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Industry report on global and Indian crop protection market

Parijat Industries

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by S&P Global

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Global macroeconomic overview

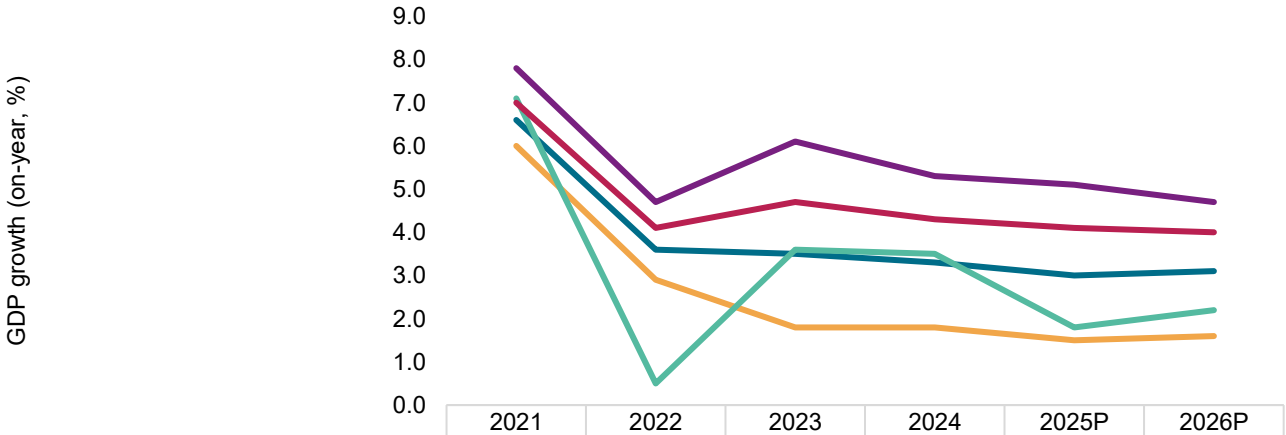
The global economy has shown remarkable resilience in recent years, navigating the supply chain disruptions in the aftermath of the COVID pandemic as well as the inflationary pressures heightened by geopolitical uncertainties.

According to the International Monetary Fund ("**IMF**") World Economic Outlook for July, calendar year (**CY**) 2025, global growth is projected at 3.00% in CY 2025, revised upwards from the April forecast of 2.80%, and edging up to 3.10% in CY 2026. This strength is largely attributed to front-loading of trade activity ahead of tariffs, lower-than-expected effective tariff rates, improved global financial conditions and fiscal expansion in key jurisdictions**.**

Among advanced economies, growth in the United States ("**US**") will fall sharply to 1.90% in CY 2025, compared with 2.80% in CY 2024, on account of greater policy and trade uncertainties, and softer demand momentum. Growth in the Euro area is estimated at 1.00% in CY 2025 as compared to 0.90% in CY 2024.

India continues to stand out as a bright spot, with the IMF projecting a strong 6.40% gross domestic product **("GDP")** growth in CY 2025, building on its robust post-pandemic recovery.

Figure 1: Global growth outlook projections (Real GDP, on-year change in %)



	2021	2022	2023	2024	2025P	2026P
World	6.6	3.6	3.5	3.3	3.0	3.1
Advanced economies	6.0	2.9	1.8	1.8	1.5	1.6
Emerging and Developing Asia	7.8	4.7	6.1	5.3	5.1	4.7
Emerging and Developing Europe	7.1	0.5	3.6	3.5	1.8	2.2
Emerging market and developing economies	7.0	4.1	4.7	4.3	4.1	4.0

Source: IMF World Economic Outlook (July 2025)

India overtook Japan to become the world's fourth-largest economy in May 2025, with a $4 trillion economy, trailing only the US, China and Germany. Over the medium term, India is set to become a dominant player in the global economy, with IMF's projections indicating that it will overtake Germany to become the third-largest economy by CY 2027

Table 1: GDP growth trend comparison - India vs other economies (real GDP, on-year change in %)

Country name	2021	2022	2023	2024	2025P	2026P
Brazil	4.80	3.00	3.20	3.40	2.30	2.10
China	8.60	3.10	5.40	5.00	4.80	4.20
India	**9.70**	**7.60**	**9.20**	**6.50**	**6.40**	**6.40**
Kazakhstan	4.10	3.20	5.10	4.80	5.00	4.30
Pakistan	5.80	6.20	-0.20	2.50	2.70	3.60
Russia	5.90	-1.40	4.10	4.10	0.90	1.00
US	6.10	2.50	2.90	2.80	1.90	2.00

P – projected

Source: IMF economic database, Crisil Intelligence

Note: The group of advanced economies includes the seven largest in terms of GDP at market exchange rates (US, Japan, Germany, France, Italy, the United Kingdom ("UK ") and Canada), 20-Euro area economies and 17 other advanced economies. The group of emerging market and developing economies (155) comprises all those that are not classified as advanced economies.

