

Future Development of the Crop Protection and Seed Markets

Prepared by AgbioInvestor

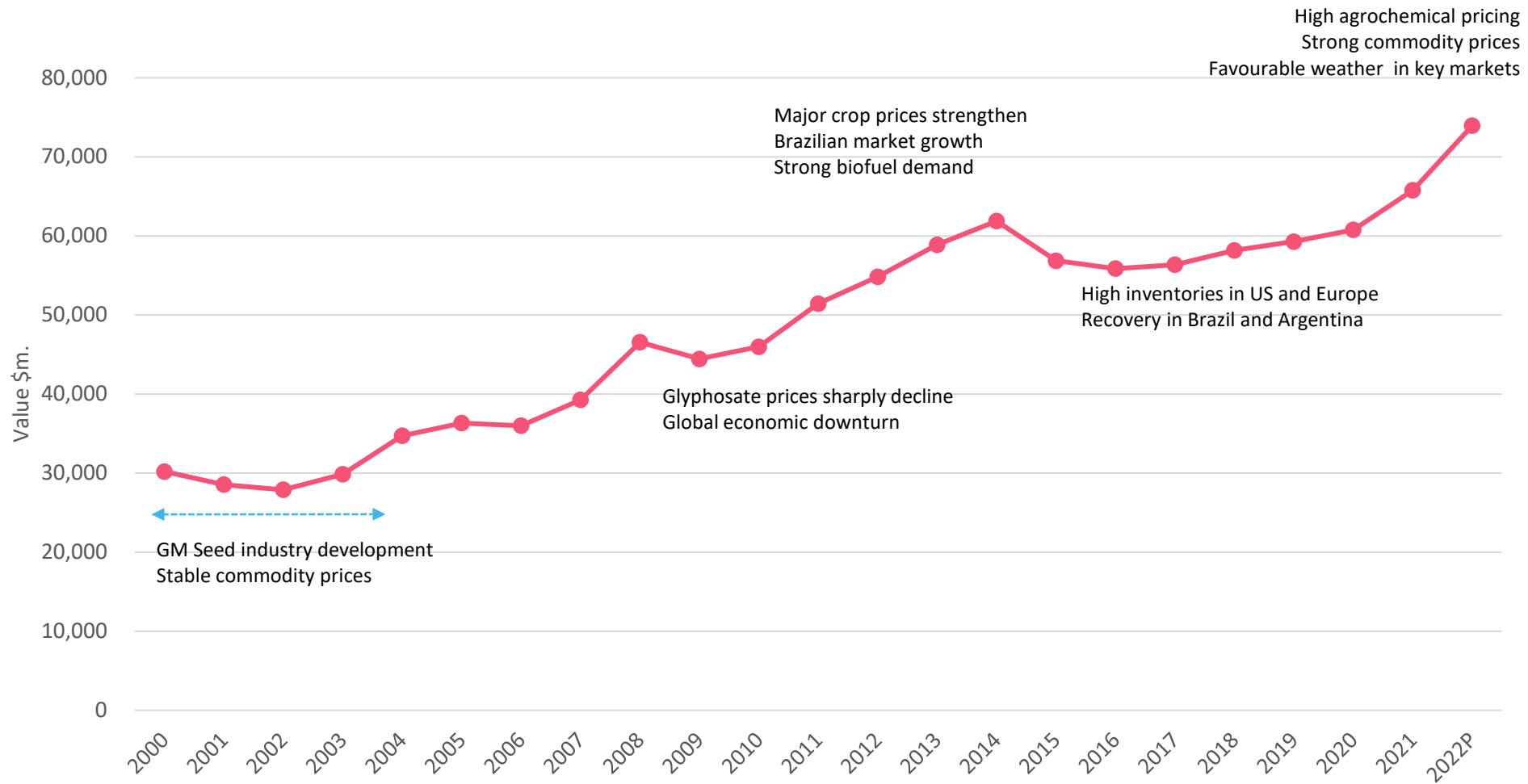
December 2022



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Global Crop Protection Market Performance





Key Factors

- **North America:** Significant benefit from high pricing environment. Increase in soybean, cotton, canola and wheat areas, but decline for maize. Strong early demand, particularly for herbicides. Boosted by continuation of robust commodity prices.
- **Central & South America:** High agchem pricing boosts value. Robust export demand and generally favourable market environment, particularly in Brazil. Very hot and dry conditions in certain regions impacted soybean yields. Safrinha maize crop in Brazil off to good start, although high pest pressure and cold weather a concern. Drought a concern in Mexico.
- **Asia Pacific:** Positive conditions in several key markets, notably India and China. China benefiting from high prices, increased focus on higher-value crops, high pest pressure. Australia continues improvement following poor 2020, also boosted by high prices. Offset by negative outlook for Japan, with switch away from rice to F&V somewhat detrimental to market value.
- **Europe:** Drought conditions in key regions (Mediterranean, France) during Q2 holding back market development. Negative impact from Ukraine situation. Strong pricing offset somewhat by further weakening of euro. More positive situation for winter crops.

