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Booth No. A18

Crop Protection Market & Trends - APAC

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CAC Asia 2016
第五届亚太农用化学品峰会及展览会
5th CAC Asia Summit

Your gateway to the Asia Agrochemical market

12-13,Dec. 2016 Thailand - Bangkok

Agenda

1. CURRENT MARKET SIZE & TRENDS

2. FACTORS AFFECTING THE MARKET – *longer term*

- Industry related
- Market related
- Regulatory related
- Technology related
- External factors

3. FUTURE PROSPECTS

1. CURRENT MARKET SIZE & TRENDS

Data is presented in nominal terms

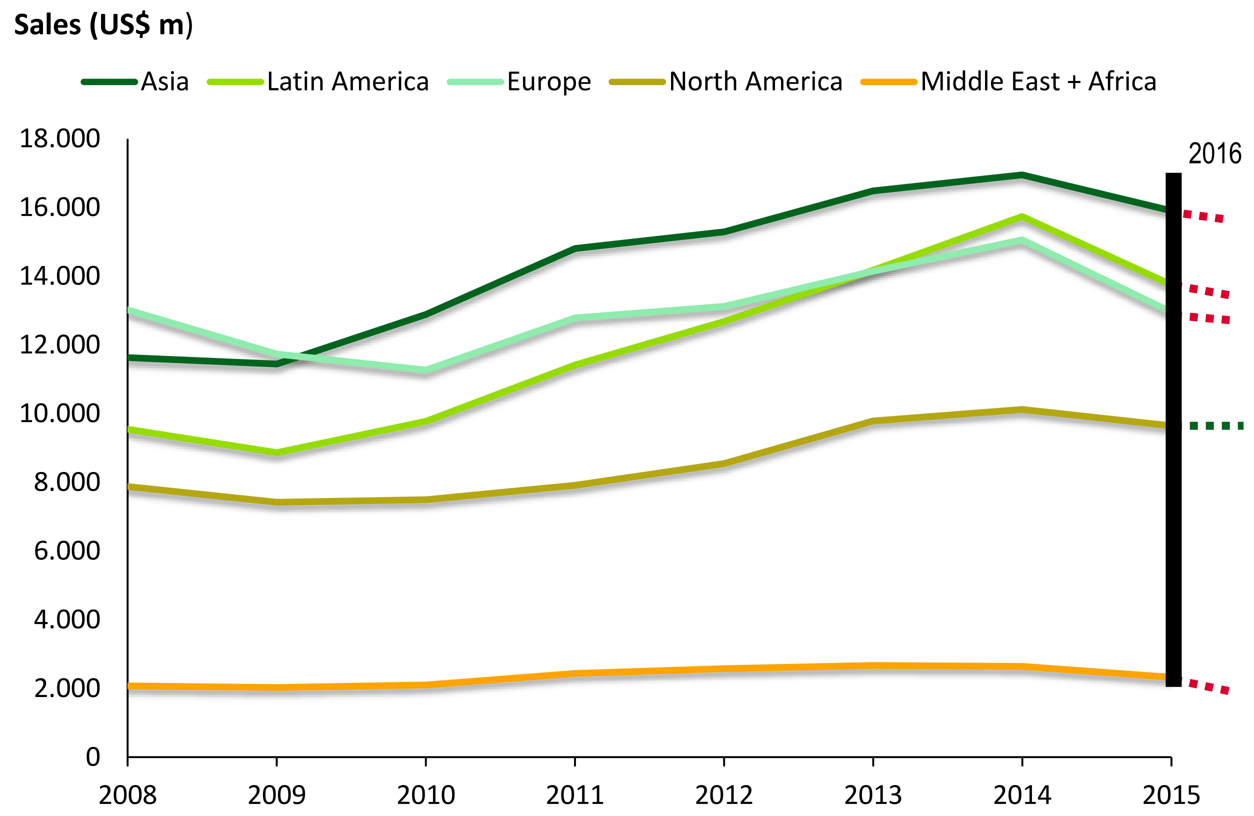
Pesticides - Market trends over time
(ex-manufacturer sales (US$) level using average year exchange)

Year	Crop Protection Sales (US$m)	Non Crop Pesticides (US$m)	Total Pesticides (US$m)	CP p.a (%)	Non Crop p.a (%)
2008	44,135	5,076	49,211		
2009	41,480	4,812	46,292	-6.02%	-5.20%
2010	43,520	5,135	48,655	4.92%	6.73%
2011	49,355	5,676	55,031	13.41%	10.52%
2012	52,220	5,953	58,173	5.80%	4.88%
2013	57,250	6,197	63,447	9.63%	4.09%
2014	60,515	6,441	66,956	5.70%	3.94%
2015	54,575	6,050	60,625	-9.81%	-6.06%

Market Performance over time
Facts & Figures

Data is presented in nominal terms

Regional Crop Protection Market over time
(ex-manufacturer level using average year exchange rates)



Market Performance over time

Facts & Figures - sales of the top ten leading markets

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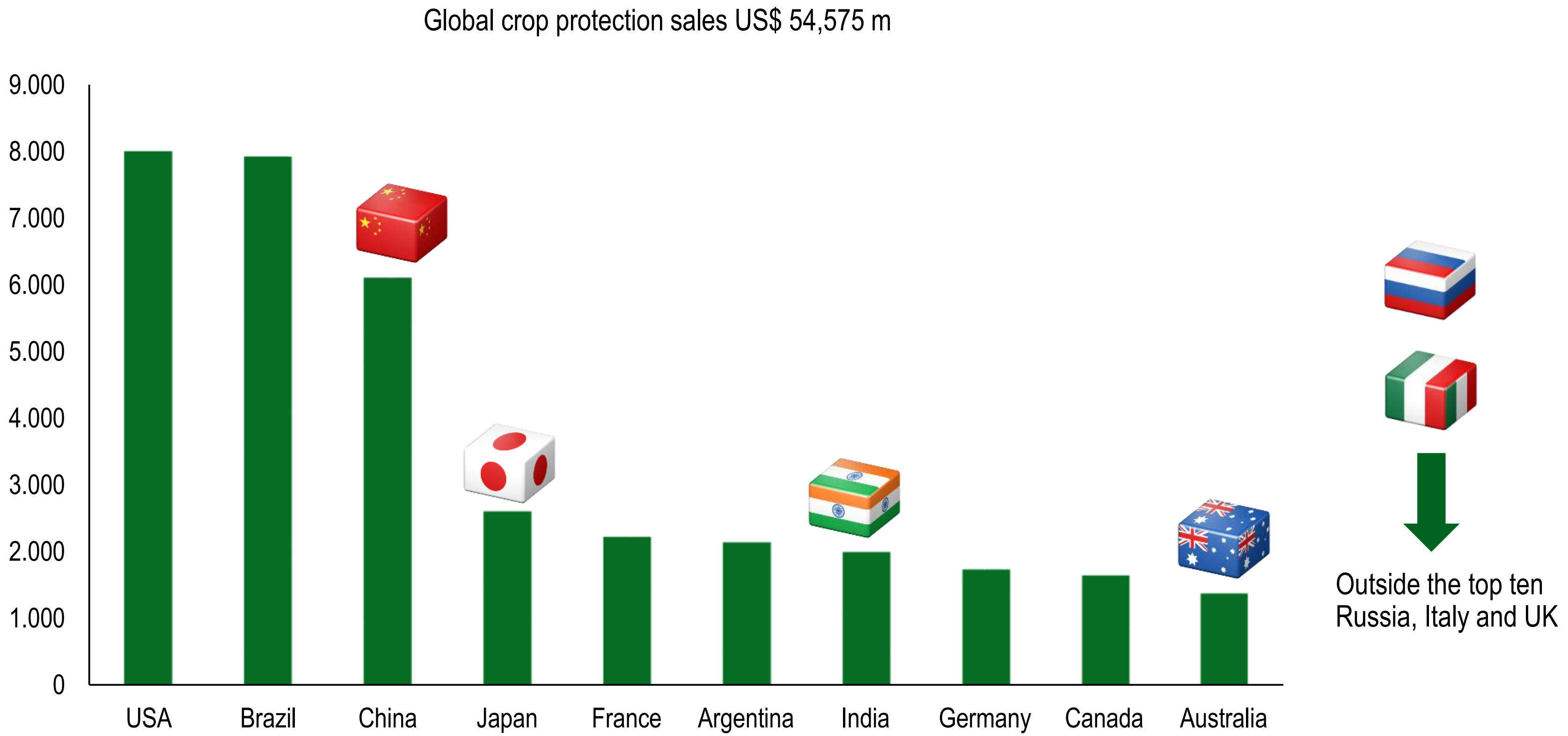
Crop Protection – USA regains No 1 market position (2015)

(ex-manufacturer level using average year exchange rates)



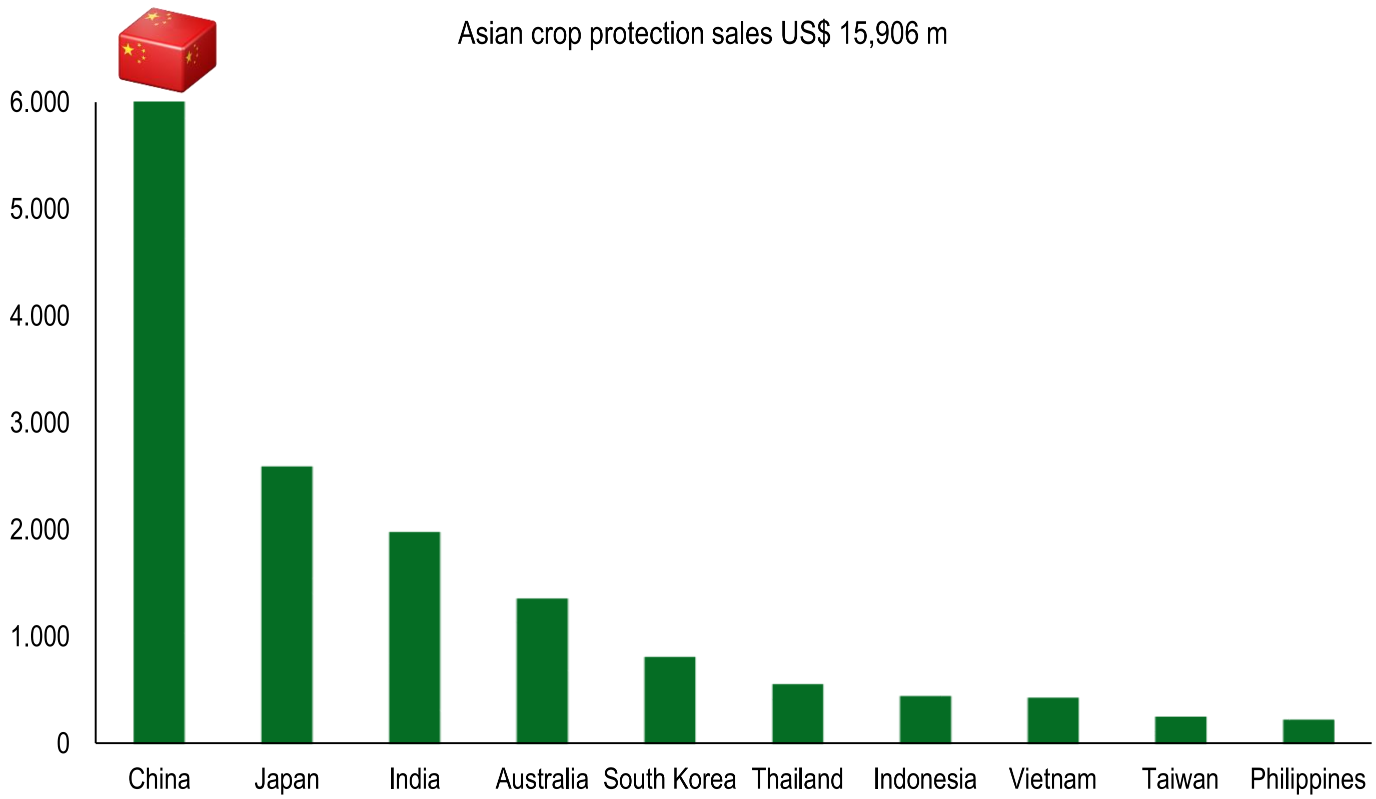
Data is presented in nominal terms, Brazil since 2010 has been world‘s No 1. market

Market Performance over time

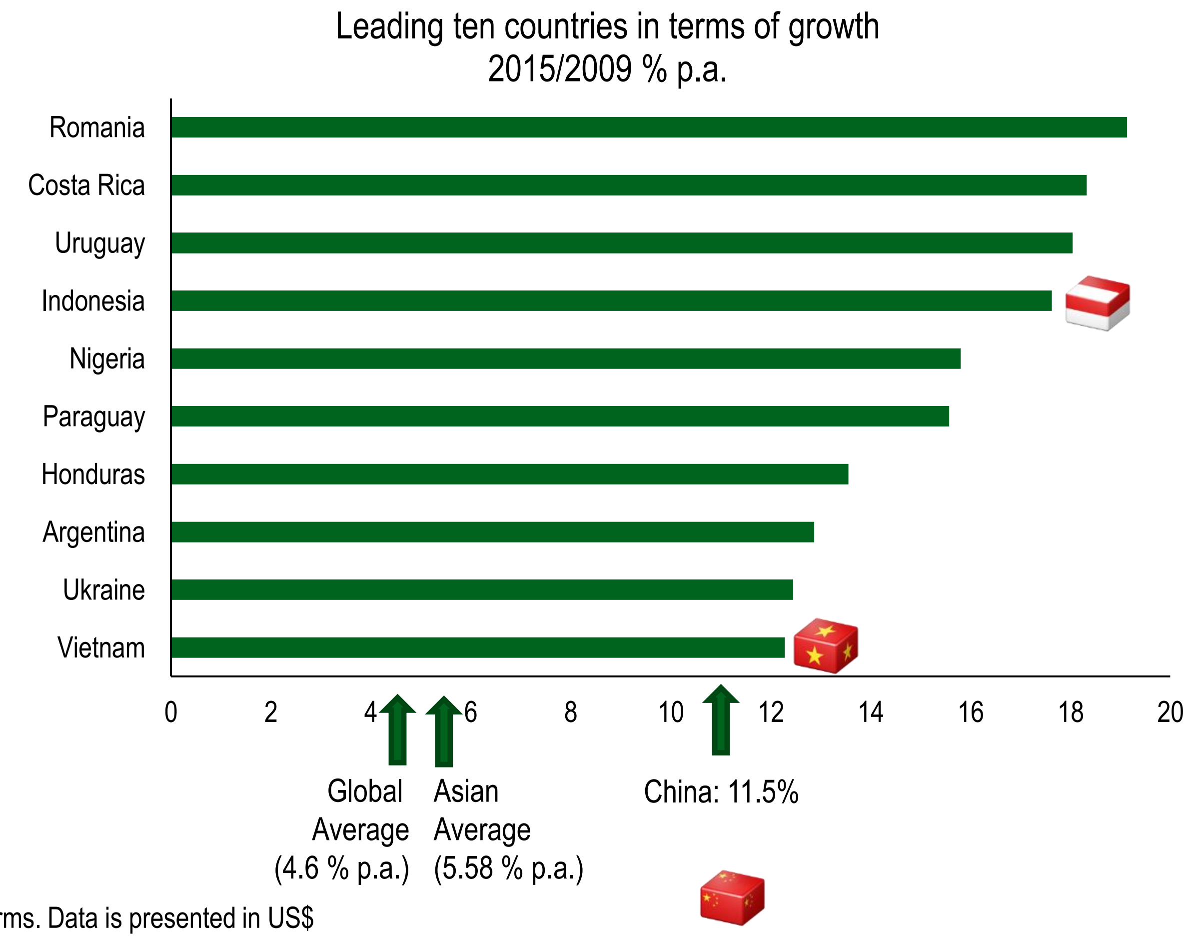
Facts & Figures - sales of the top ten asian leading markets

