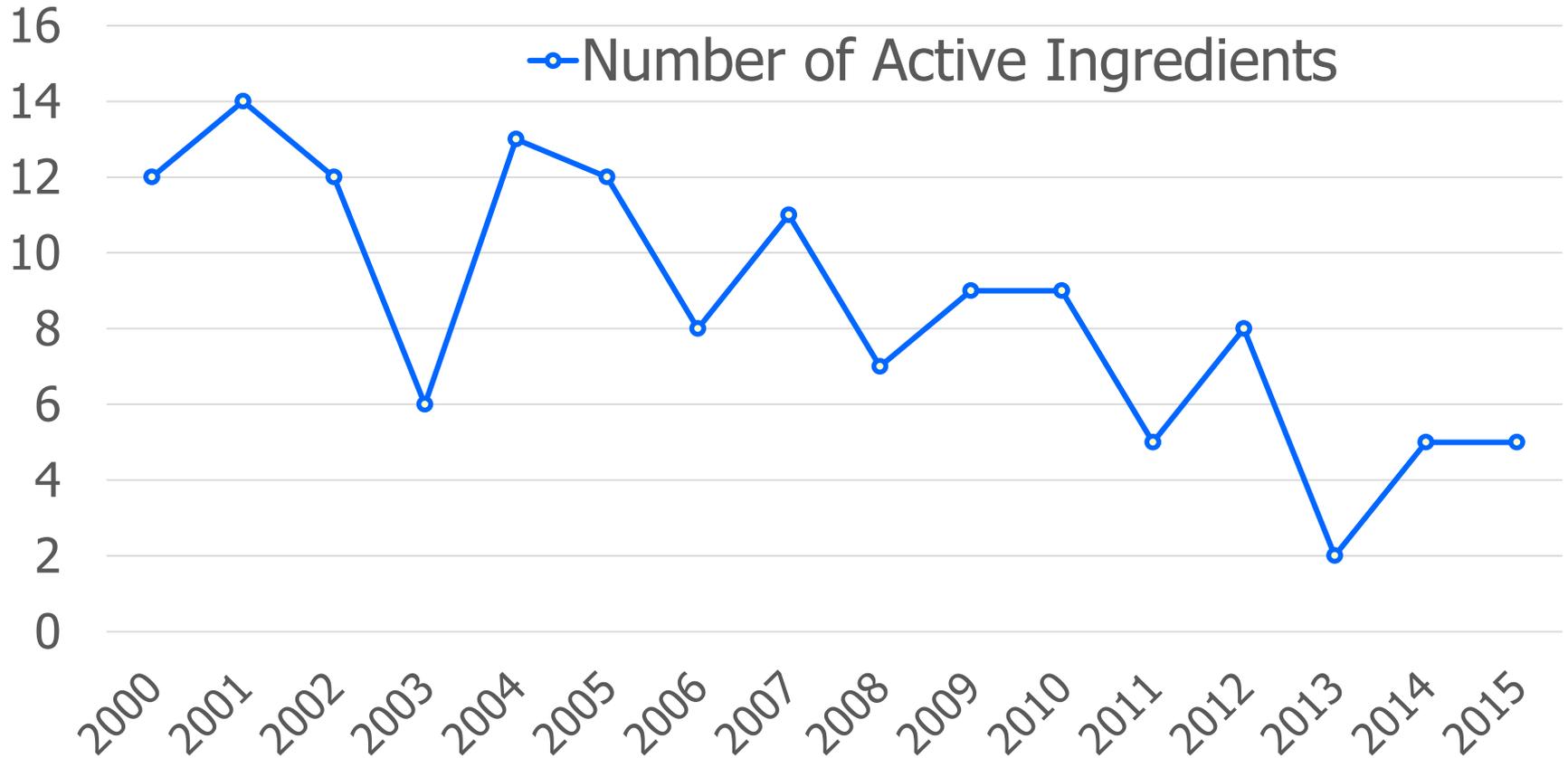
Expansion of the Generic Crop protection Market

- The market share of generic crop protection chemicals continues to expand (“Generic” is defined as off-patent crop protection chemicals, the market share of the companies that had active ingredient patents is less than 90% of crop protection chemicals)

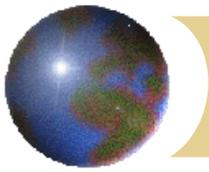




Decrease in New Active Ingredients for Crop protection

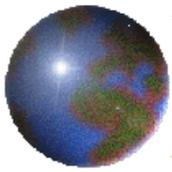


Since 2000, the number of new active ingredients entering the market has gradually fallen