Region	2021 (\$ m.)	2022 (\$ m.)	Nominal Change (%)	2022 Constant (\$ m.)	Constant Change (%)	Currency	Volume	Price
North America	10,333	12,663	22.5	12,703	22.9		++	+++
Central & South America	18,735	23,103	23.3	22,730	21.3	+	++	+++
Asia Pacific	20,330	21,887	7.7	23,684	16.5	--	+++	++
Europe	13,736	13,548	-1.4	15,069	9.7	---	+	+
MEA	2,641	2,736	3.6	3,189	20.8	---	+	++
WORLD	65,775	73,937	12.4	77,376	17.6	--	++	+++

- Negative impact 'blank' Zero to very minor impact + Minor impact ++ Moderate impact +++ Major impact



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Global Crop Protection Market 2023: Key Factors



GLOBAL

- Expectations for lower fertiliser prices could boost spending on crop protection
- Energy prices remain high, but expected to decline from peak levels of 2022
- Commodity prices expected to remain strong in 2023, but below 2022 levels
- Continuing weakness in major currencies (Chinese RMB, Japanese yen, euro, GBP)
- Agrochemical pricing stabilising from peaks of late 2021, but concerns over local lockdowns in China and high energy costs, particularly in Europe
- Possibility of recovery from drought in central and south Europe, south and west USA and parts of Africa



Crop Protection Market 2023 – Regional Development

NORTH AMERICA

- US maize areas projected to be up slightly, but soybean down
- Canada wheat area up strongly, but canola down
- Continuing high commodity prices, but lower than 2022
- Inflation and high input costs expected to impact farm profitability in 2023
- High inventories, particularly on-farm, following strong pre-buying in 2022
- Low water levels of Mississippi impacting US exports
- Potential for lower glyphosate and glufosinate prices

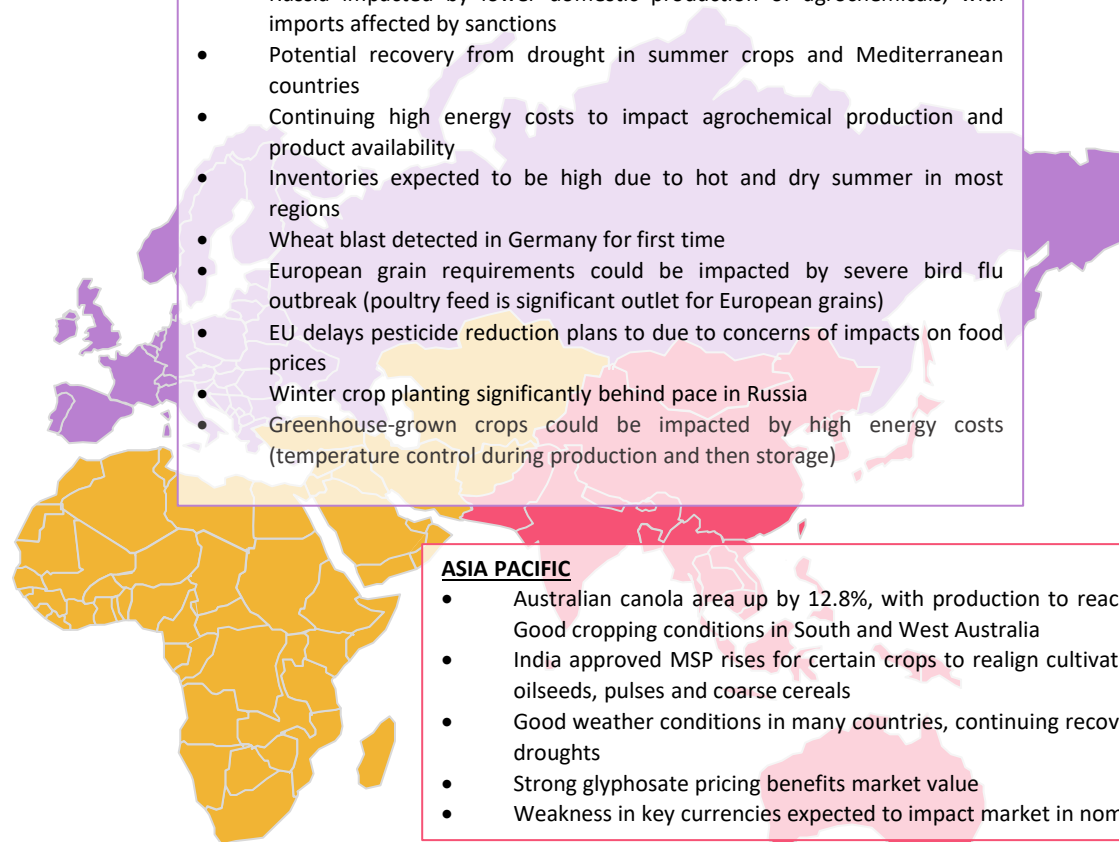


CENTRAL & SOUTH AMERICA

- Brazil soybean area up by 4.2%, maize up by 3.4%. First maize crop expected to be under intense pest pressure, but safrinha crop less so.
- Argentina wheat area down by 9.6%, soybean expected to increase
- Expectations of high pest pressure:
 - Soybean rust detected early in Brazil
 - Wet weather in key wheat growing regions of Argentina leading to high fusarium pressure
 - Root leafhopper impacting sugarcane crop in Brazil
- Planting of first maize crop in Brazil impacted by wet weather and subsequent high soil moisture
- China to boost maize imports from Brazil
- Wet weather during soybean planting in Paraguay could lead to increased disease pressure
- Pesticide shortages in Argentina, with distributors and growers struggling to source fungicides used for treating wheat and barley, herbicides for maize and soybeans and saflufenacil for fallow pre-plant.
- Pesticide imports in Brazil increased sharply during 2022 due to fears over supply issues, potentially resulting in inventory build-up; however, robust demand has eroded these concerns over inventory levels somewhat.