Asian Crop Protection –China No 1 market position (2015)

(ex-manufacturer level using average year exchange rates)



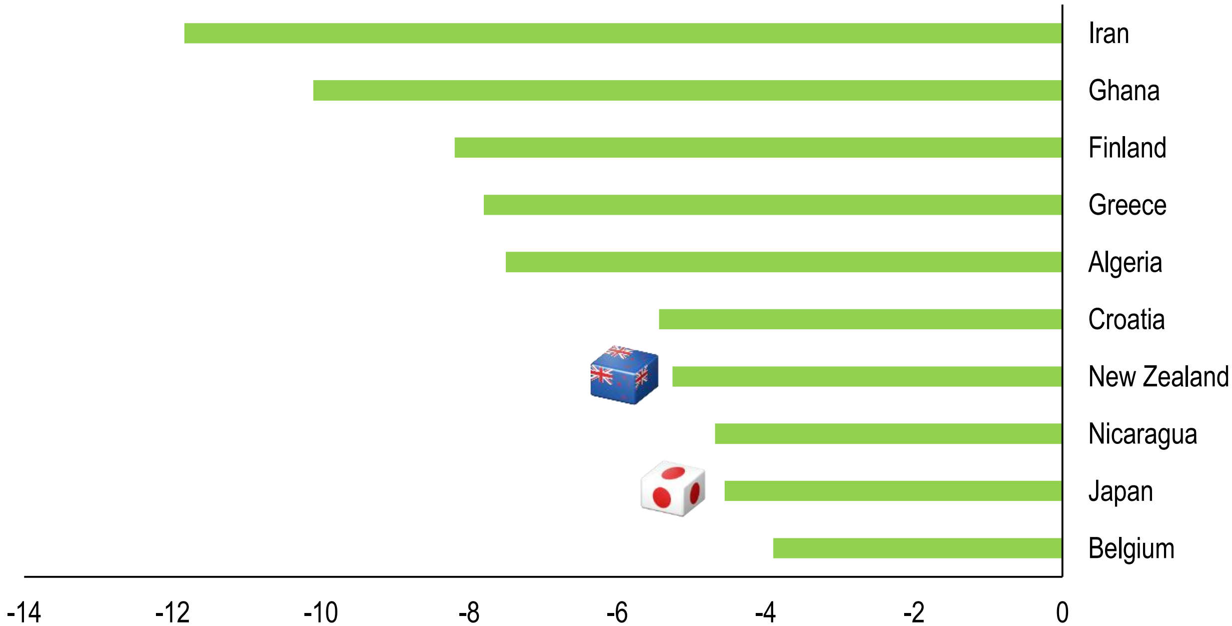
Crop Protection Market over time
(ex-manufacturer level using average year exchange rates)



Data is presented in nominal terms. Data is presented in US$

Crop Protection Market over time
(ex-manufacturer level using average year exchange rates)

Worst ten countries in terms of growth
2015/2009 % p.a.

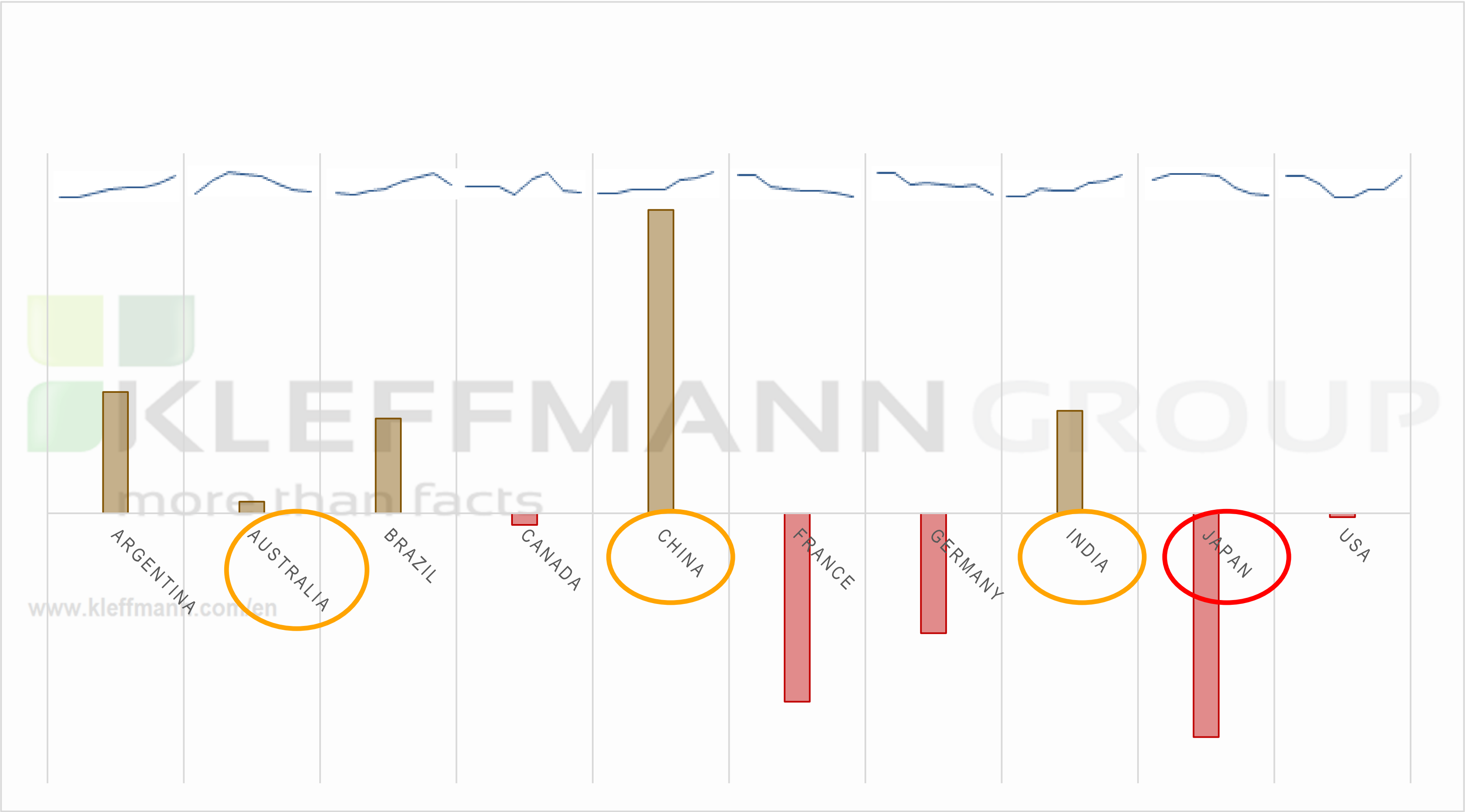


Global average
4.6% p.a

Data is presented in nominal terms
Data is presented in US$

Changing Contribution of TOP 10 countries to the global CP market

2008 -2015



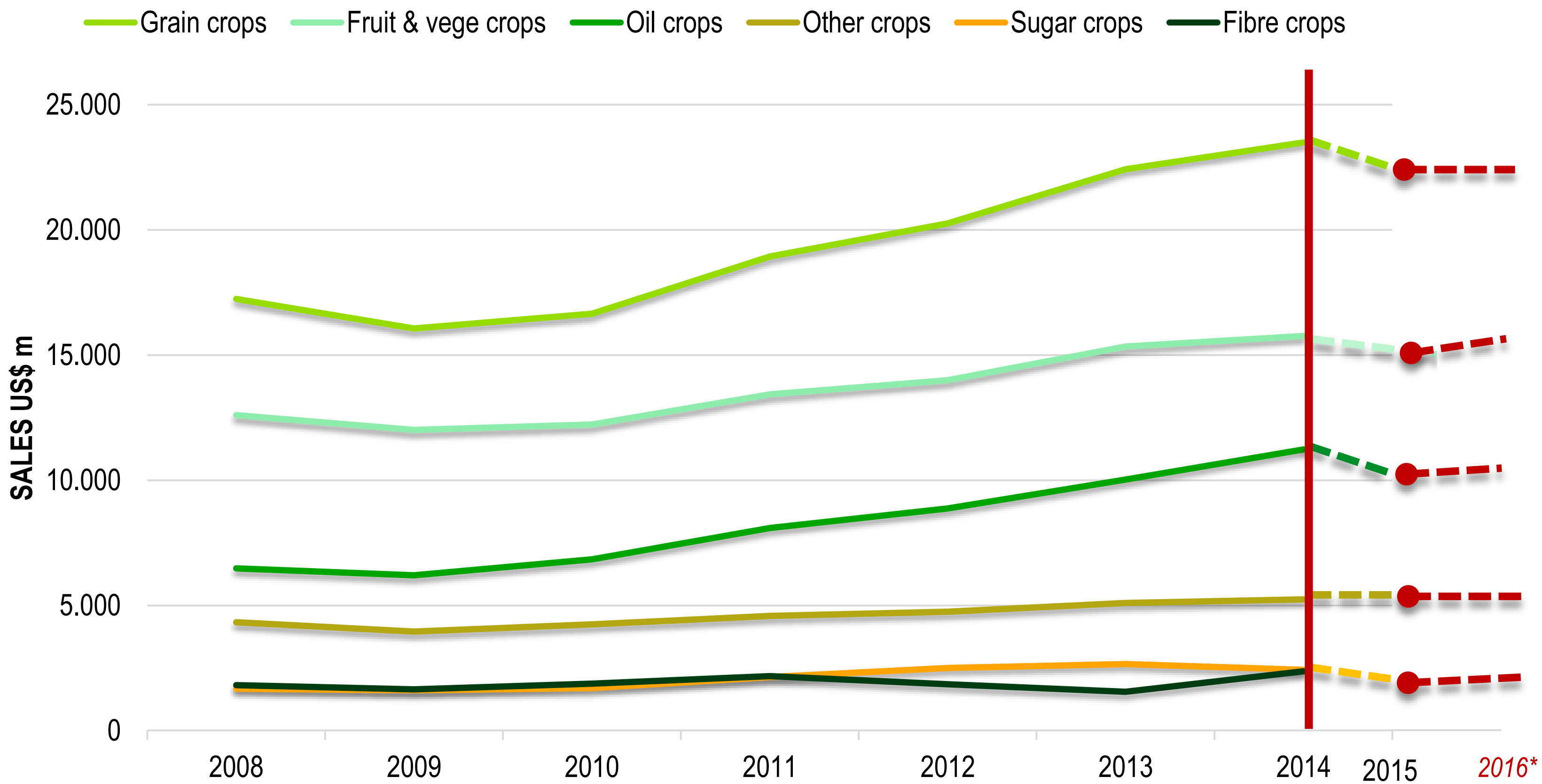
Source: Author's own analysis

Market Performance over time

Facts & Figures

Crop Type Crop Protection Market over time

(ex-manufacturer level using average year exchange rates)



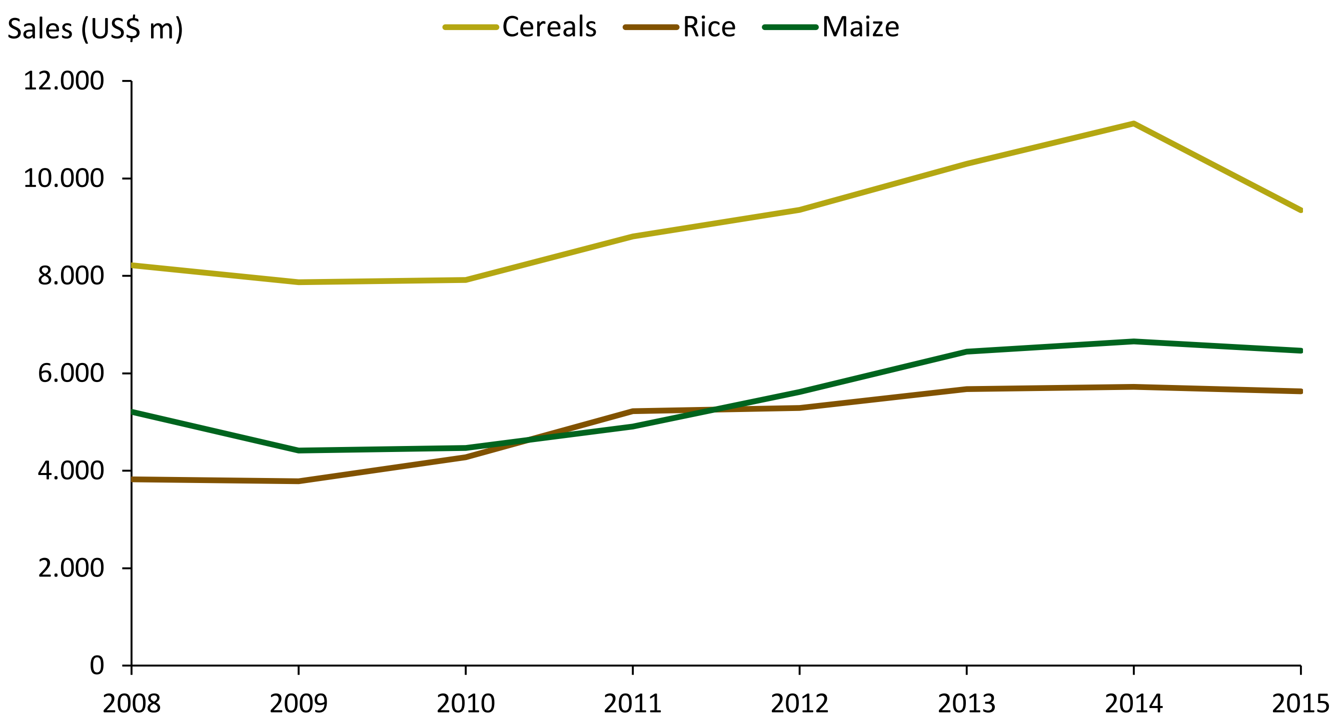
Footnotes: Data is presented in nominal terms
*2016 values are estimates