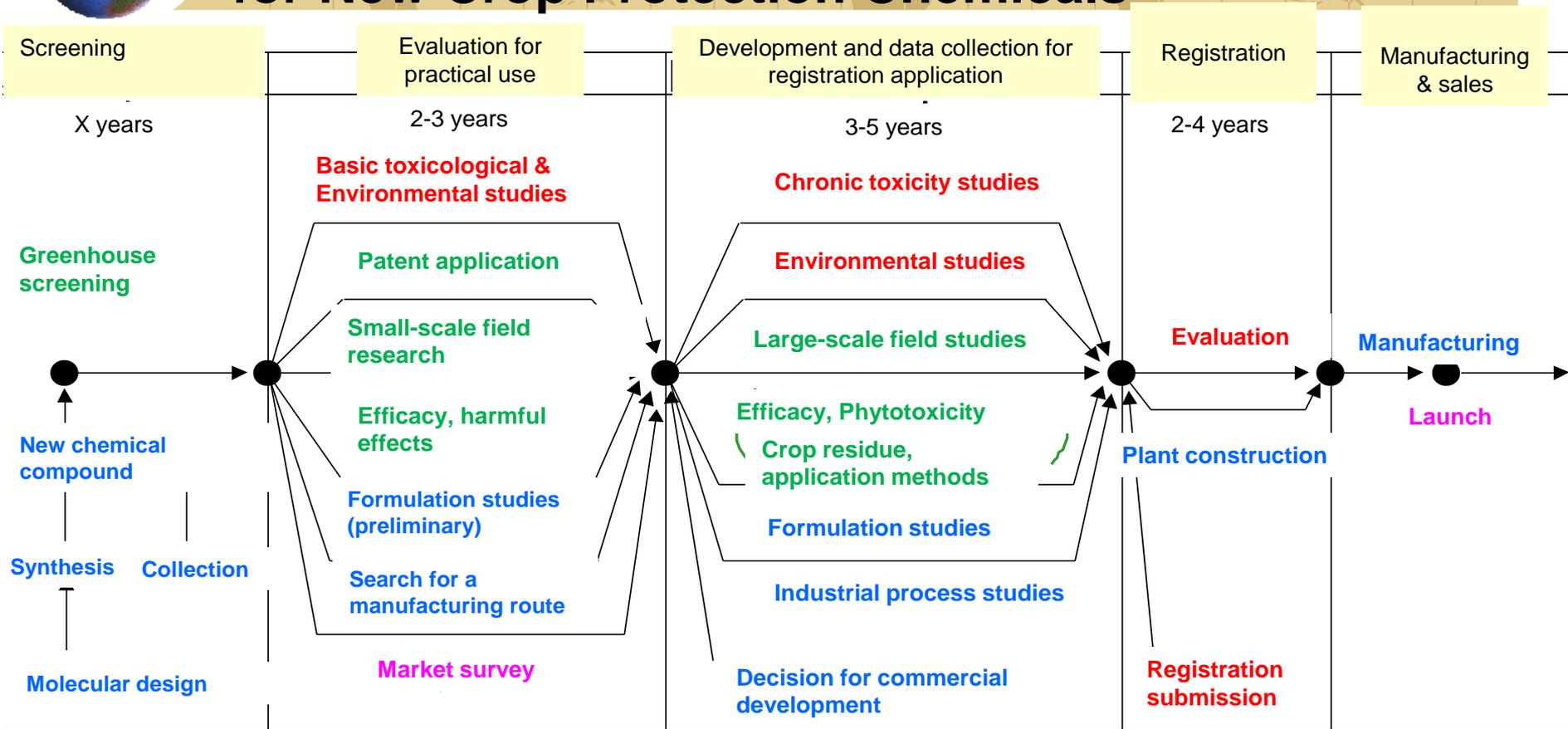


Basic Information about the Crop Protection Business

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- (3) Regulatory Trends, Patents and Data Protection
- (4) Status of Competitors

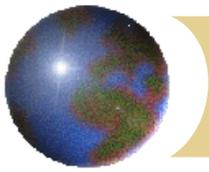


Development Process for New Crop Protection Chemicals



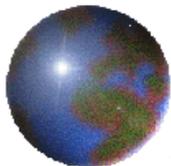
Data collection for registration application
1 billion yen (Japan) – 1.5 billion yen (US, Europe)