EUROPE

- Ukraine to benefit from Black Sea exports returning
- Russia impacted by lower domestic production of agrochemicals, with imports affected by sanctions
- Potential recovery from drought in summer crops and Mediterranean countries
- Continuing high energy costs to impact agrochemical production and product availability
- Inventories expected to be high due to hot and dry summer in most regions
- Wheat blast detected in Germany for first time
- European grain requirements could be impacted by severe bird flu outbreak (poultry feed is significant outlet for European grains)
- EU delays pesticide reduction plans due to concerns of impacts on food prices
- Winter crop planting significantly behind pace in Russia
- Greenhouse-grown crops could be impacted by high energy costs (temperature control during production and then storage)



ASIA PACIFIC

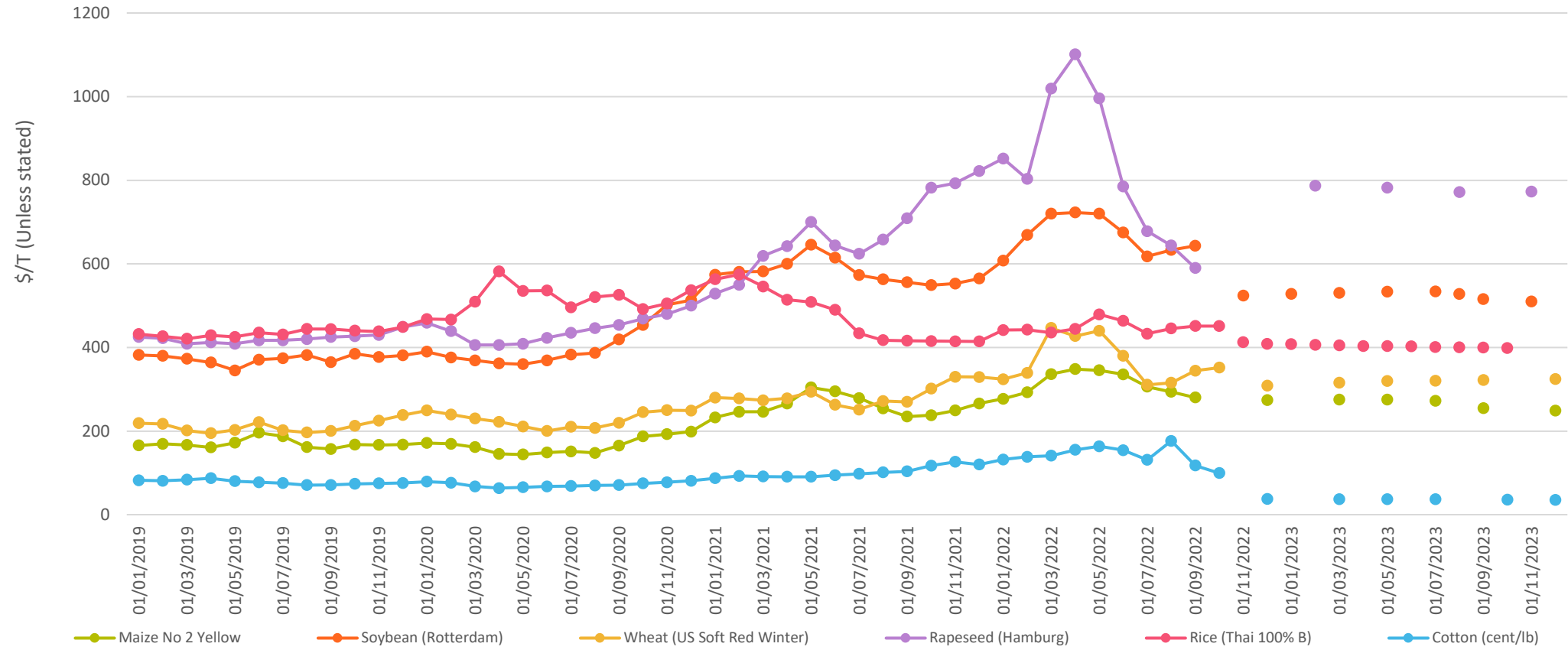
- Australian canola area up by 12.8%, with production to reach record levels. Good cropping conditions in South and West Australia
- India approved MSP rises for certain crops to realign cultivation in favour of oilseeds, pulses and coarse cereals
- Good weather conditions in many countries, continuing recovery from recent droughts
- Strong glyphosate pricing benefits market value
- Weakness in key currencies expected to impact market in nominal USD terms