Note: India numbers are on a Fiscal Year basis (April-March), where CY 2025 would correspond to FY 2026; on calendar year basis for other countries.

In the Middle East and Central Asia, growth is projected to accelerate to 3.40% in calendar 2025 and 3.50% in CY 2026. Growth is expected to be relatively stable in 2025 in sub-Saharan Africa at 4.00%, before picking up to 4.30% in CY 2026

Global manufacturing: India as a strategic alternative to China

Post COVID, the global manufacturing landscape is undergoing a significant transformation, with India rapidly positioning itself as a viable alternative to China.

1. Factors driving the shift away from China

The global manufacturing landscape is undergoing a realignment, with several structural challenges prompting companies to diversify away from China:

- **Rising labour costs**: Manufacturing wages in China have risen to ~$7.00 an hour today from ~$0.30 an hour in 2000.
- **Shrinking labour force**: Driven by an ageing population and lower birth rates.
- **Stricter regulatory norms**: Increasing environmental and labour compliance costs.
- **Uncertainties surrounding** US-China trade and supply chain disruptions post-COVID.
- **Export restrictions and production curbs**: Periodic output cuts due to China's environmental and energy policies.
- **Supply chain vulnerabilities**: Overdependence on China exposed during the pandemic and through regional conflicts.

These challenges are driving global firms to adopt a "China Plus One" strategy, shifting parts of their supply chain to more stable and cost-effective destinations.

2. India's competitive advantages

India is rapidly emerging as an alternative manufacturing destination, driven by a favourable cost structure, demographic advantage and proactive government initiatives aimed at enhancing industrial capacity.

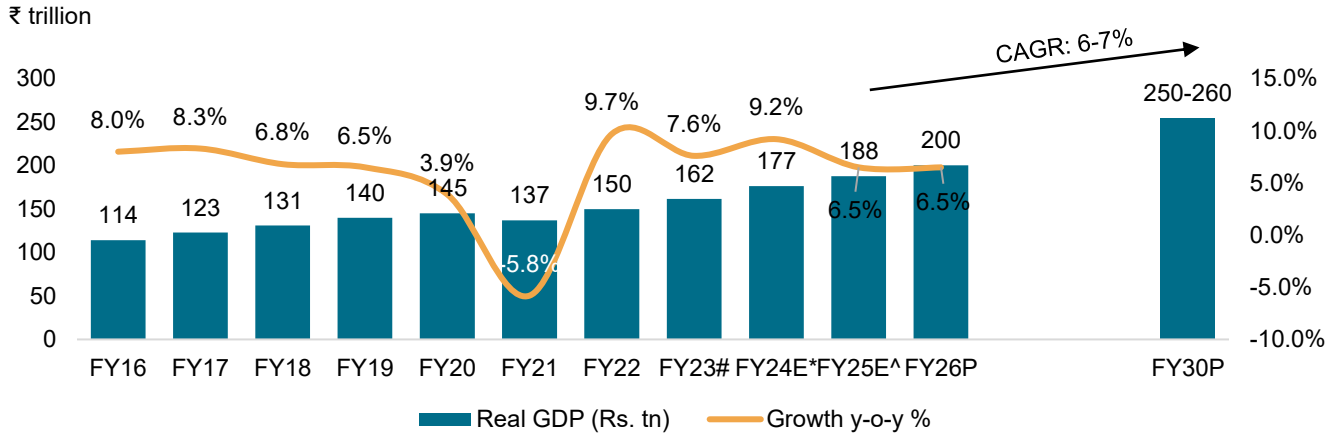
- **Cost-effective manufacturing base:** The cost of labour in India (~$1.50 per hour) is significantly lower than China, making it attractive for cost-sensitive sectors such as agrochemicals.
- **Demographic dividend and domestic demand**: India's young workforce (median age 28) and growing 500 million-strong middle-class support both manufacturing and domestic agrochemical demand.
- **Strong policy support and investment incentives**: Make in India and the ₹ 1,970 billion production Linked Incentive ("**PLI**") scheme boosting manufacturing, industry is lobbying for agrochemical inclusion in PLI, exports could cross ₹ 800 billion in four years.
- **Integrated infrastructure and logistics network**: Industrial corridors, port modernisation (Sagarmala programme), and projects such as the Jalna Dry Port and Vadhavan Port in Maharashtra enhance export connectivity for agrochemicals.
- **Political stability and favourable business environment**: Stable political environment, liberal foreign direct investment norms ("**FDI**") norms and ease of doing business reforms strengthen India's case as a resilient manufacturing hub.