Development Expenses: 10~30 billion yen (1 of every 100,000~ chemical compounds)
Development Time: More than 10 years



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Global Trends in Pesticide Regulation (1)

Europe

Strict crop protection chemical regulation (Regulation 1107/2009, Effective in June 2011)

- Cancellations of registration due to hazard-based cut-off criteria
- Decrease in number of registered products, Strong tendency toward safer agrochemicals

Renewal of registration (Since 2010)

- Political decision-making through voting by various countries, rather than scientific evaluations (e.g. glyphosate)
- Frequent proposals from EU committees for non-approval or the loss of existing product registration as part of an anti-pesticide trend

Bee/Pollinator issue (Apr. 2018: Ban of outdoor use of neonicotinoids)

- Unrealistic evaluations using not-authorized EFSA guidelines
- Political attack organized by anti-pesticide NGOs

Endocrine disrupter evaluation (Beginning Nov. 2018)

- Concerns over cancellations and reduction of registrations due to additional cut-off criteria

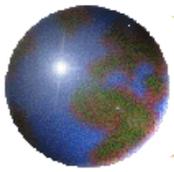
Japan

Revisions to the Agricultural Chemicals Control Act (June 2018) and implementation of a reevaluation system (beginning 2021)

- Increased expenses due to additional crop residue tests, possibility of reduction of registrations
- Promotion of the registration of generics through equivalency of technical in agricultural chemicals

Implementation of worker exposure evaluations and expansion of ecological risk assessments

- Increased expenses and possibility of cancellation or reduction of registrations due to additional registration standards



Global Trends in Pesticide Regulation (2)

U.S.

Reregistration (Registration Review, since 2007)

- Data call-ins based on new data requirements (including nervous/immune system toxicity, ecotoxicology and environmental fate)

Registration cancellation and use restrictions due to NGO pressure

- Pressure on EPA policy-making due to NGO lawsuits and public comments
- Increase in lawsuits based on laws such as the Endangered Species Act

Bee/pollinator issue

- Requirement for a large amount of data, mainly on neonicotinoids
- EPA policies not accepting expanded applications of neonicotinoids until reregistration is complete

Changes in trends under Trump (since 2017)

- Expectation of flexible and realistic regulations from an industry perspective
- Concerns of delays in evaluation and reductions of evaluation capabilities due to reductions in EPA personnel and budget

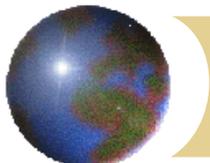
Brazil

New draft regulations published for consultation (2018 Ministry of Health ANVISA Public Consultation)

- Proposed implementation of cut-off criteria stricter than in Europe
- Clarity about direction after the presidential election (October 7, 2018)?

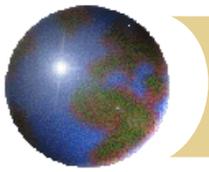
Inefficient registration and approval system

- Long evaluation periods due to bureaucratic, compartmentalized authority and lack of resources (5-6 years needed for approval)
- Significant backlog of evaluations



Patents and Data Protection

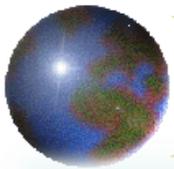
	EU	US	Japan
Patent Lifespan	20 years from date of application	20 years from date of application	20 years from date of application
Regulations Governing Crop Protection Chemicals	Regulation 1107/2009	Federal Insecticide, Fungicide, and Rodenticide Act (FIFRA)	Agricultural Chemicals Regulation Act
Data Protection Period (Excluding CBI)	10 years from registration However, low risk chemicals are 13 years. Measures for extending minor crop registrations by 2 years	10 years from registration However, there are measures for extending minor crop registrations by 3 years. Data compensation system: Appropriate compensation is required for data after the protection period has ended, but less than 15 years from submission.	15 years from registration Requirements in equivalency of active ingredient materials used for toxicity tests
Reevaluation System	In general: 10 years Low risk chemicals: 15 years Candidate replacement chemicals: 7 years	In general: 15 years (Advance publication of required supplemental data and evaluation schedule)	In general: 15 years
Chemical Equivalence	Meaningful impurities: over 0.1% However, relevant impurities with toxicity concerns are subject to equivalency even if less than 0.1%	Unpublished	Meaningful impurities: over 0.1%. However, relevant impurities with toxicity concerns are subject to equivalency even if less than 0.1%