Market Performance over time

Facts & Figures

Grain crops- Crop Protection Market over time

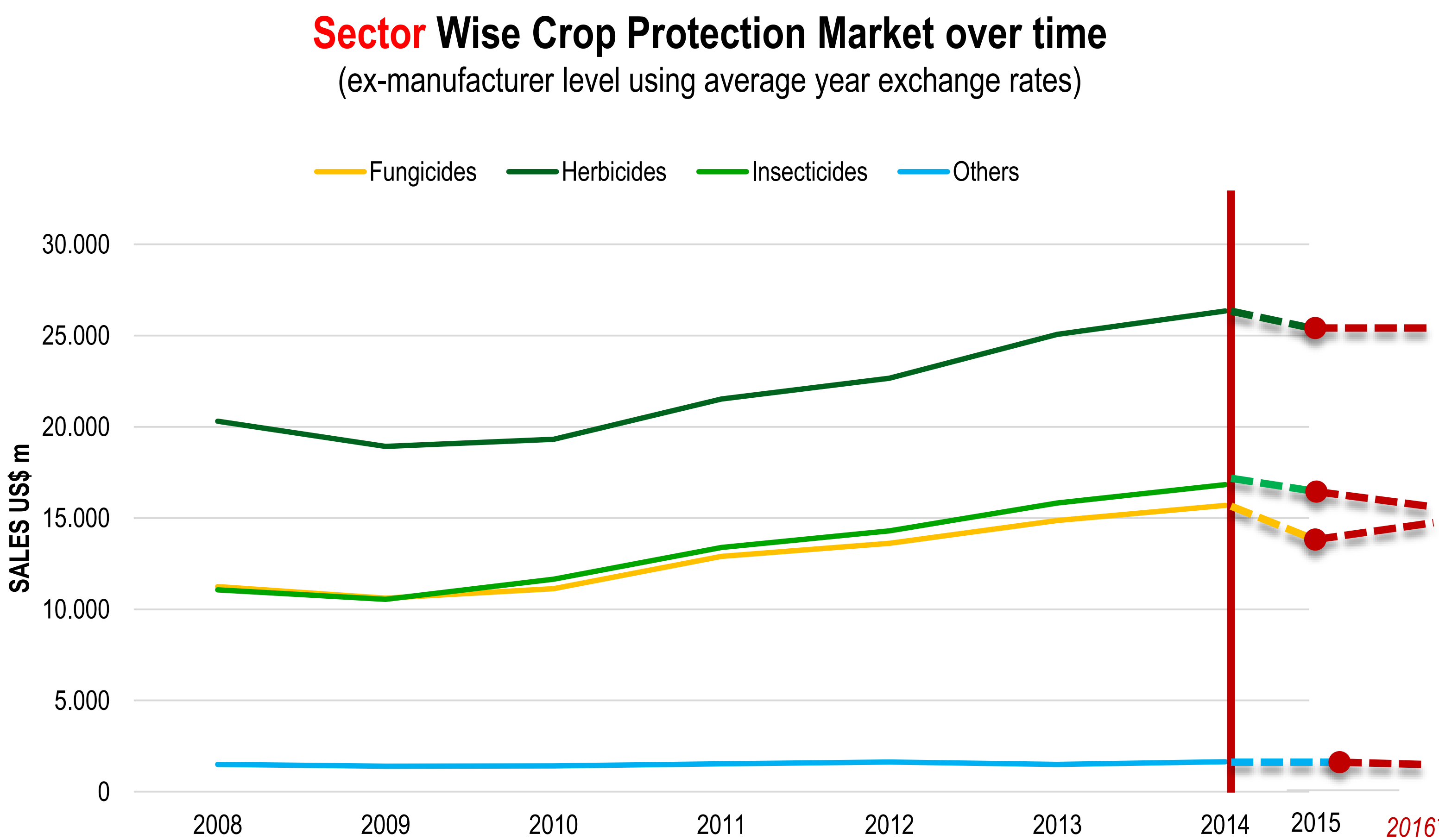
(ex-manufacturer level using average year exchange rates)



Footnotes: Data is presented in nominal terms

Market Performance over time

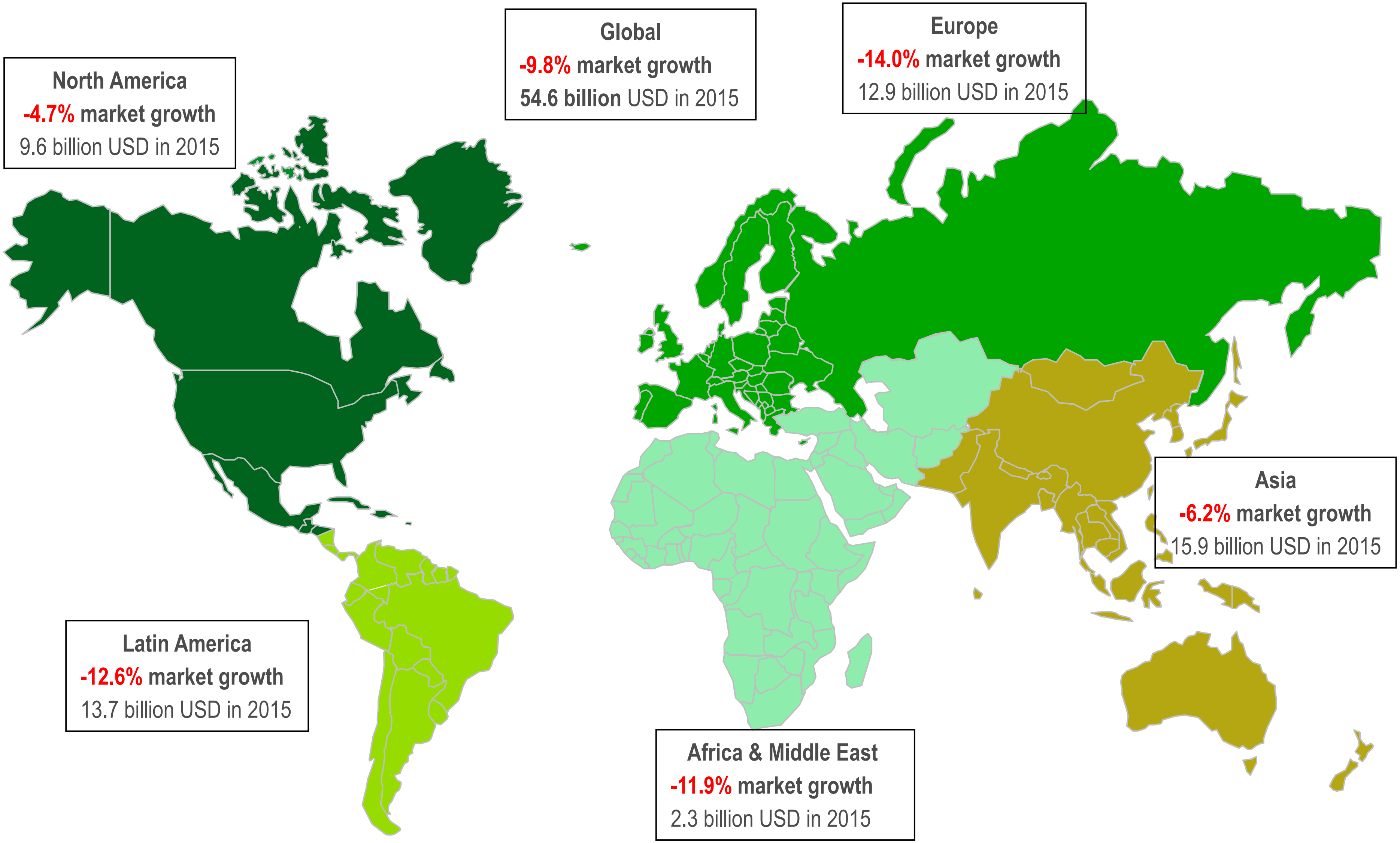
Facts & Figures



Footnotes: Data is presented in nominal terms
*2015 data is preliminarily; *2016 values are estimates

Market Performance over time

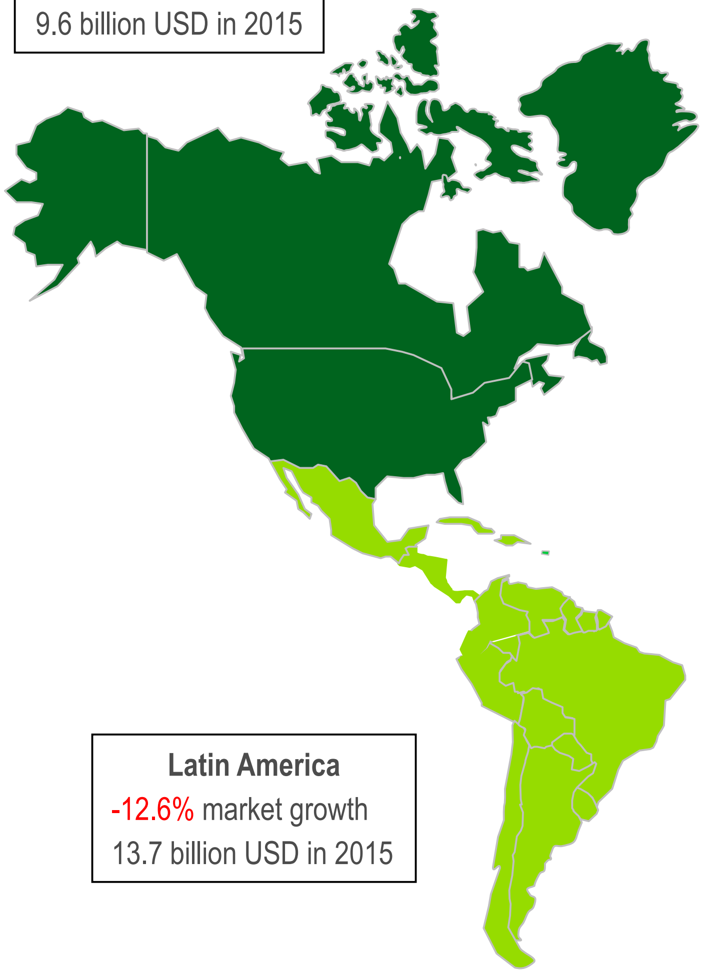
Regional growth of the CP market (nominal terms 2015 over 2014)



Market Performance over time

Regional growth of the CP market (nominal terms 2015 over 2014)

North America
-4.7% market growth
9.6 billion USD in 2015



Latin America
-12.6% market growth
13.7 billion USD in 2015

North America:

- Low commodity prices
- Lower prices of Glyphosate
- US maize harvested area deceased by 3%
- Soybean harvested area decreased by 1%
- + Good season for fungicides
- + Trend of moving back to the residuals

Latin America:

- **Brazil:** 58% of Latam, decreased by 19% in USD
- Local currency depreciation (significantly weaker against US dollar) – higher input costs
- Farm credit constraints
- Normal climate conditions
- + Adoption of premium products *e.g.* Flubendiamide, aaAzoxystrobin / Benzovindiflupyr
- + Intacta changing pest pressures from the “chewing” aato the sucking
- **Argentina:** 16% of Latam, increased by 6% when treated as a US$ market
- Soybean herbicides selective herbcides did well

Market Performance over time

Regional growth of the CP market (***nominal terms 2015 over 2014***)

Europe

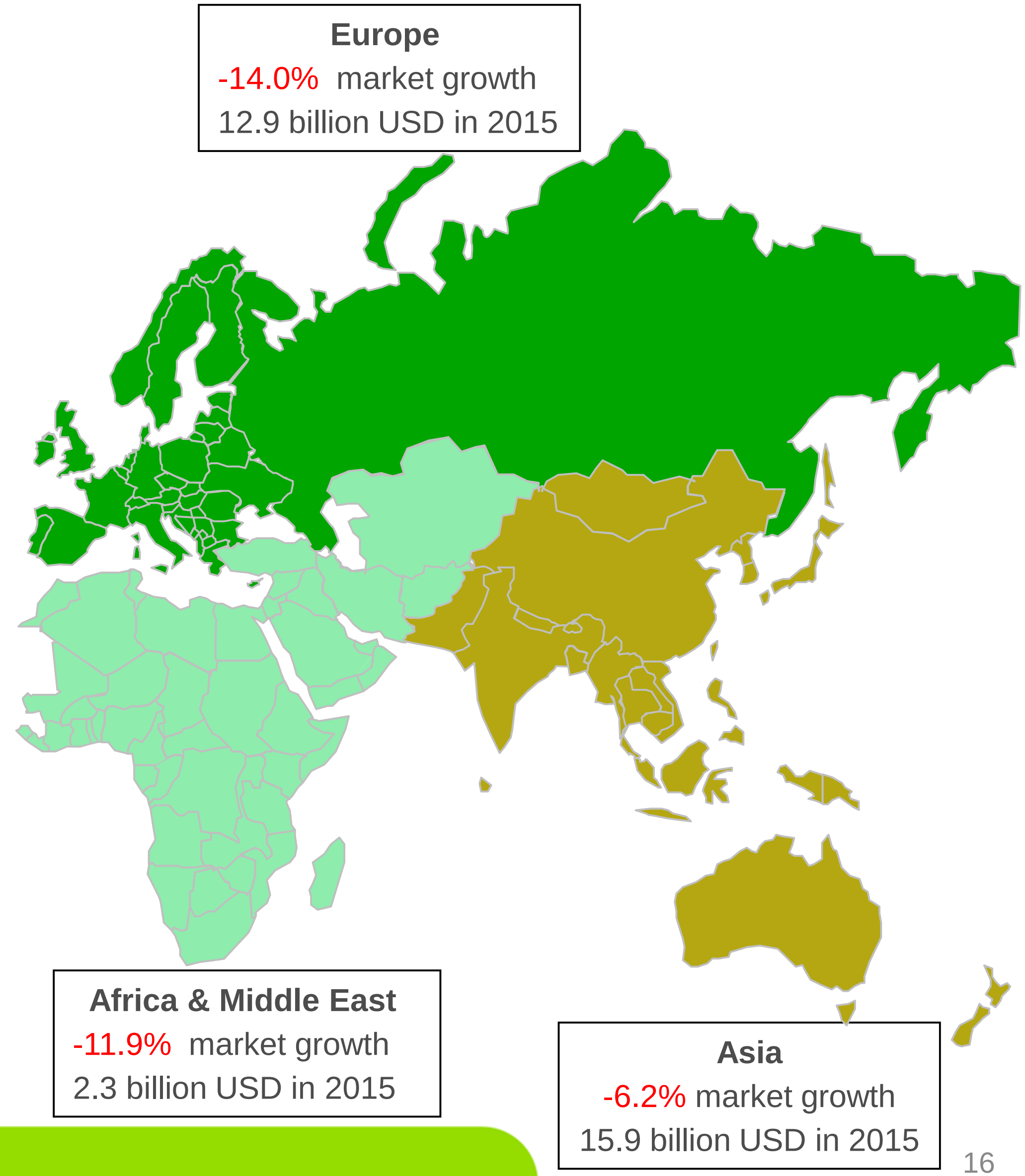
- Major markets of France, Germany & Italy & Spain, decreased by between 17 - 24%.
- In € terms the market shrunk by less than 1%
- + Russia contributes 9%, stable in 2015 despite currency movements