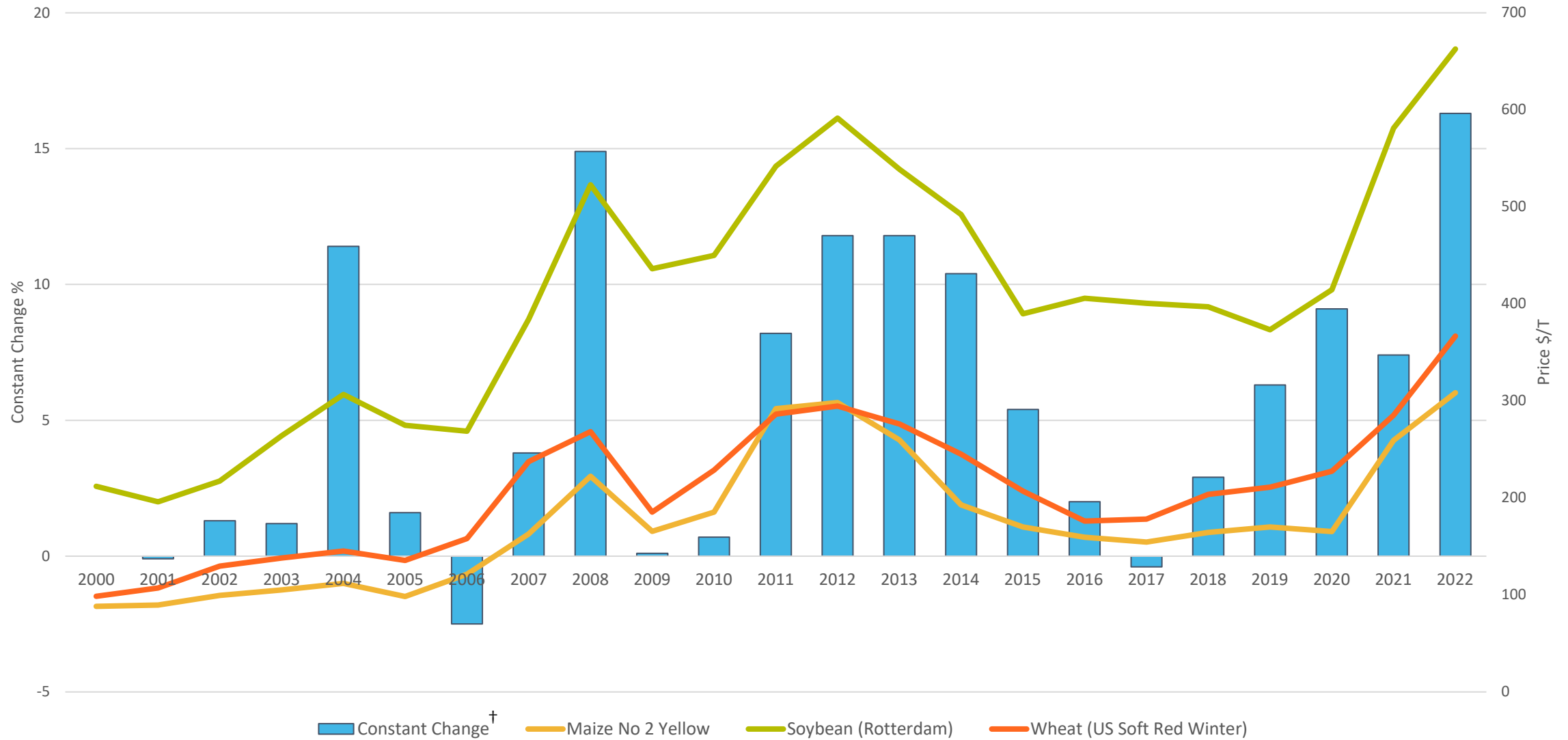


Crop Protection Market 2023 – Crop Commodity Price Expectations

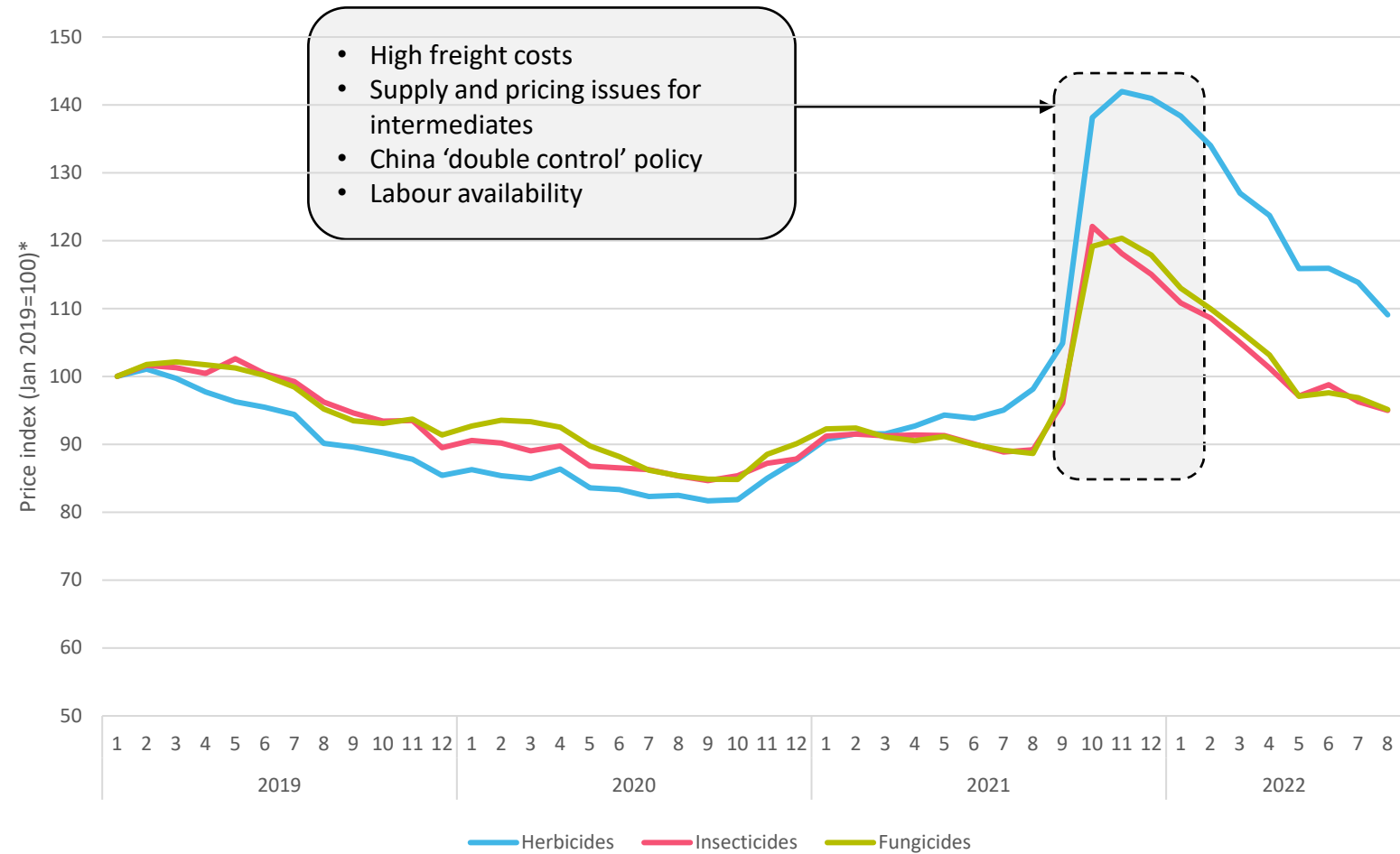
Record Commodity Prices in 2022

- Crop commodity prices peaking at record levels
- Poor weather conditions across several key production regions
- Ukraine conflict severely impacted global cereals and oilseeds supply
- Rising oil & gas prices increase demand for biofuels