Basic Information

about the Crop Protection Business

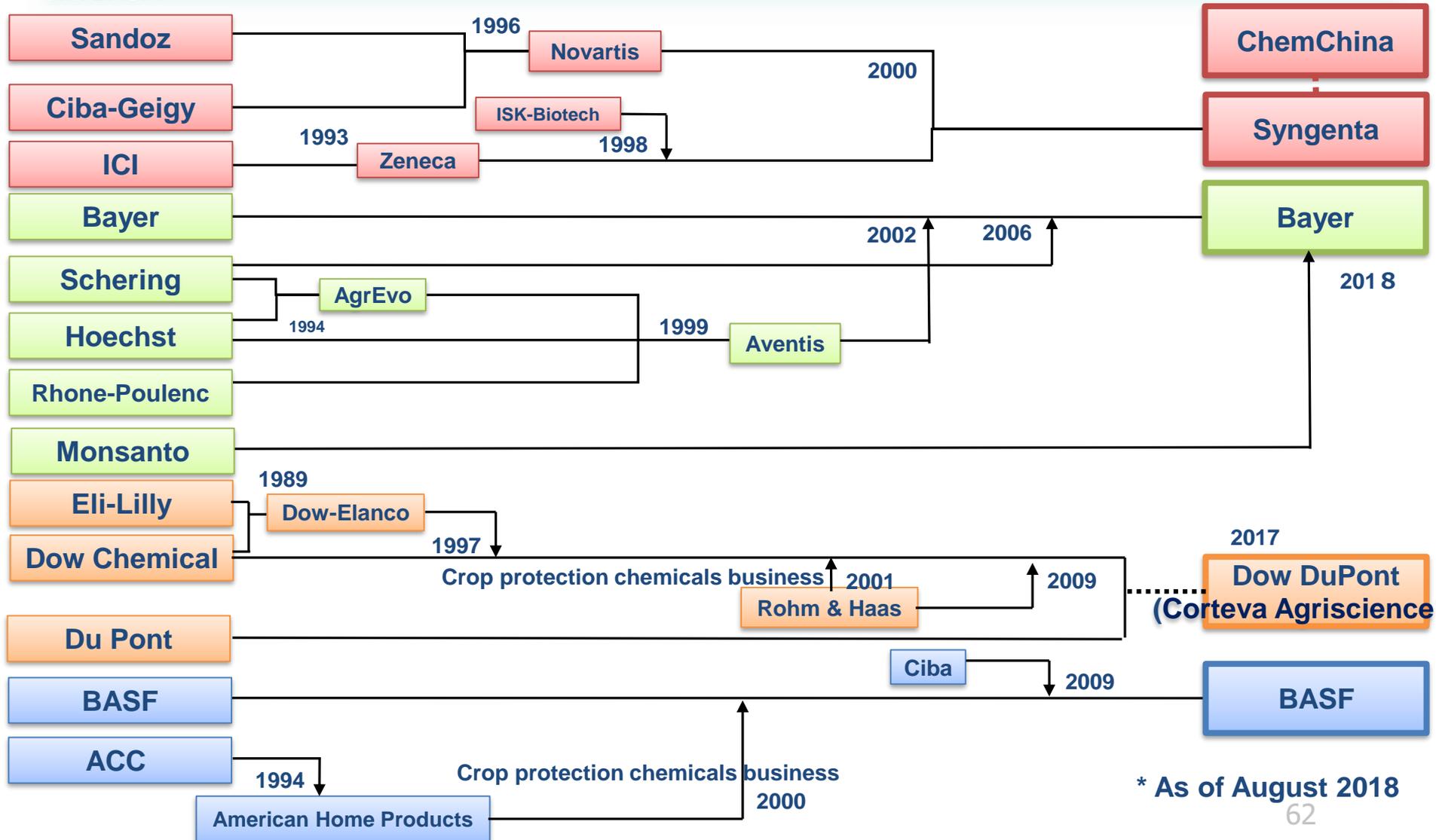
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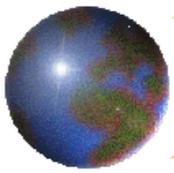
Consolidation of major Agchem companies

By 2009, 13 major US and European Agrochemical companies had consolidated down to 6 companies Agro.

Since 2017, the 6 companies had reorganized as the 4 companies of Bayer, Dow DuPont (Corteva Agriscience™), Syngenta, and BASF.