Middle East & Africa

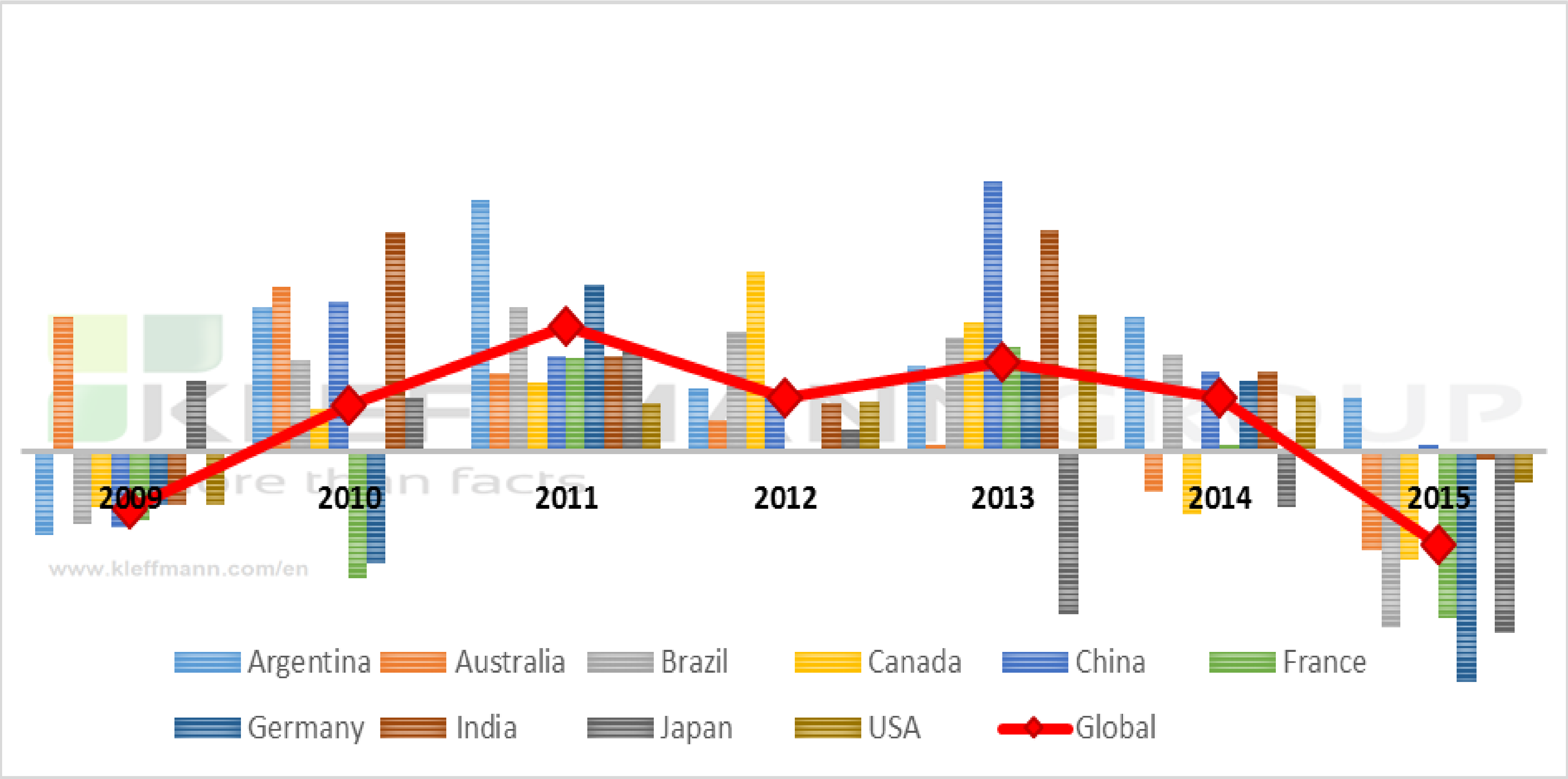
- Turkey as the region's largest market increased by 8% to 388 million USD in 2015
- Due to drought conditions, market reduced in emerging economies like South Africa
- (-15.4%) and Nigeria (-16.4%)

Asia

- Market reduced in Japan (-19.2%), Australia (-10.5%) & South Korea (-3%)
- China market stayed almost flat in US$ terms
- India market slightly decreased in terms of product use
- + Inceasing pressure from the generic companies

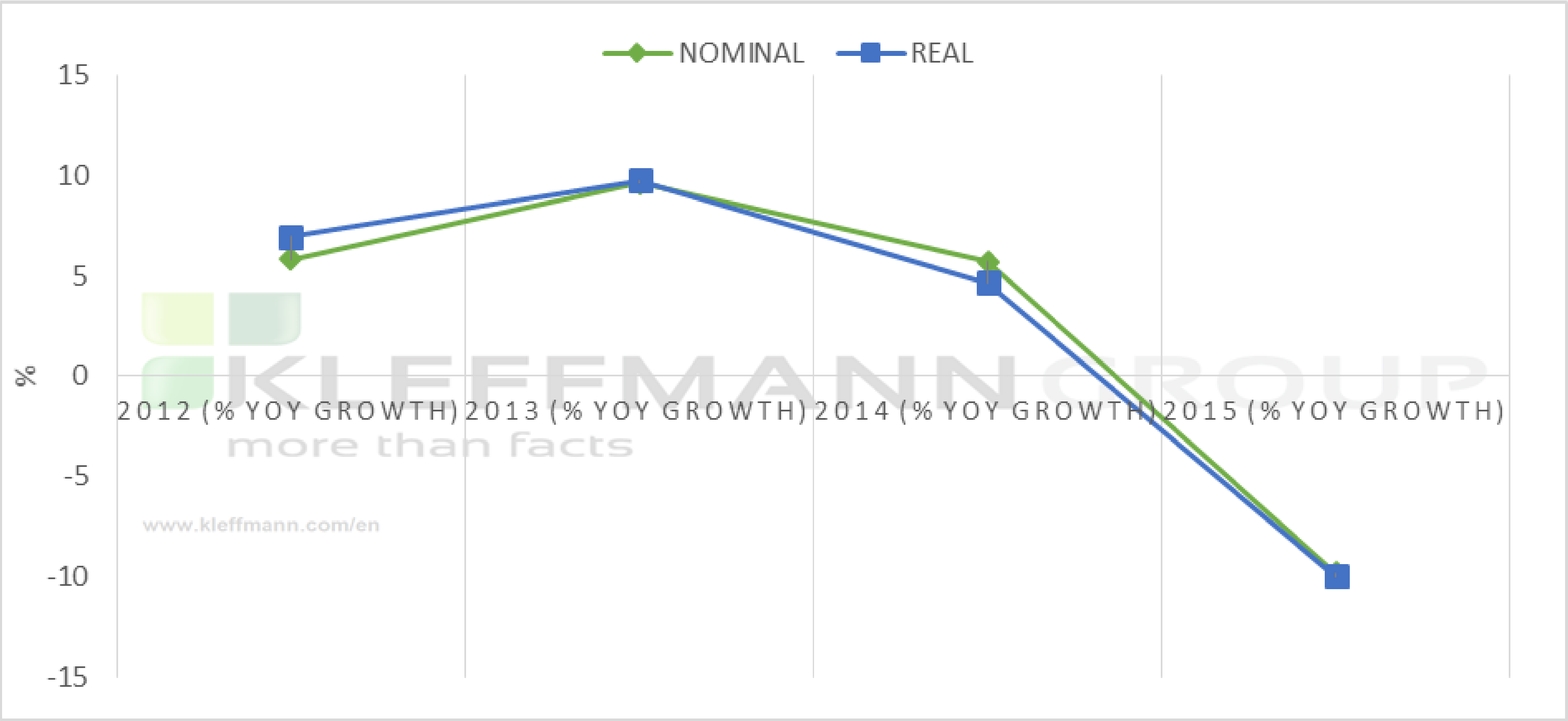


Growth dynamics of TOP 10 CP Markets and their transmissional impact on Global CP Market growth 2009-2015 (based on % yoy growth)



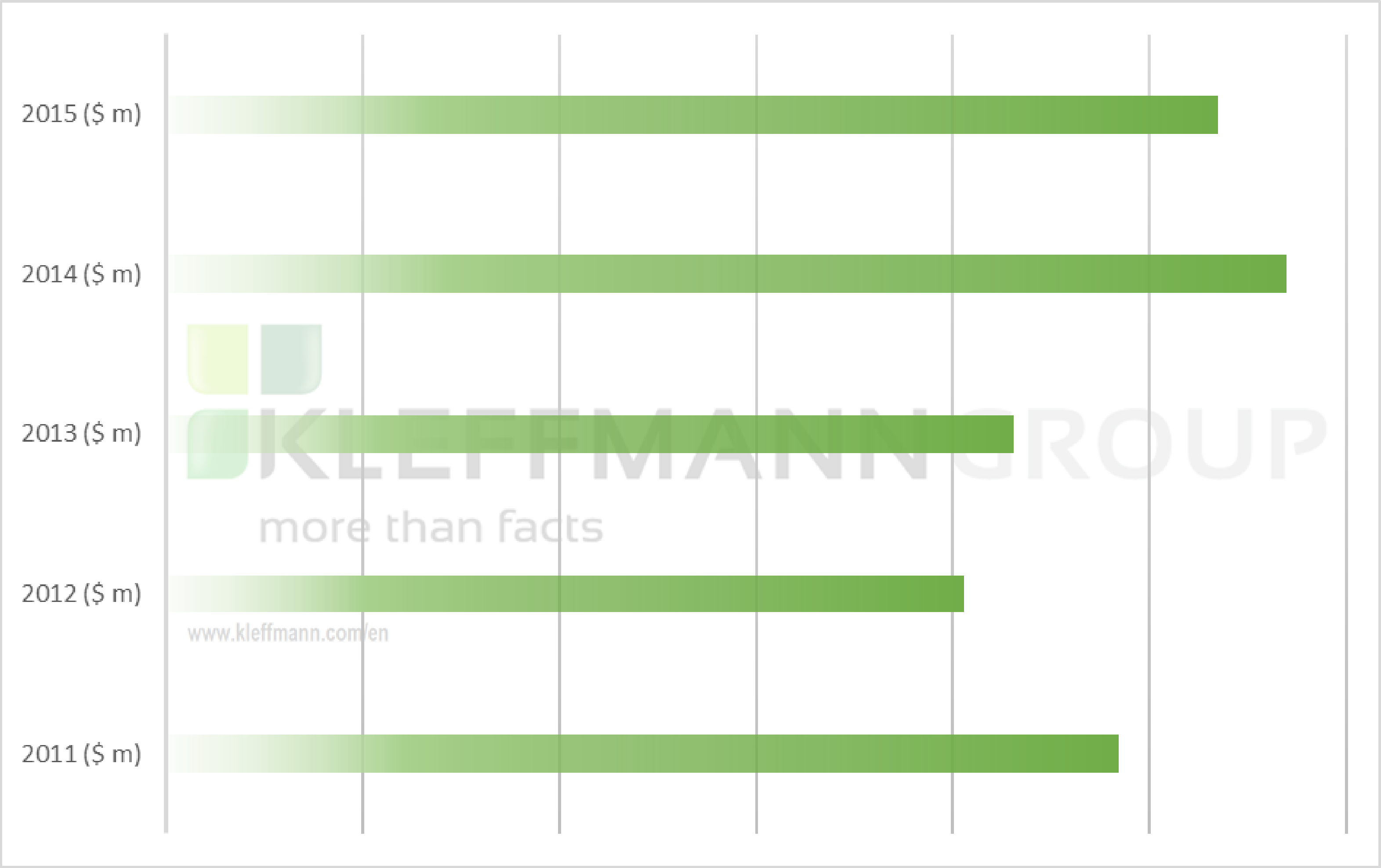
Source: Author's own analysis

CP Market Growth Nominal vs Real



Source: Author's own analysis

CP Market Growth - Absolute Gap Nominal vs Real



Source: Author's own analysis

TOP 6 - Company pesticide sales 2012 - 2015

US$ million

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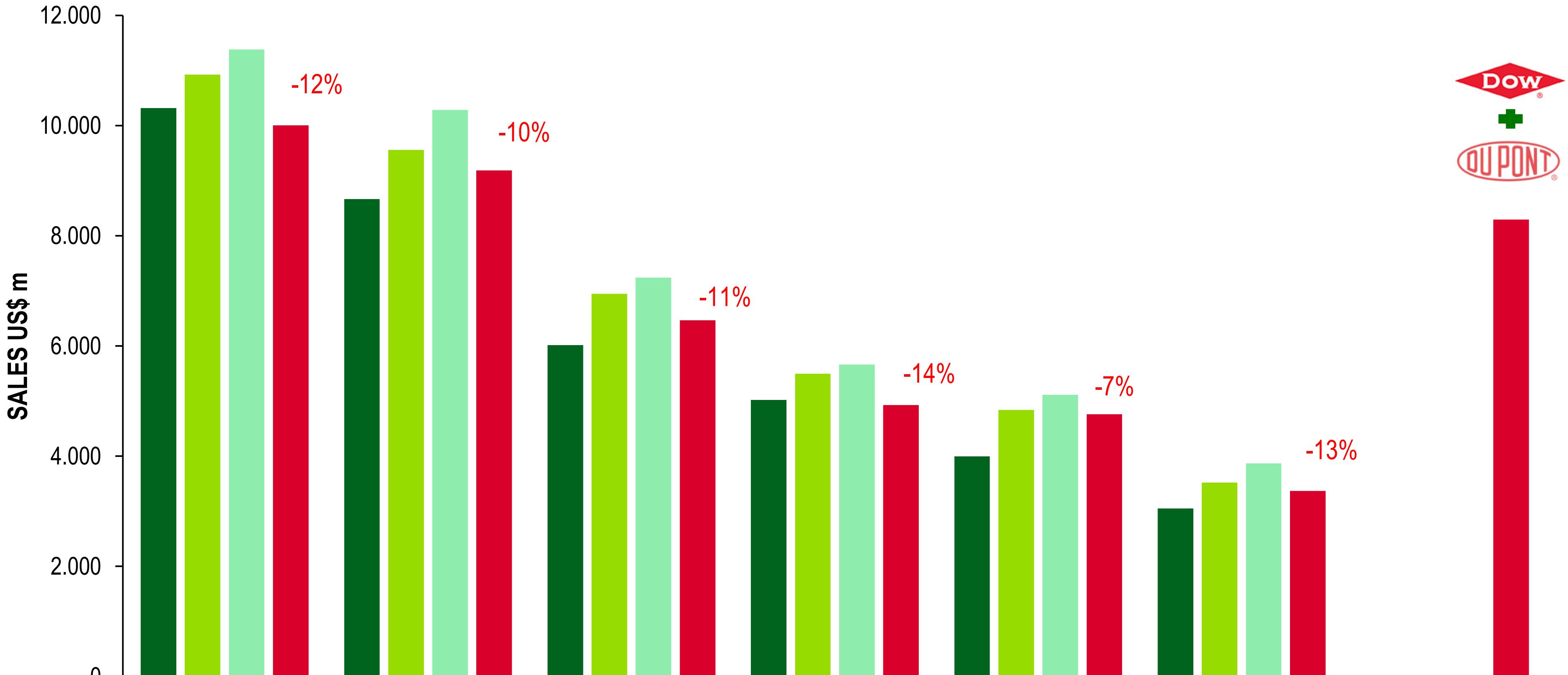