Sector	Price Change 2021 (% per month)	Price Change 2022 (% per month) Jan-Aug
Herbicides	3.7	-2.9
Insecticides	2.0	-1.9
Fungicides	2.1	-2.1

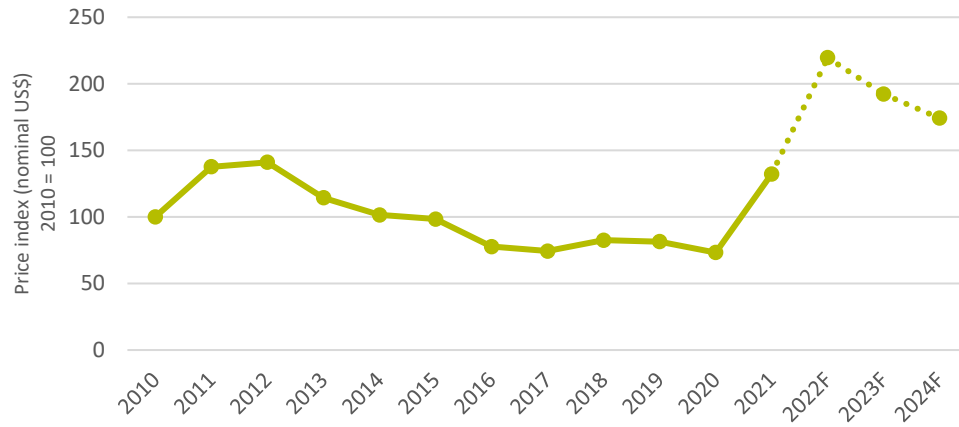


*Represents an average of ex-factory technical prices for ~100 AIs in China

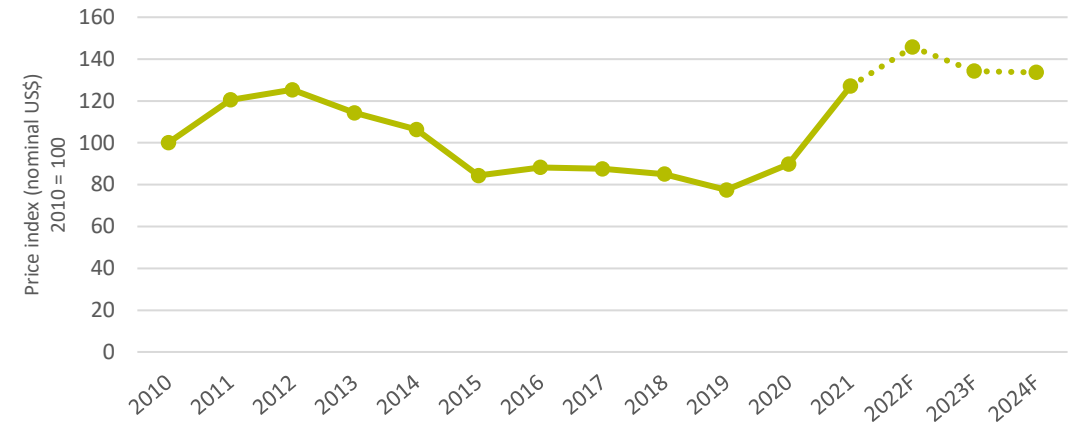


Price Development for Key Metrics

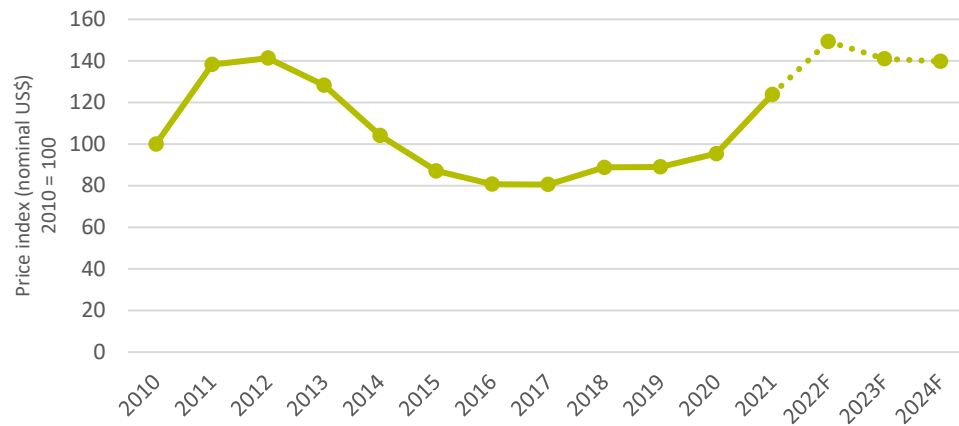
Fertilisers



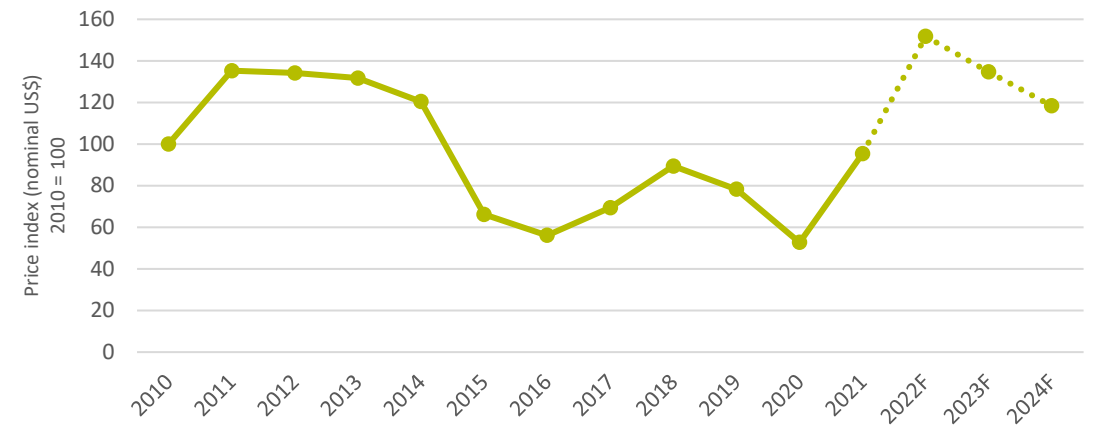
Oils and Meals



Grains



Energy



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Future Market Drivers

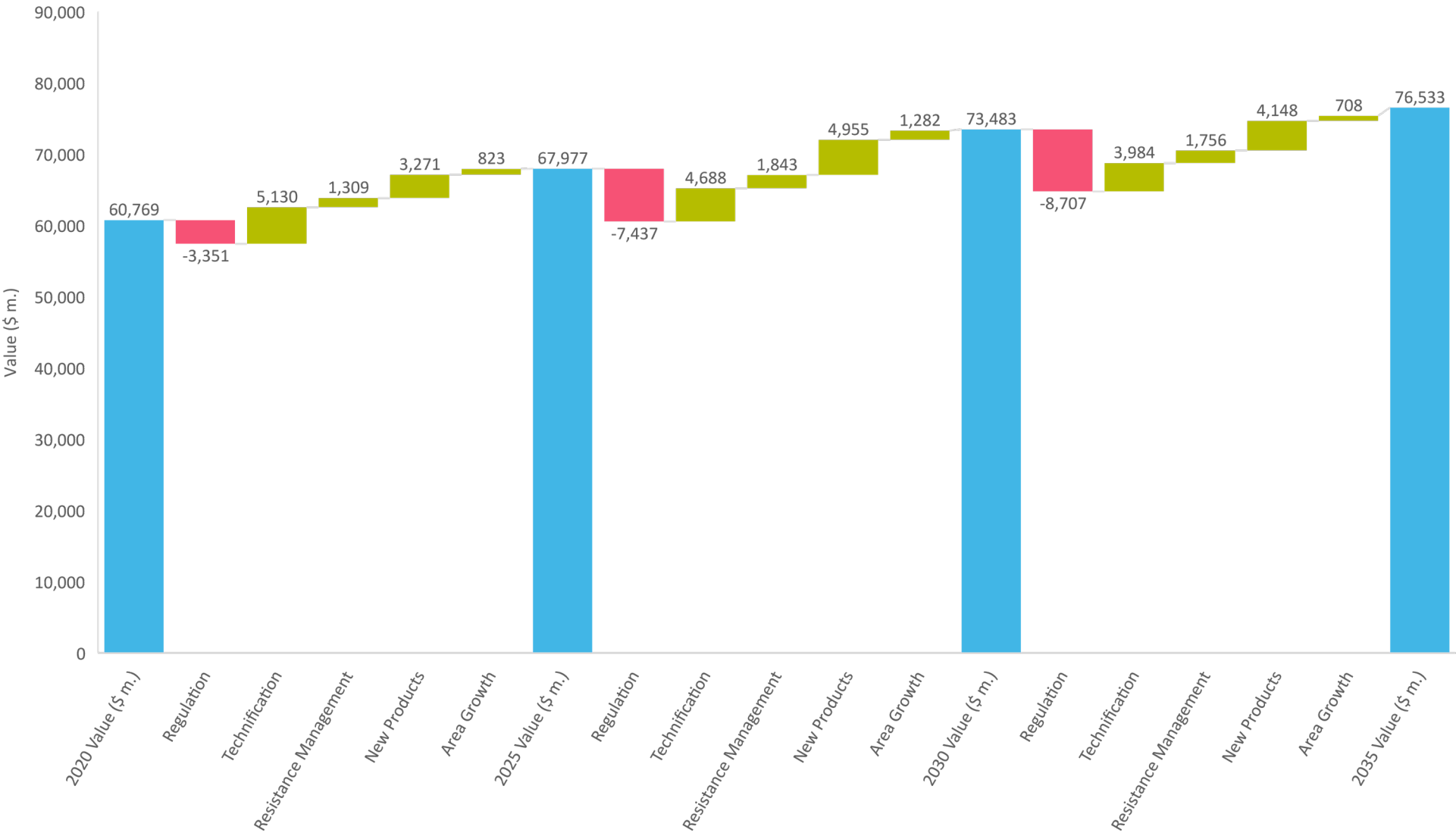


Future Market Drivers: Impact on Crop Protection Market Value

Positive	Negative
Pest resistance development drives need for new technology	New plant input trait acres (e.g. China) removing need for sprays
Increased technification in developing markets	Regulation removing products from market
Base treated acreage growth in developing markets (e.g. SE Asia, C&S America, Eastern Europe)	Variable rate and targeted application reducing volumes
Biofuel driving feedstock crop demand	Pesticide volume reduction targets in several significant markets (EU, China, Japan, Brazil, US, Australia, etc.)
Increased meat consumption (primarily in Asia) driving feed crop demand	Climate change leading to more frequent and more severe climatic impacts
Increased uptake of biologicals, benefiting from consolidation and a focus on improved technologies	Impacts from new GM seed technologies (inc. RNAi, sucking pest control, PPO/HPPD tolerance)
Market penetration of newly introduced and pipeline products with strong market potential	



Crop Protection Forecast 2025-2030-2035



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Traded Seed Market Performance