Indian macroeconomic overview

Gross domestic product growth

Despite the ongoing global uncertainties, India has maintained its position as one of the fastest-growing economies. The country's real GDP is estimated to have grown at 6.50% on-year in FY 2025, according to the National Statistical Office's ("**NSO**")'s second advance estimate of national income. Crisil Intelligence expects India's GDP growth to remain stable at 6.50%, with some downside risks in FY 2026. The combination of easing inflation, rate cuts by the Monetary Policy Committee of the Reserve Bank of India and the personal income tax cuts announced in the budget for FY 2026 are expected to benefit households and boost consumption.

Figure 2: Real GDP growth



*Note: E - estimated, P - projected; GDP growth till FY 2022 is actual, FY23 is final estimate *FY24E is first revised estimate, ^FY25E is second advanced estimate, FY26 is projected based on Crisil Intelligence estimates and that for FY 2026-2030 is based on IMF estimates.*

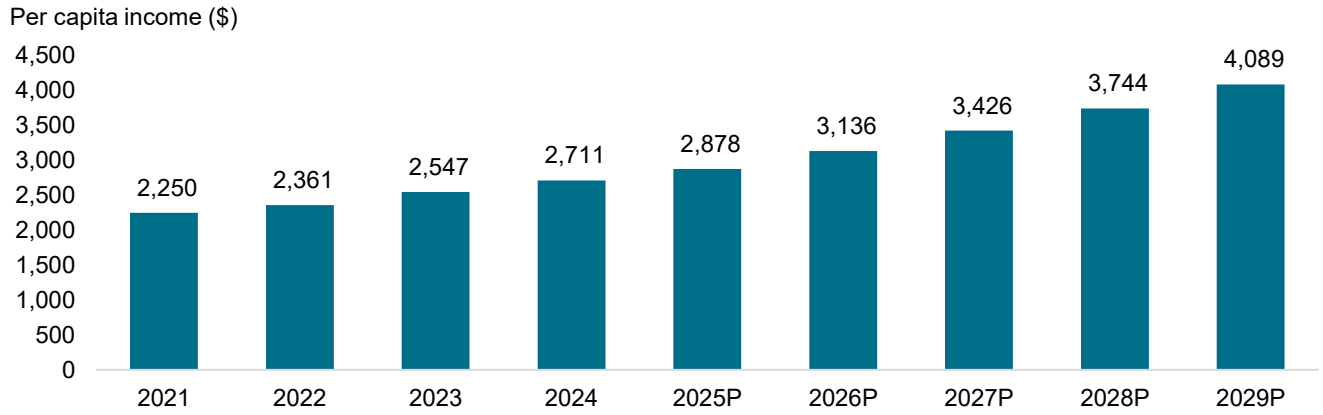
Source: NSO, IMF (World Economic Outlook – October 2024), Crisil Intelligence

Over FY 2022 to 2025, the Indian economy outperformed its global counterparts. Going forward, the Indian economy is expected to remain strong and one of the fastest growing economies.

Gross domestic product per capita

Though India's rank in the World GDP Ranking 2025 list is fourth, the per capita income is substantially lower. India's per capita income of the population for 2025 is $2,880 (~₹ 240,000). Multiple factors have led to low per capita income in India, compared with top GDP countries.