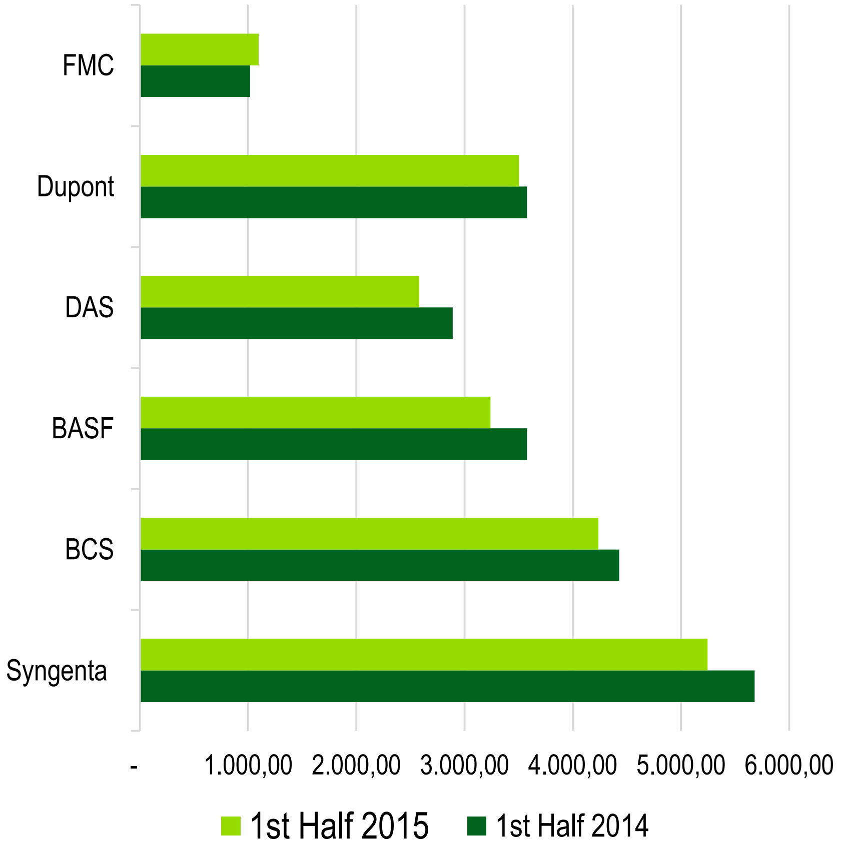
	Syngenta	Bayer CropScience	BASF	Dow Agrosciences	Monsanto	Dupont	Dow - DuPont
2012	10.318	8.668	6.017	5.022	3.994	3.051	
2013	10.923	9.557	6.944	5.495	4.837	3.518	
2014	11.381	10.283	7.238	5.660	5.115	3.870	
2015	10.005	9.186	6.464	4.925	4.758	3.367	8.292

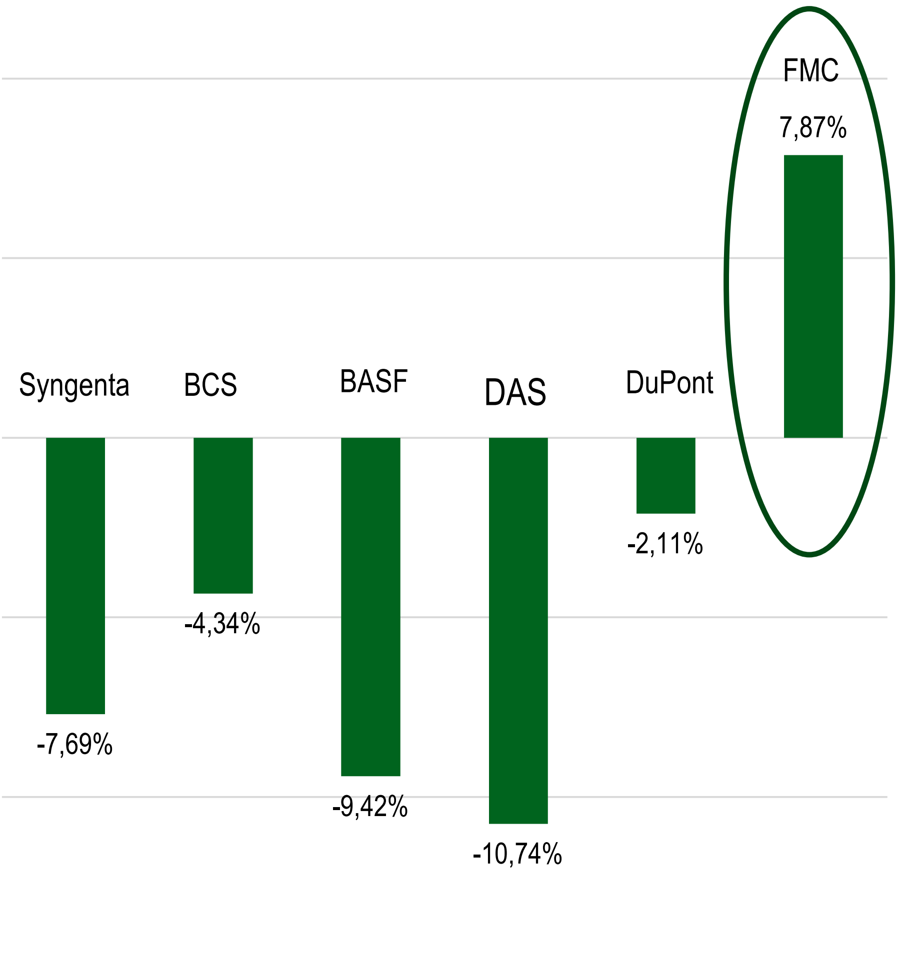
Data is presented in nominal terms

2016 TOP - Pesticide- Company Sales 2016 (*ongoing)* *(US$ million)*

(first half 2016 – the story so far)

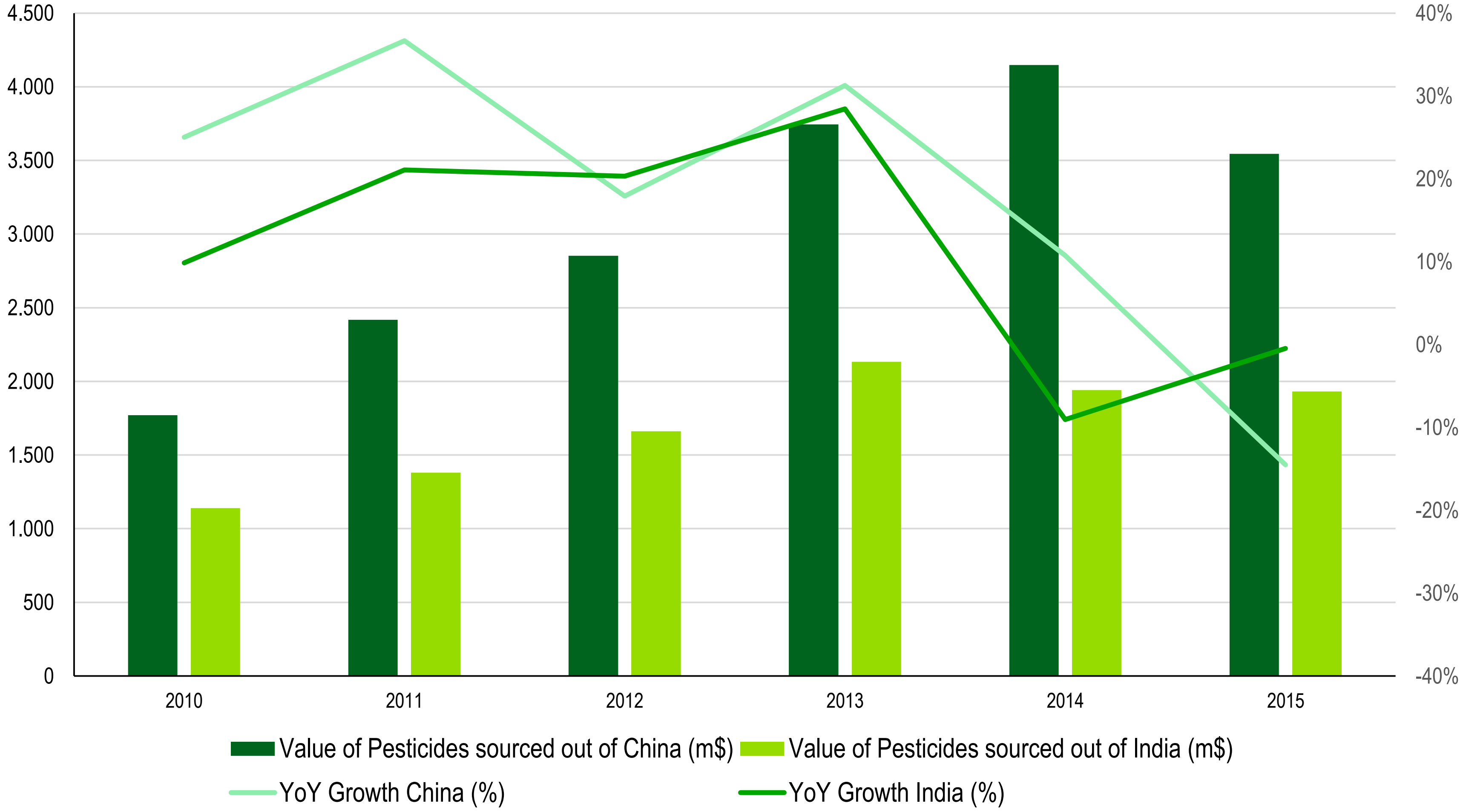
1st half sales of leading companies 2016 compared to 2015





Crop Protection Market Trends

Is China's competitive advantage shrinking?



Crop Protection Market Trends

2015 Company sales & structure – total pesticide sales of US$ 60,625 m

Ranking	Company	Pesticide Sales 2015 (US$ m)	HQ	Share of Global Pesticide Market
1	Syngenta	10,005	Europe	17%
2	Bayer CropScience	9,186	Europe	15%
3	BASF	6,464	Europe	11%
4	Dow Agrosciences	4,925	USA	8%
5	Monsanto	4,758	USA	8%
6	DuPont	3,367	USA	6%
7	ADAMA	2,885	China	5%
8	FMC	2,615	USA	4%
9	Nufarm	2,500	Australia	4%
10	Sumitomo Chemical	1,900	Japan	3%
11	UPL	1,840	India	3%
12	Arysta Lifescience	1,829	USA	3%
13	Mitsui Chemical Company	675	Japan	1%
14	Ishihara	645	Japan	1%
15	Zhejiang Wynca	613	China	1%
16	Huapont Nutrichem Co Ltd	602	China	1%
17	Nanjing Red Sun	572	China	1%
18	Jiangsu Yangnong	489	China	1%
19	Kumiai Chemical	472	Japan	1%
20	Gowan	470	USA	1%

Big six 64% of pesticide market

no account is made of intercompany selling in % market share calculations, sales from lower ranked companies are preliminarily

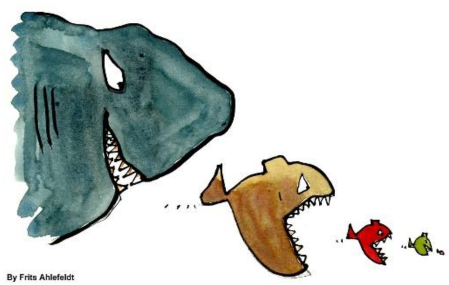
Crop Protection Market Trends

2015 Company sales & structure (potential dance partners) total pesticide sales of US$ 60,625 m

Potential effect of further consolidation of the market

Ranking	Company	Pesticide Sales 2015 (US$ m)	HQ	% change (2015 over 2014)
1	Bayer / Monsanto	14,930	Europe	-12%
2	Syngenta / ADAMA (Chem China)	11,801	China	-14%
3	Dow / Dupont	11,222	USA	-9%
4	BASF	6,464	Europe	-11%
5	Sumitomo Chemical / Nufarm / Fuhua	4,400	Australia	-9%
6	FMC	2,615	USA	-23%

63% of pesticide market



no account is made of intercompany selling in % market share calculations

Crop Protection Market Trends

Company sales & structure (potential dance partners)

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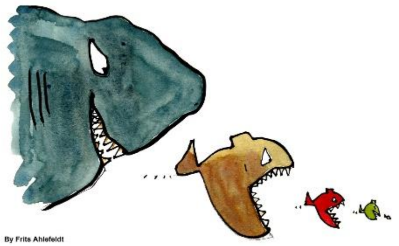
Ranking	Company	Pesticide sales range 2015 (US$ m)	HQ
	UPL	1,800 to 2,000m	India
	Arysta	1,800 to 2,000m	USA
	Mitsui Chemical Group	600 to 700 m	Japan
	ISK	600 to 700 m	Japan
	Kumiai	600 to 700 m	Japan
	Nippon-Soda	600 to 700 m	Japan
	Zhejiang Wynca Chemical Industry Group Co., Ltd.	500 to 600 m	China
	Nutrichem Company Limited	500 to 600 m	China
	Nanjing Red Sun Co. ,Ltd.	500 to 600 m	China
	Shandong Weifang Rainbow Chemical Co., Ltd.	500 to 600 m	China
	Sinochem Group	500 to 600 m	China
	Zhejiang Jinfanda Biochemical Co., Ltd.	less than 500 m	China
	Hubei Sanonda Co., Ltd.	less than 500 m	China
	Jiangsu Yangnong Chemical Co., Ltd.	less than 500 m	China
	Sichuan Leshan Fuhua Tongda Agro-Chemical Techr	less than 500 m	China
	Zhejiang Zhongshan Chemical Industry Group Co., L	less than 500 m	China
	Sipcam	less than 500 m	Italy
	Gowan	less than 500 m	USA
	Large number of Chinese companies	less than 400 m	China
	Smaller number of Indian companies	less than 300 m	India