Planted Areas of Key Crops 2022* (Ha m.)							
	Maize	Soybean	Cotton	Rice	Rapeseed	Sunflower	Wheat
World	202.6	135.0	32.4	164.4	40.1	27.1	220.4
1Yr (% Change)	-2.3	3.1	0.3	-1.0	6.1	-5.8	-0.8
USA	35.9	35.4	5.6	0.9	0.9	0.7	18.5
1Yr (% Change)	-5.0	0.3	23.0	-12.2	2.8	31.0	-2.1
Canada	1.5	2.1			8.7		10.3
1Yr (% Change)	4.4	-0.9			-3.9		9.4
EU27	8.8	1.2			5.9	4.8	24.0
1Yr (% Change)	-3.8	8.6			8.6	7.6	0.0
China	43.0	9.4	3.0	30.0	7.1	1.0	23.6
1Yr (% Change)	-0.7	11.3	-3.2	0.3	4.4	7.1	0.1
India	10.0	12.7	13.0	45.5	8.6	0.3	30.5
1Yr (% Change)	-1.0	1.6	7.0	-1.9	4.9	10.0	-1.9
Brazil	21.6	41.5	1.6	1.6			3.0
1Yr (% Change)	8.2	4.9	16.8	-3.6			10.6
Argentina	10.6	16.1	0.5	0.2		2.0	6.8
1Yr (% Change)	9.3	-3.0	22.0	0.0		17.6	0.0
Australia	0.053	0.027	0.6	0.0677	3.2	0.019	13.0
1Yr (% Change)	4.0	12.4	113.6	46.0	4.5	10.0	0.0
South Africa	2.6	0.9				0.7	
1Yr (% Change)	-4.8	11.9				40.4	

Region	2020	2021	Growth (21/20%)	2022F*	Nominal Growth (%)	Constant Growth (%)
North America	14,979	15,325	2.3	16,397	7.0	6.9
Central & South America	8,208	8,459	3.1	9,812	16.0	14.1
Asia Pacific	9200	9414	2.3	9,790	4.0	3.4
Europe	6,474	6,723	3.8	6,729	0.1	5.2
MEA	2,012	2,078	3.3	2,140	3.0	2.8
WORLD	40,874	41,998	2.7	44,869	6.8	7.1

- **North America:** Fall in maize areas, however, any lost value will likely be replaced by higher seed prices brought on by high crop prices. Greater proportion of the total soybean area planted with higher priced Xtend and Enlist products. Large increase in US cotton areas following two years of decline. A decline in Canadian canola area as growers move into maize and wheat. Strong company performance across all major crops except canola. Positive impact of currency.
- **Central & South America:** Greater soybean area in Brazil and launch of new technology (Intacta 2 Xtend and Conkesta E3). Fall in Argentina soybean area due to attractiveness of maize and strong export taxes. Maize areas for both countries expected to have grown. Brazil cotton increasing in area following a decline in the previous year. Strong company performance across all major crops. Positive impact of currency.
- **Asia Pacific:** Smaller maize and areas in China and India, although company performance looks positive. Company performance indicates a fall in vegetable and soybean market values but a rise in rice. Positive impact of currency in China but negative in India, Australia and Japan.
- **Europe:** Greater rapeseed areas across the region leading to strong company sales and likely market value improvement. Smaller maize area and negative exchange rate into Euro more than offset by higher domestic seed prices. Vegetable and cereal sales lower, potentially indicating a fall in regional market values.



Positive start in South America

- Brazil – maize & soybean areas up
- Argentina – lower maize area but greater soybean

Early indicator that US growers will plant more maize and less soybean

Planted Areas of Key Crops 2023* (Ha m.)							
	Maize	Soybean	Cotton	Rice	Rapeseed	Sunflower	Wheat
USA	37.7	35.1					19.2
1Yr (% Change)	5.0	-0.8					3.8
Brazil	22.3	43.2	1.6	1.5			3.1
1Yr (% Change)	3.4	4.2	2.6	-6.2			11.4
Argentina	10.2	16.5	0.5	0.0		2.2	6.1
1Yr (% Change)	-3.8	2.5	0.0	#DIV/0!		10.0	-9.6

Negatives

- Falling crop prices
- So far, poor exchange rates into US dollar

Region	2021	2030	Growth (CAGR %)
North America	13,803	13,989	0.1
Central & South America	6,521	8,355	2.8
Asia Pacific	978	6,585	23.6
Europe	44	37	-2.0
MEA	281	363	2.9
World	21,627	29,329	3.4

Crop	2021	2030	Growth (CAGR %)
Maize	11,363	17,806	5.1
Soybean	7,117	8,076	1.4
Cotton	1,936	2,322	2.0
Canola	981	919	-0.7
Sugarbeet	230	206	-1.2
World	21,627	29,329	3.4

2030 GM Seed Market Drivers

Maize

- Global area expected to nearly double
- Chinese adoption
- Greater areas in Philippines and Vietnam
- New technology
 - RNAi, short stature corn

Soybean

- Area expansion in the America's
- Chinese adoption
- New technology
 - Multiple MOA HT
 - Conkesta E3
 - Intacta 2 Xtend