Figure 3: Per capita income growth trend in India



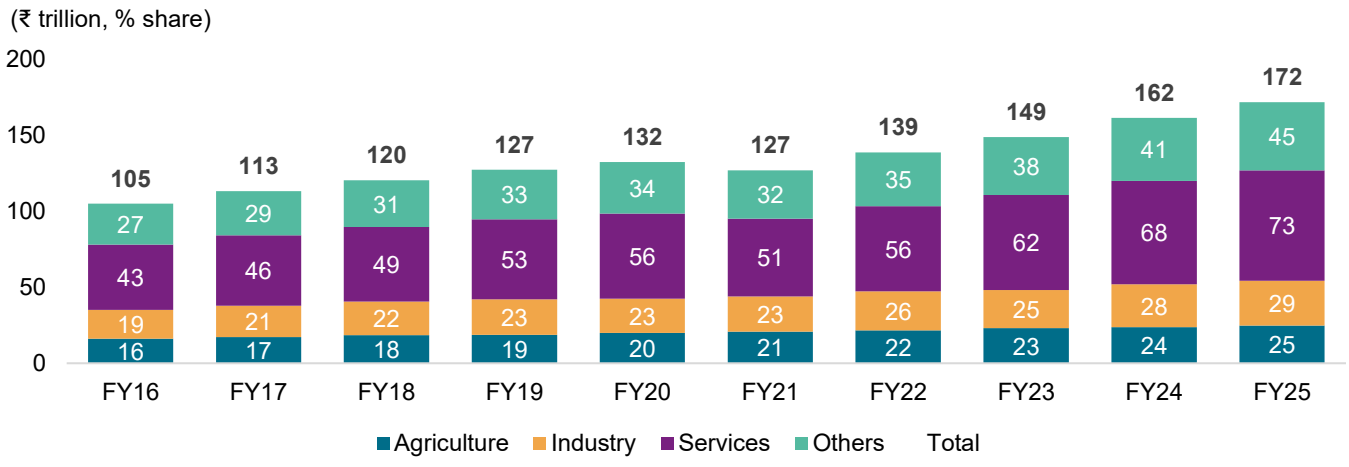
Source: IMF World Economic Outlook, Crisil Intelligence

India stands out with one of the fastest growth trajectories among major economies. The country's per capita income is expected to rise to $4,089 in 2029 from $2,878 in CY 2025, at a compound annual growth rate ("**CAGR**") of 9.20% This projected sharp increase is seen driven by domestic consumption, manufacturing push, infrastructure development and digital inclusion. The rising income levels in India suggest a growing ability among farmers and rural consumers to afford higher-quality agricultural inputs, including branded agrochemicals and integrated crop protection systems.

Contribution of key sectors to gross value added

India's gross value added ("**GVA**") has shown consistent growth over the years, barring a dip in FY 2021 on account of the pandemic. The services sector continues to be the largest contributor, with services exports—comprising half of total exports—growing faster than the overall economy. Manufacturing GVA clocked a CAGR of 5.40% between FY 2016 and FY 2024, supported by initiatives such as Atmanirbhar Bharat, Make in India and the PLI scheme. However, much of the PLI-linked capital expenditure is yet to materialise. The industry's GVA share remains at 28.00% (FY 2024), but upcoming investments are expected to boost manufacturing and exports. Agriculture GVA also recorded a 4.90% CAGR (FY 2016-2024) in the same period, driven by government support through schemes such as PM-Kisan, normal monsoons and favourable commodity prices.

Figure 4: Contribution of key sectors (industry, agriculture and services) to GVA



Source: MoSPI, Crisil Intelligence

Note: Other sectors include mining and quarrying from primary sector, electricity, gas, water supply and other utility services and construction from secondary sector, public administration, defence and other services from tertiary sector.

Table 2: Sector-wise growth rate FY 2016-2020 vs FY 2021-2025

Sector	CAGR (%)	
	FY 2016-2020	FY 2021-2025
Agriculture	5.40%	4.50%
Industry	4.40%	6.10%
Services	6.80%	9.20%
Others	6.00%	9.00%
Total	**6.00%**	**7.90%**

Source: MoSPI, Crisil Intelligence

Factors making India a preferred destination for manufacturing

- Cost competitiveness, infrastructure, and reforms: India is emerging as a preferred destination for global manufacturing due to its strong cost advantage and supportive infrastructure. Average monthly manufacturing wages in India ($258) are significantly lower than in China ($341) and Indonesia ($285) (*source: Crisil Intelligence*). The country hosts over 3,900 industrial parks spread over nearly 1 million acres, equipped with essential utilities and connectivity to ports and economic corridors. Regulatory reforms have also played a key role—India's Ease of Doing Business ranking improved to 63 in 2019 from 142 in 2014. Simplified business procedures, single-window clearances, implementation of the goods and services tax ("**GST**"), and digitised tax and customs processes have significantly improved business environment.
- **Labour availability and skill development:** India's vast and youthful labour force is another major strength, with a working-age population exceeding 900 million and nearly 1.5 million engineering graduates produced annually. This is supported by a wide network of vocational training programmes and national skill development initiatives that align workforce skills with industry needs. The talent pool caters to both traditional and advanced manufacturing sectors. Additionally, India has built strong capabilities in agricultural research and higher education, with over 75 state agricultural universities, four deemed universities, and Indian Council of Agriculture Research ("**ICAR**") -affiliated institutes, adding depth to its technical workforce.
- **Strategic location and market potential:** India's geographical position in the Indo-Pacific trade routes provides strategic access to high-growth markets such as Association of Southeast Asian Nations ("**ASEAN**"), the middle eastern countries, and Africa, as well as Europe and North America. This makes it an ideal hub for diversified supply chains. Domestically, a growing middle class—projected to surpass 70.00% of the households by 2030—offers a substantial consumer base, complementing export opportunities. Together, these factors are driving India's transformation into a global manufacturing hub, attracting investments and enabling long-term industrial growth.