Potential effect of further consolidation of the market



Distributors and Retailers: Sales and Margins

What Industry needs to consider

- Distributors and retailers profit by selling pesticides and pest management solutions to growers, commercial applicators, and homeowners

- They stock large quantities of pesticide products and carry a substantial credit risk to maintain a viable inventory. They prefer products that

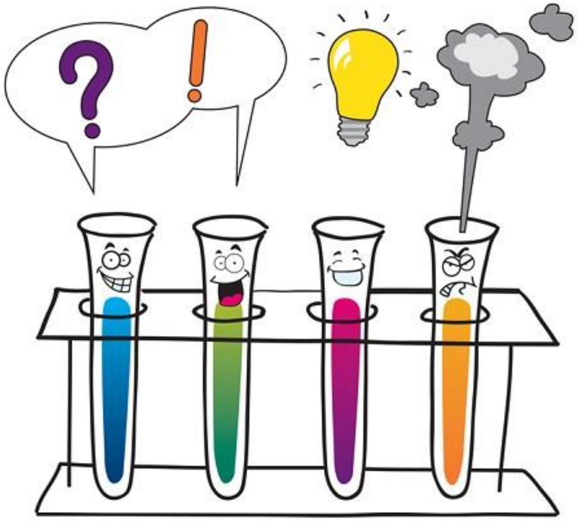
  - control a broad spectrum of pests / targets
  - are formulated for easy handling and storage
  - provide excellent value for the investment
  - Sell quickly and provide a reasonable profit opportunity (low overhead/high demand)

Crop Protection Market Trends

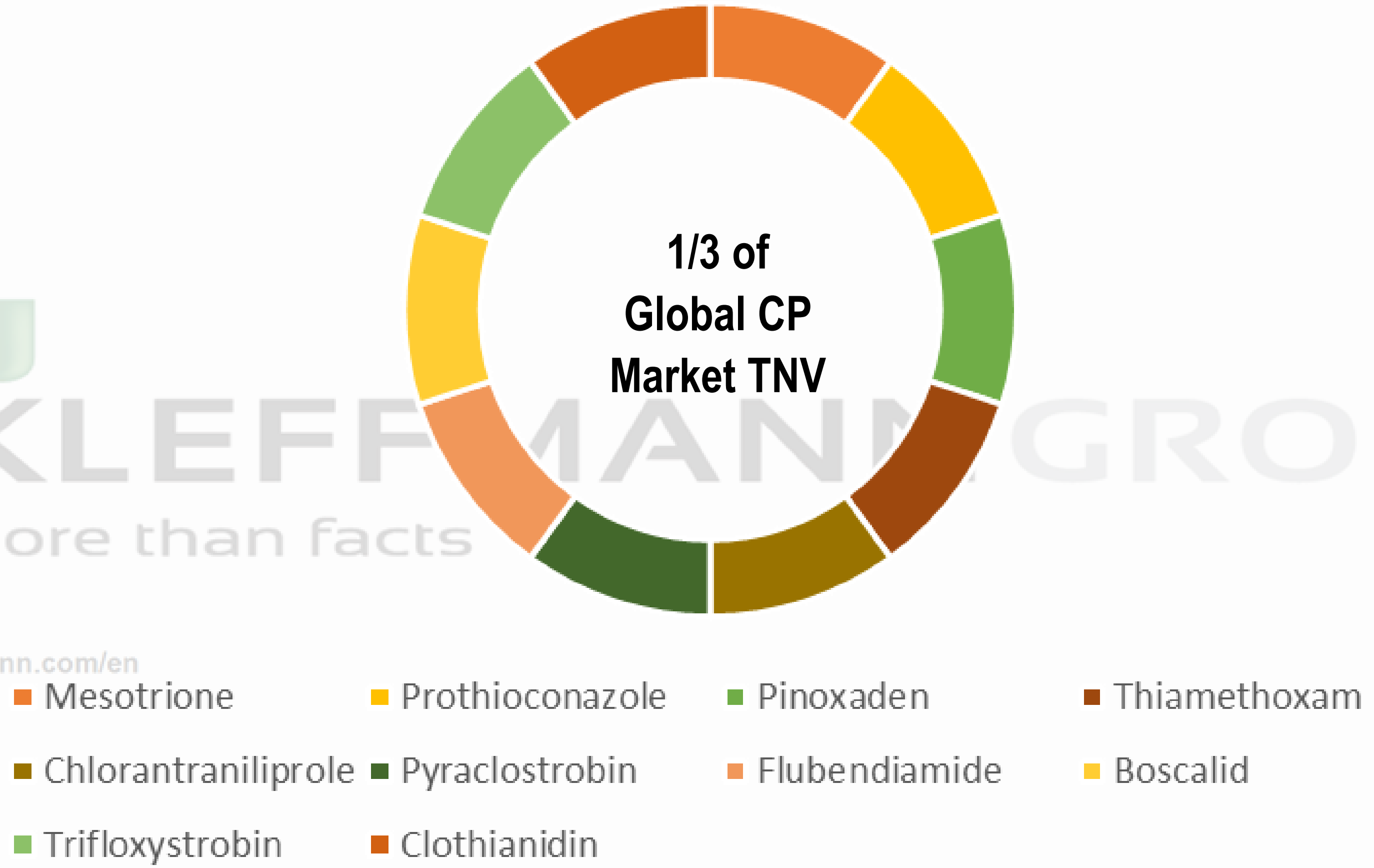
New active ingredients

- Dow AgroSciences prepares to launch **six new active ingredients** in the EMEA region over the next three to five years.
- BASF intends to launch twelve **new active ingredients** over a range of crops in the next decade
- Bayer CS set to launch **new active ingredients** for novel treatment of infections in farm and companion animals, with a particular focus on nematodes.
- DuPont refocus on R&D Pipeline

is the trend reversing back to conventional chemistry?

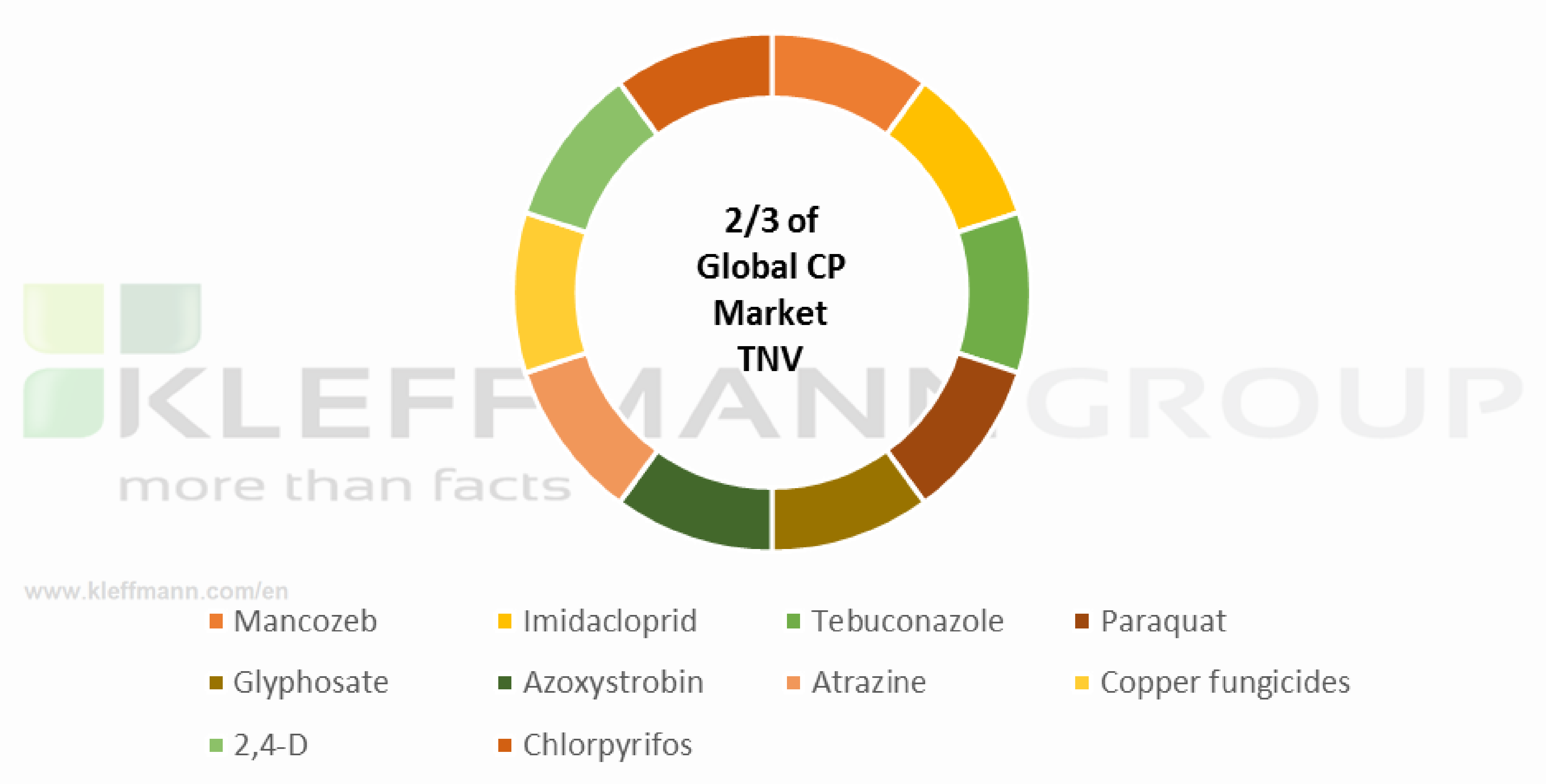


Most CP-Market relevant Proprietary Chemistry



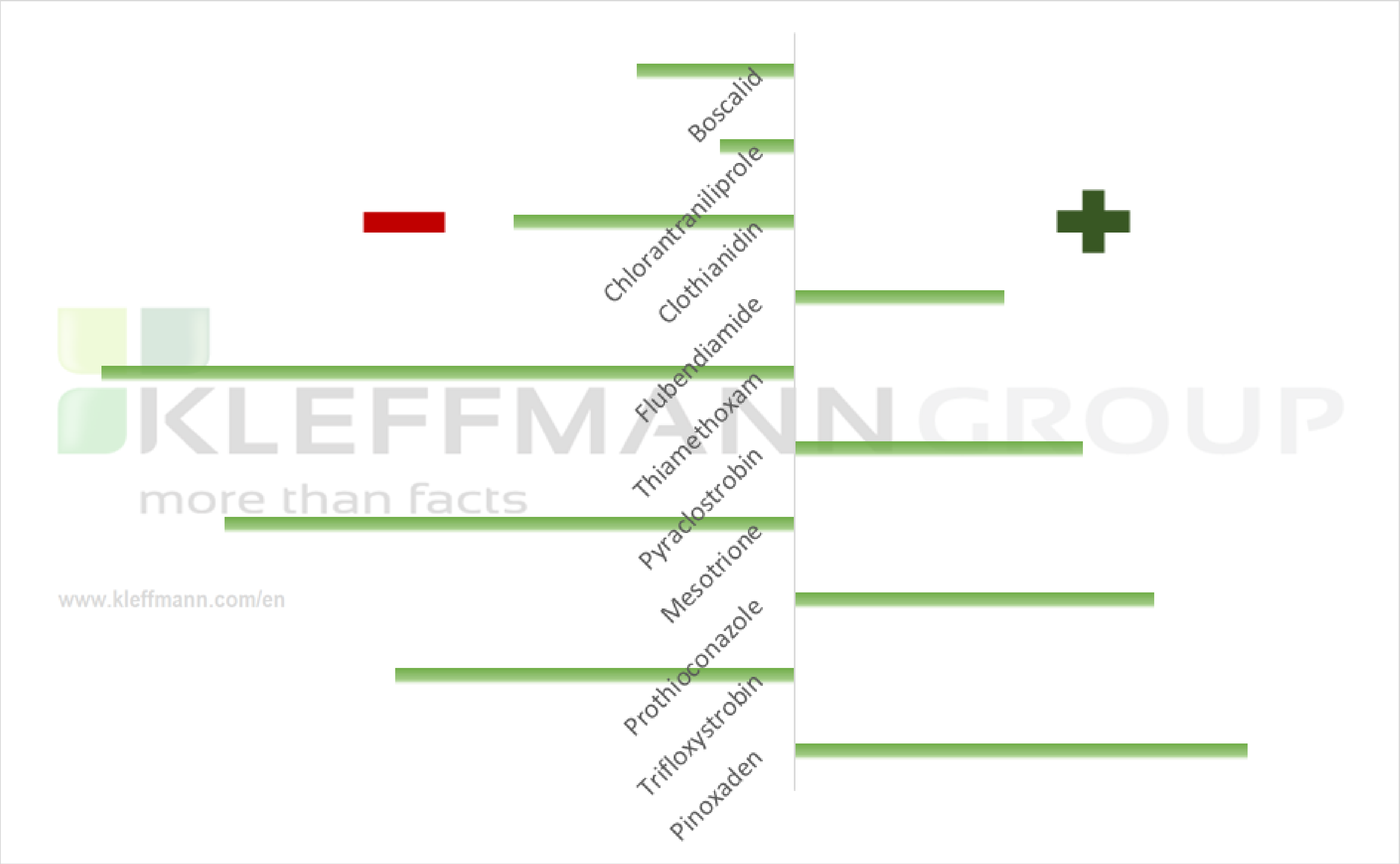
Source: Author's own analysis

Most CP-Market relevant Off-Patent Chemistry



Source: Author's own analysis

Dynamics of Key proprietary Chemistry 2013-2015 (index)