Cotton

- Area expansion in USA, India, Brazil and Africa

Canola

- Declining areas in Canada, US and Australia

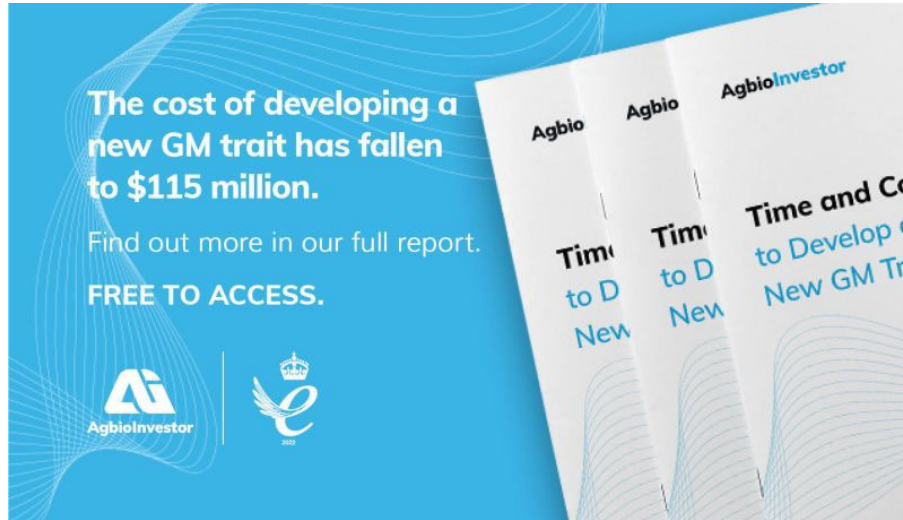
Sugarbeet

- Small area decline in the US

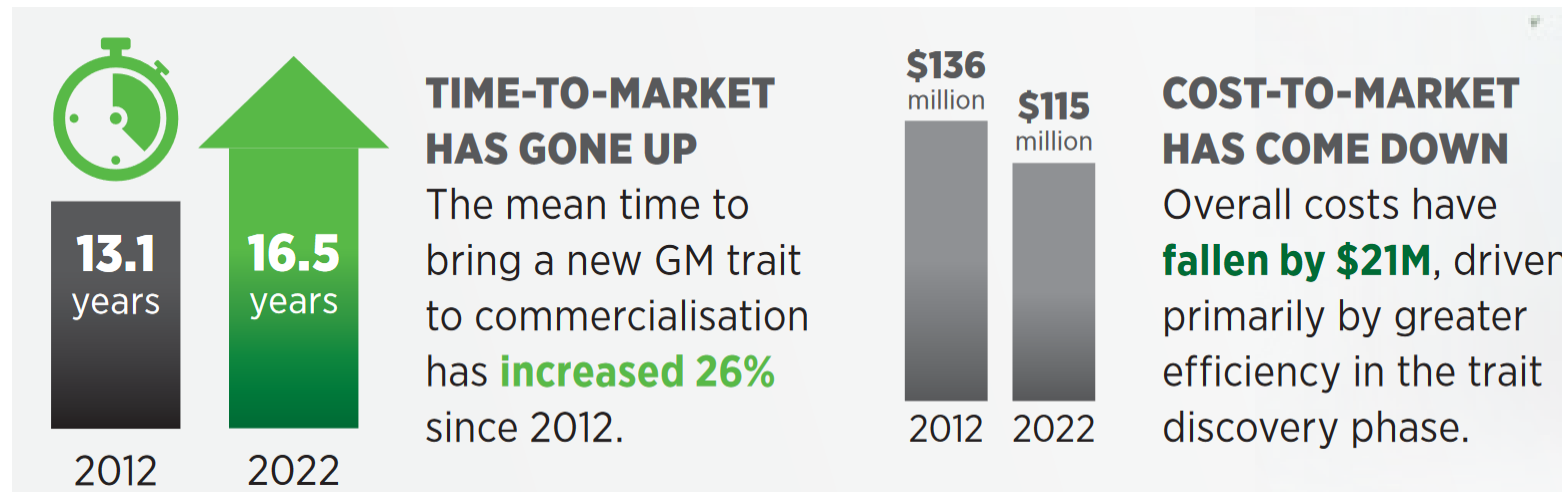


Company	Crop	Trait / Product	Geographies	Launch Date	Comments
Bayer	Maize	VPro4	South America	2021	VT3 + RNAi ~ 200,000 Ha
Bayer	Soybean	Intacta 2 Xtend	South America	2022	320,000 Ha
Corteva	Soybean	Conkesta E3	South America	2022	
Bayer	Maize	SmartStax Pro	North America	2022	40,000 Ha
Corteva	Maize	Vorceed	North America	2023	Qrome + RNAi
Syngenta	Sunflower	AIR	Europe	2023	non-GM IMI & STS Ukraine and Spain
Bayer	Maize	Short Stature Corn	North America	2023	Non-GM
Corteva	Cotton	W3E1	USA	2023	Lacks GLY tolerance
Corteva	Maize	PowerCore Ultra Enlist	North America	2023	PowerCore + Vip
Bayer	Maize	VT4Pro	North America	2024	Genuity Trecepta + RNAi
Corteva	Maize	Reduced Stature Corn	North America	~2025	Non-GM
Bayer	Soybean	5-way HT stack	North America	2027	HPPD, 2,4-D, GLY, GLU, Dicamba
BASF, Corteva, M.S Technologies	Soybean	Enlist E3 + Nematode	Americas	End of 2020's	
Corteva	Maize	Reduced Stature Corn	North America	End of 2020's	
Corteva	Soybean	4-way HT stack	North America	2030's	2,4-D, GLY, GLU, PPO
Corteva	Maise	3rd Gen CRW	North America	2030's	
Corteva	Soybean	2nd Gen Lep	South America	2030's	
Corteva	Maize	Higher Yield	Americas	2030's	
BASF	Soybean	5-way HT stack	North America	2040's	HPPD, 2,4-D, GLY, GLU, PPO
Bayer	Maize	Short Stature Corn		Phase III	
Bayer	Maize	4th Gen Col		Phase III	
Bayer	Maize	4th Gen HT		Phase III	
Bayer	Soybean	3rd Gen IR		Phase III	
Bayer	Canola	Dicamba Tolerance		Phase III	With BASF
Bayer	Sugarbeet	2nd Gen HT		Phase III	With KWS
Bayer	Soybean	6-way HT stack		Phase II	HPPD, 2,4-D, GLY, GLU, Dicamba, PPO
Bayer	Maize	5th Gen Lep		Phase II	
Bayer	Maize	5th Gen HT		Phase II	





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