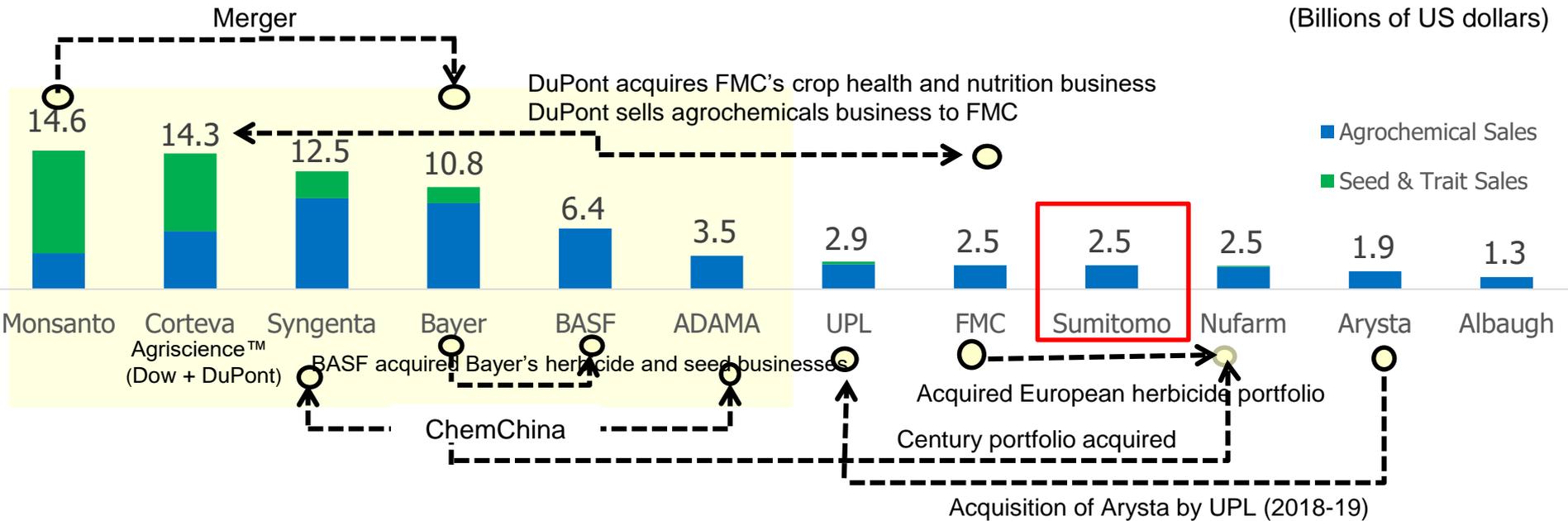
* As of August 2018



Crop Protection Products Sales by Major Agchem Companies

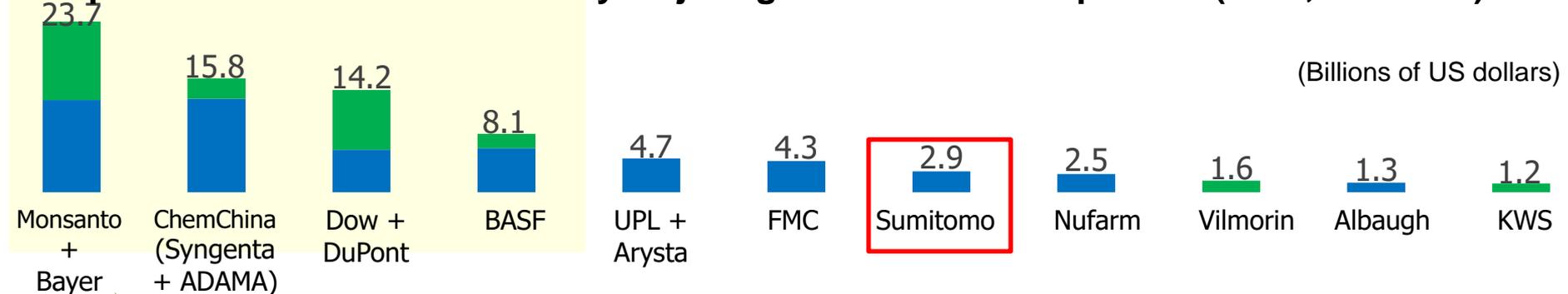
Crop Protection Products Sales by Major Agrochemical Companies (2017)

(Billions of US dollars)



Crop Protection Products Sales by Major Agrochemicals Companies (2018, Estimate)

(Billions of US dollars)



➔ Disparity in scale growing further due to industry reorganization

(Source) 2017: AgbioCrop, 2018, Estimate: GRESHAM, SC's numbers are internal estimates

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