Source: Author's own analysis

Crop Protection Market Trends

Pesticides – New Active Ingredients 2012 - 2015

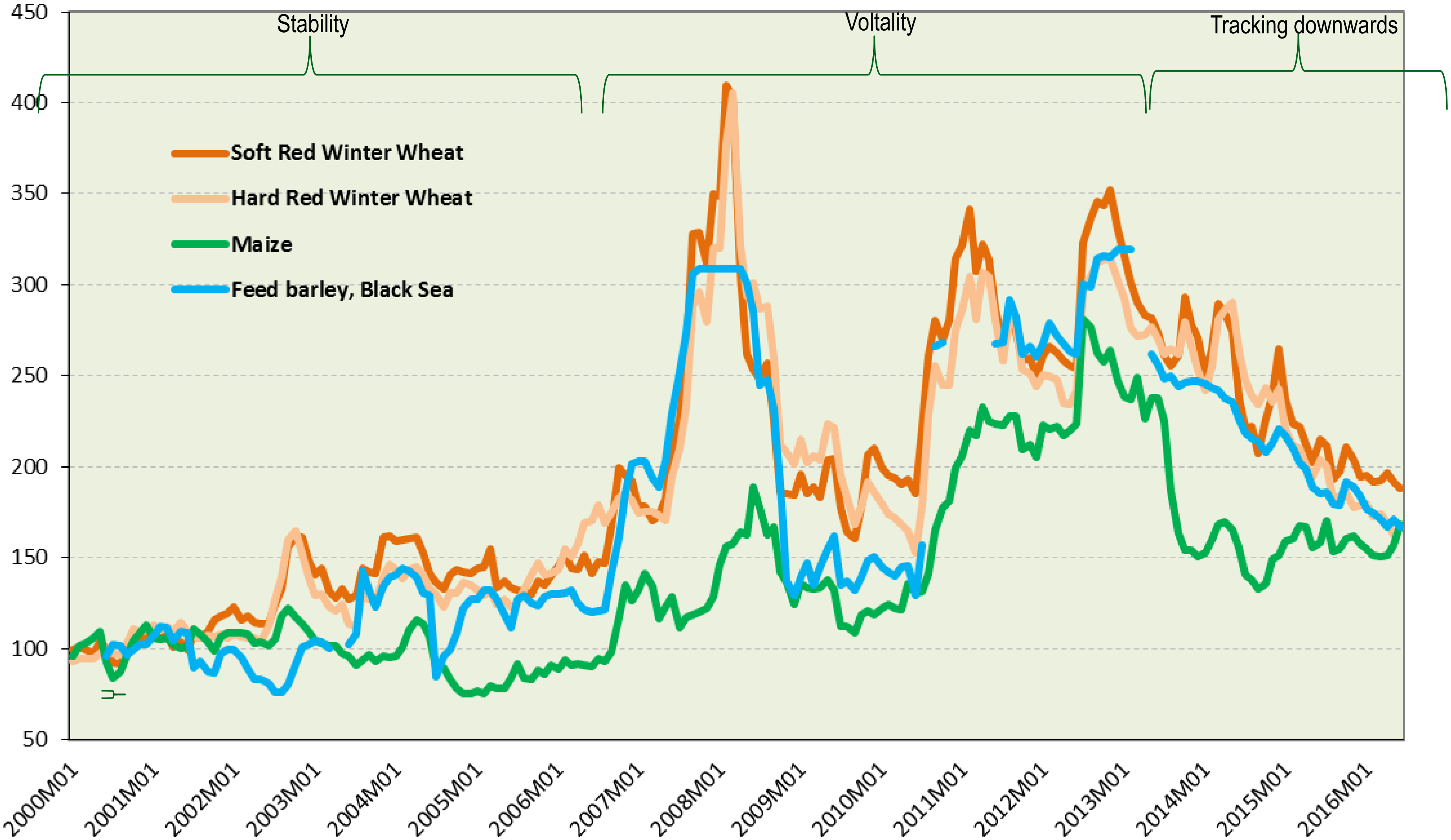
Year	Segment	Active Ingredient	Originator
2012	Fungicide	fluxapyroxad	BASF
2012	Fungicide	fluopyram	Bayer CropScience
2012	Fungicide	penflufen	Bayer CropScience
2012	Insecticide	sulfoxaflor	Dow AgroSciences
2012	Insecticide	cyantraniliprole	DuPont
2012	Fungicide	pyribencarb	Kumiai/Nippon Soda
2013	Fungicide	fenpyrazamine	Sumitomo/Valent
2013	Herbicide	metazosulfuron	Nissan
2013	Fungicide	isofetamid	ISK
2014	Insecticide	flometoquin	ISK
2014	Herbicide	halauxifen-methyl	Dow AgroSciences
2014	Insecticide	pyflubumide	Nihon Noyaku
2015	Insecticide	afidopyropen	Meiji Seika Pharma
2015	Insecticide	flupyradifurone	Bayer CropScience
2015	Fungicide	benzovindiflupyr	Syngenta
2015	Fungicide	oxathiapiprolin	Syngenta

- Focus is on I & F
- Many products from Japan
- Focus is on specialties
- Few “blockbusters”

examples of main launches

Factors affecting the market – longer term

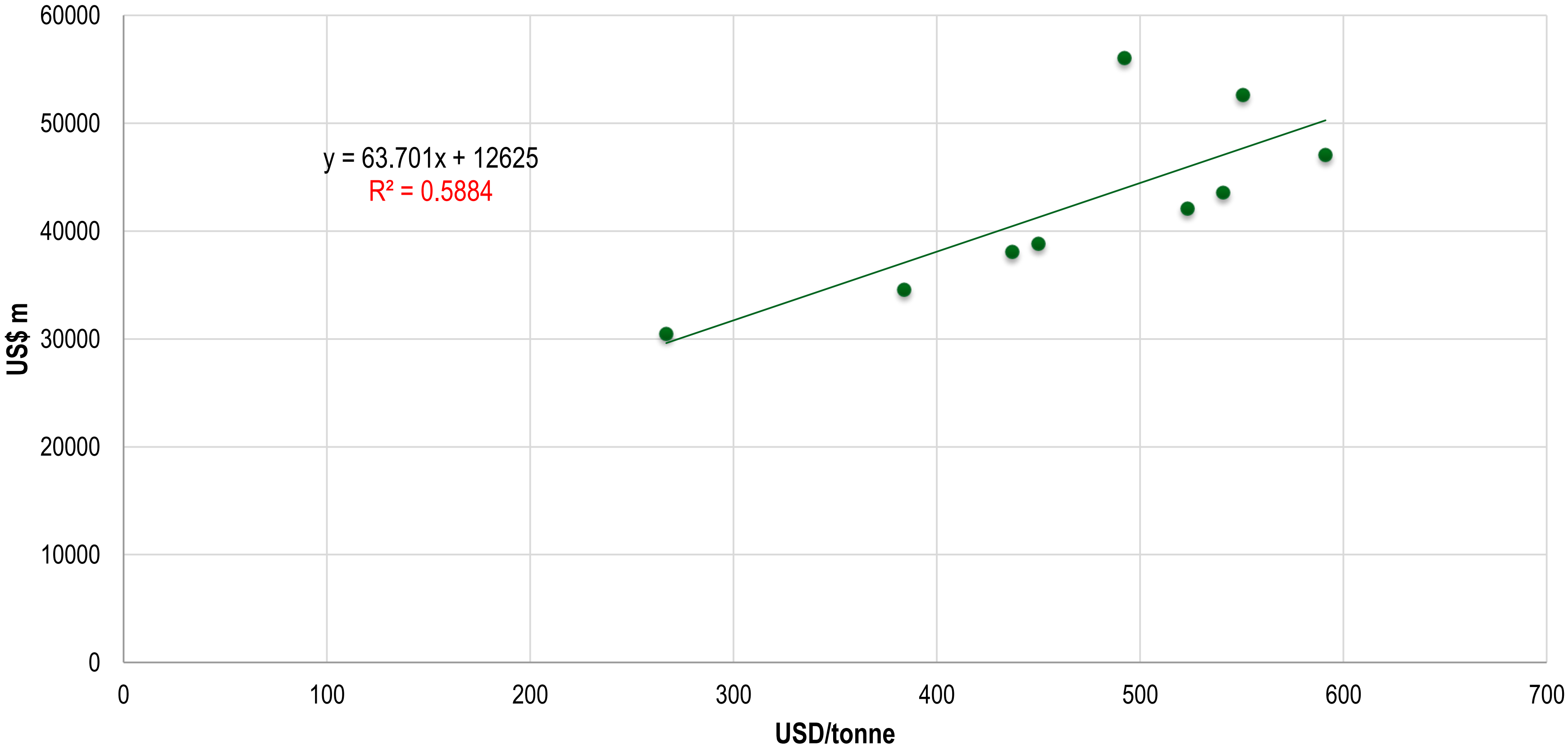
Cereals: international price developments (January 2000 until June 2016, 2000=100, based on USD)



Source: EU Commodity Price Dashboard, June 2016

Interconnectivity of commodity prices and AgChem sales 2007 -2014 - SOYBEAN

Simple correlation of soybean price vs AgChem sales



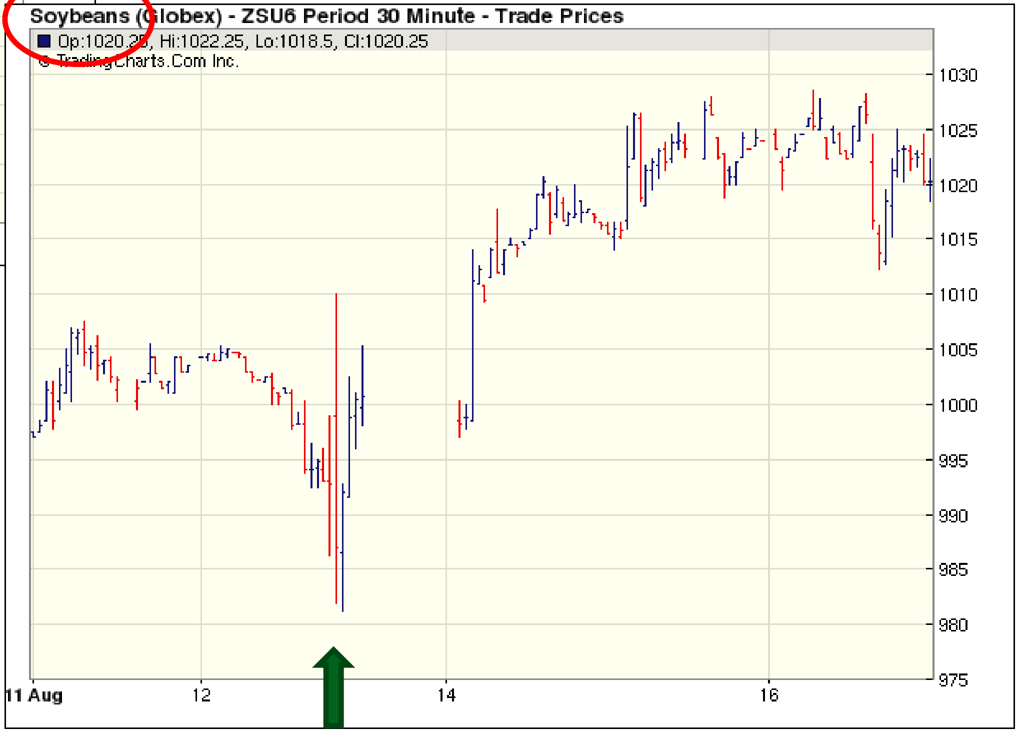
Ceteris paribus, *average annual soybean prices **seem** to explain the fluctuations in AgChem sales better (R^2=0,59)*

Source: International Commodity Prices, USDA, 2015

Factors affecting the market – longer term

Commodity Price Current situation

USDA –Record Yield Forecasts (12th August)



Futures (8/16/2016)

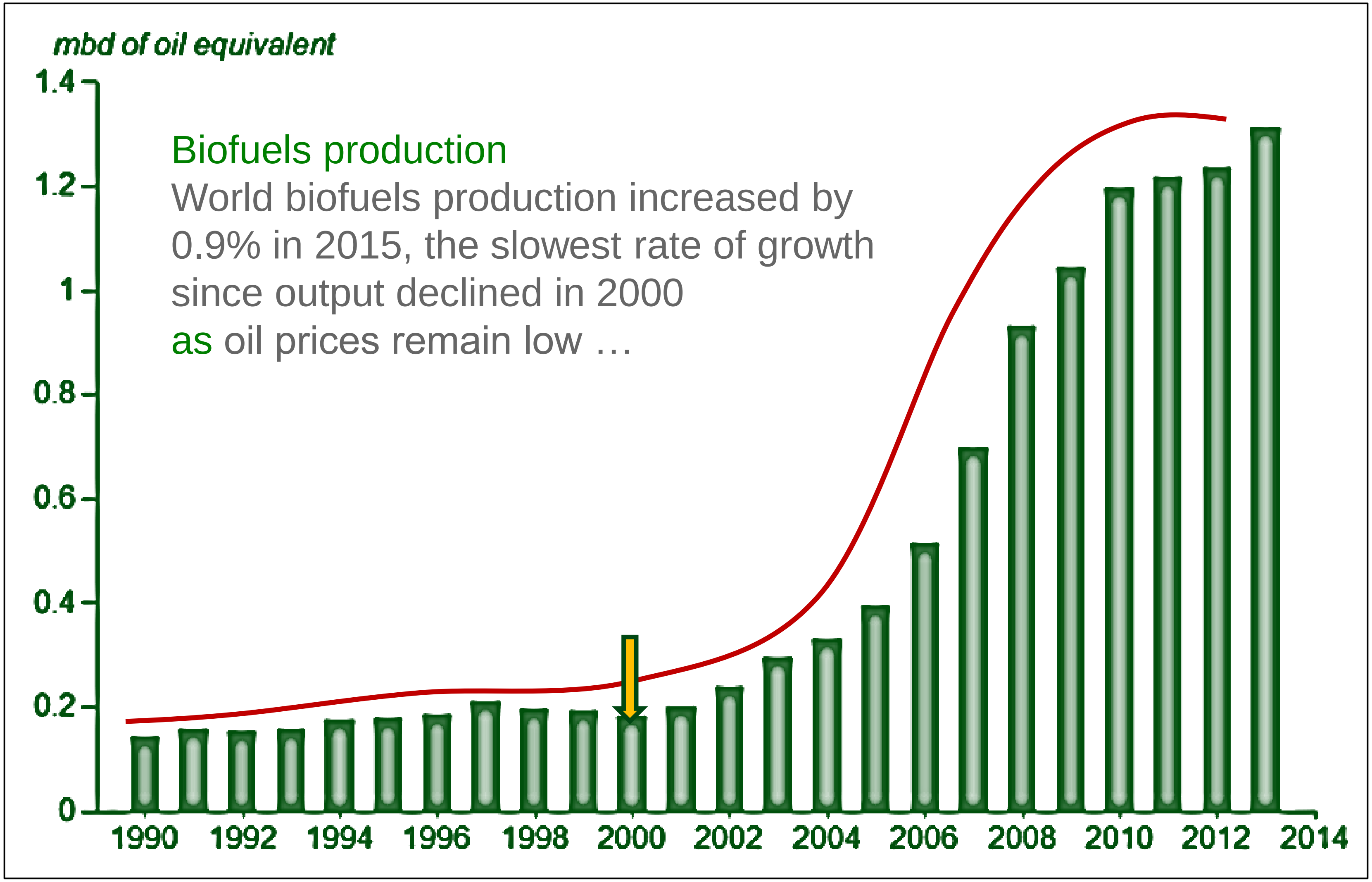
The September corn futures settled 1¢ higher at $3.27; December futures closed ¼¢ higher at $3.37¼ per bushel.

September soy oil futures closed 0.17¢ higher at 33.38¢ per pound.

Source: Kleffmann Amis® AgriGlobe® Market Dashboard, 2016

Factors affecting the market – longer term

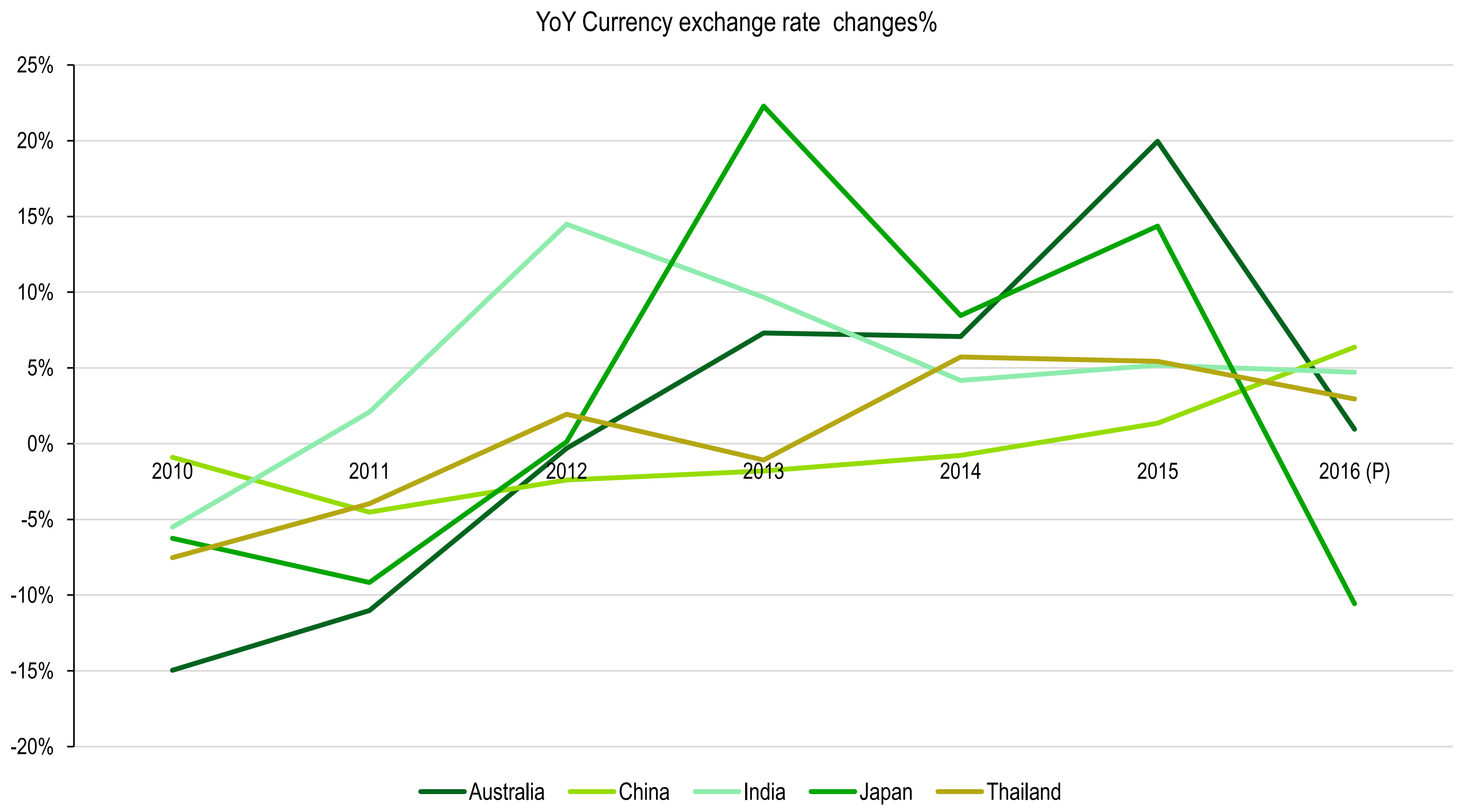
Global production of Biofuels



Source: International Energy Agency, 2014

Currency exchange rate(% change) in Asian top markets

In 2016, only Japan national currency became stronger against US dollar



Pesticide Regulations

Different approaches to regulations

USA:

Environmental Protection Agency's (EPA) Office of Pesticide Programs (OPP) is responsible for pesticide-related issues at the federal level - **Risk based assessment (but changing)**

Europe:

Plant protection products (PPPs) and active ingredients in those products are governed by Regulation (EC) No 1107/2009 of the European Parliament and the Council of the European Union – **Hazard based assessment** "the precautionary principle"

Brazil:

In Brazil three federal agencies (Health Ministry, Agriculture Ministry, and Environment Ministry) are involved in the pesticide registration process. Pesticide registration is conducted in accordance with Law 7.802/1989 (amended by Law 9.974/00), Decree 4.074/2002 (amended by Decree 5.981/2006), and respective Ordinances (very complex and time consuming)

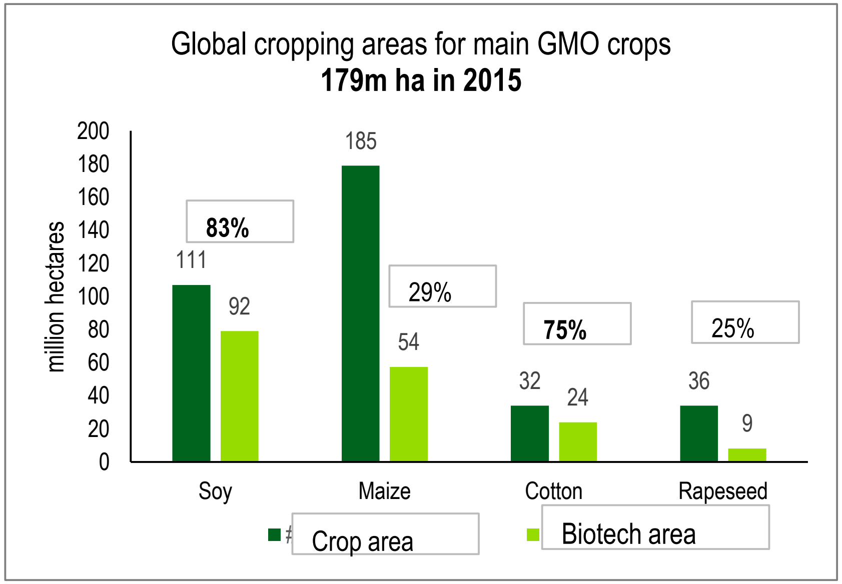
Japan:

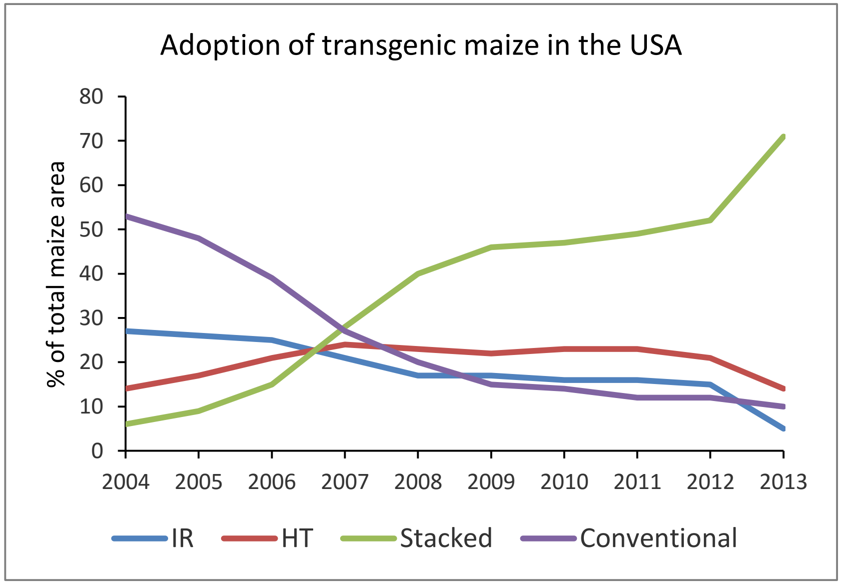
Pesticide Registration is regulated by the Ministry of Agriculture, Forestry and Fisheries (MAFF)

Factors affecting the market – longer term

What is the effect of GM crop on agrochemical industry

- Soybean, maize, cotton and rapeseed together account for almost 100% of the global GMO area.
- In those countries were GMOs are authorized, their share amounts to 80% - 100% of the total cropping area for these crops
- Trend towards stacked traits instead of only herbicide tolerance (HT) or insect resistance (IR) e.g. In the US maize production, stacked traits accounted for 71% of the total maize area in 2013





Xtend vs. Enginea vs. Enlist

Xtend

- Herbicide – a premix of **dicamba & glyphosate.**
- Managing of weeds before planting and as an over-the-top option on Roundup Ready® 2 Xtend crops during season.
- Extended application/post-emergence applications and planting flexibility.
- Developed in collaboration with BASF.
- For farmers an additional choice of glyphosate-resistant and tough-to-control broadleaf weeds.

Enginea

- Technologically advanced dicamba formulation.
- Provides an additional site of action for control of broadleaf weeds in **dicamba** tolerant crops.
- Controls more than 190 broadleaf weeds.

Enlist

- Combines performance of a new **2,4 D and glyphosate.**
- Exceptional control of a broad spectrum of weeds – including hard-to-control and resistant weeds.
- Advanced with Colex-D Technology enabling close to zero volatility, minimized potential for physical drift, decreased odor.

Formulation technology

The new battle ground

- Changes in "delivery method"
  - *e.g. China: ban on Paraquat AS solution leading to granular formulations?*
  - the shift from WP to WG
  - The increasing use of OD (OIL-DISPERSION) formulations CS (CAPSULE SUSPENSION) and ME (MICRO EMULSION)
  - New delivery methods *e.g.* allosperse®, a polymer-based delivery system
  - Chiral Separations for Next-Generation Agrochemicals (removing detrimental isomers)
  - Entostate®, is a proprietary wax micropowder which has unique electrostatic properties
  - Starpharma's Priostar dendrimer technology (ADAMA with 2,4-D)

- Unique co-formulations of different active ingredients creating new segments

- New **"go to market"** opportunities (*e.g.* two different salts of Glyphosate)

Crop Protection Market Trends

External factors

- role of distribution
- changing agricultural practices
- changing “pest” pressures
- investment community
- weather *etc etc*

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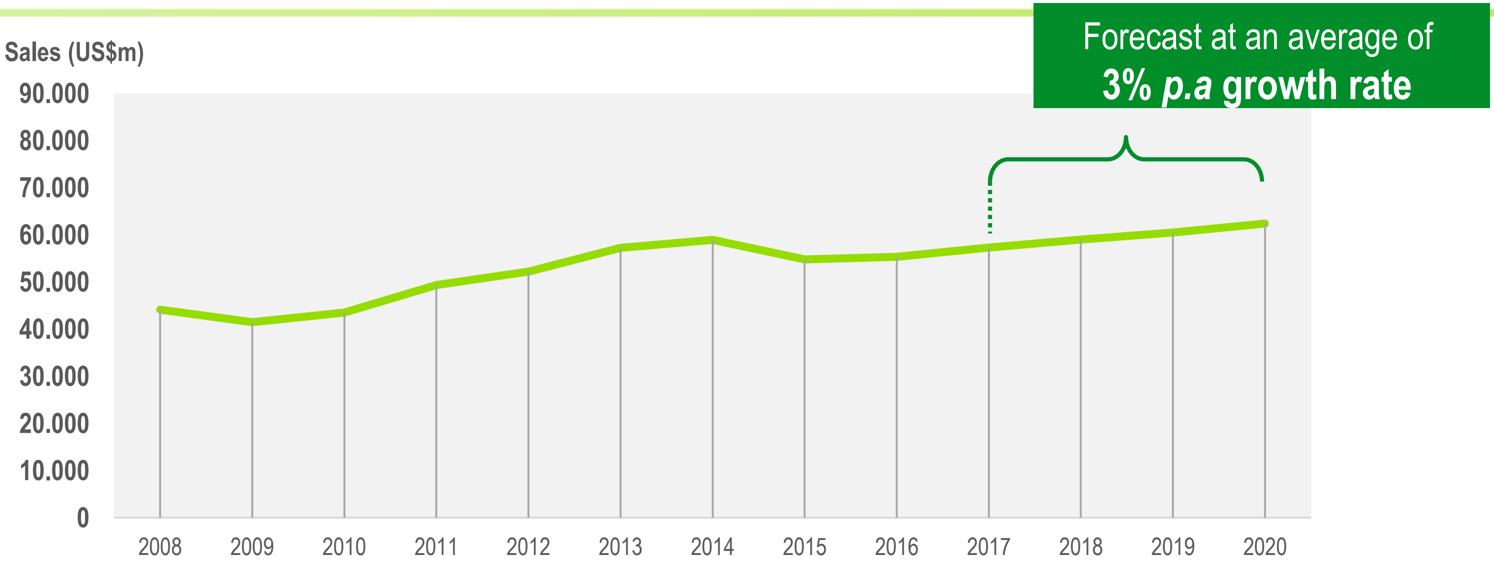
3. FUTURE PROSPECTS

“ Key Big Bullet Points“

- CP use in volume remained stable vs. 2015
- USA with less product use in 2016
- BRA + RU saw increasing volumes
- APAC negative growth – excluding India
- Currency impact turned a positive volume trend into a negative value trend
- Consumption in 2016 remained stable
- After another de-stocking in 2016, 2017 will see a modest market gr

Future prospects – Global

2016 -2020 (Summary)



- 2016 remains a difficult year before any major sign of recovery in 2017. That the industry will return to growth is without question as all the **"fundamentals"** for growth are in place.
- It is too early to say for sure how 2016 will pan out in the end but some indications suggest that the last ¼ of 2015 was better than expected leading to optimism about the 1st quarter of 2016. Commodity prices slightly recovered - key here as is overall confidence by growers as well as clearly the effects of weather.
- Currency fluctuations have been less severe in 2016
- Generics continued growth → decreasing value
- Registration bans for older active ingredients, however, will be favorable for the R&D industry
- Growth in seed traits will be smaller, hence in mid-term there won't be a further decline of the CP market (resistances, regulatory aspects (Europe), new/emerging disease/pest pressure (global warming)
- 3% growth per annum over the next 4 years (post 2016) is realistic

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