Impact of geopolitical uncertainties on India's manufacturing sector

Disruptions in shipping and trade flows: Ongoing geopolitical uncertainties have disrupted critical shipping routes. This has resulted in increased insurance premiums and higher freight rates due to route diversions. These developments pose risks to India's manufacturing sector, particularly in terms of input costs and supply chain reliability.

Additionally, the Russia-Ukraine conflict had disrupted the global supply of fertilizers, grains, and energy, contributing to price volatility and trade restrictions. This has impacted on food security globally and driven up agri-commodity prices. Maize and wheat prices had risen by 27.00% and 13.00% respectively between January 2021 and January 2023. India's agrochemical sector had been affected by supply shortages and rising input costs. However, India had leveraged discounted imports of oil and fertilizers from Russia, leading to a sharp rise in bilateral trade. In 2022, Russia had become India's one of the largest suppliers of oil and fertilizers.

Capital flows and investment outlook: India's manufacturing sector encountered further challenges as foreign investment slowed down between 2021 and 2023**.** The decline in FDI during this period, coupled with some investors opting for alternative destinations that offer more attractive fiscal incentives, has significant implications for India's long-term industrial capacity building and technology absorption capabilities.

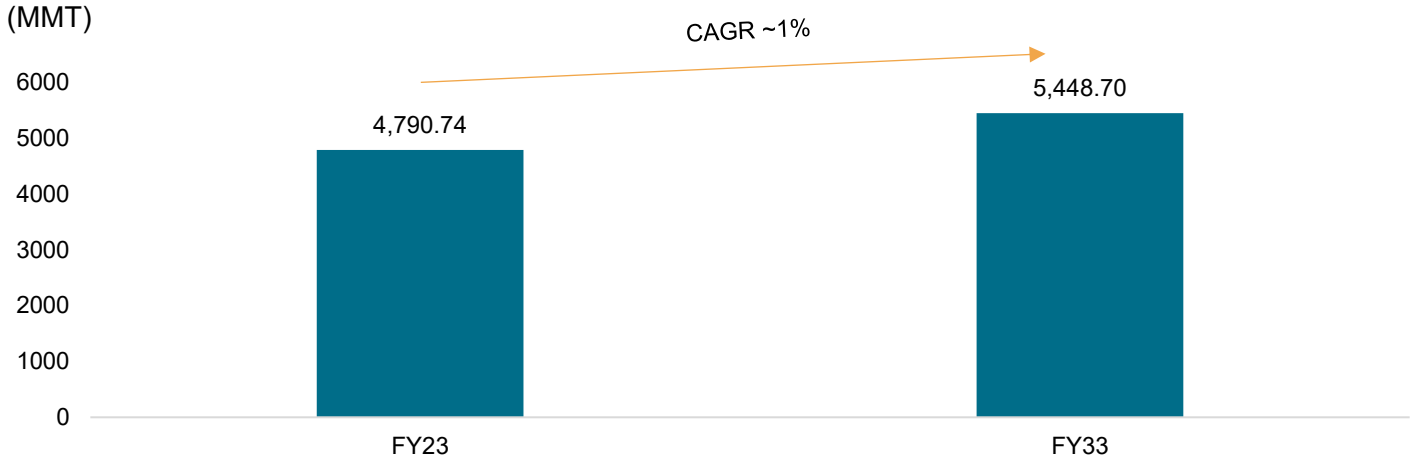
Global agriculture sector

Overview

By 2050, global population is projected to reach 9.80 billion, leading to changes in food consumption patterns and demand for various crops. To meet this demand, agricultural production must increase nearly 70.00% by 2050 from 2005-2007 levels, with most of this growth coming from yield improvements and increased cropping intensity.

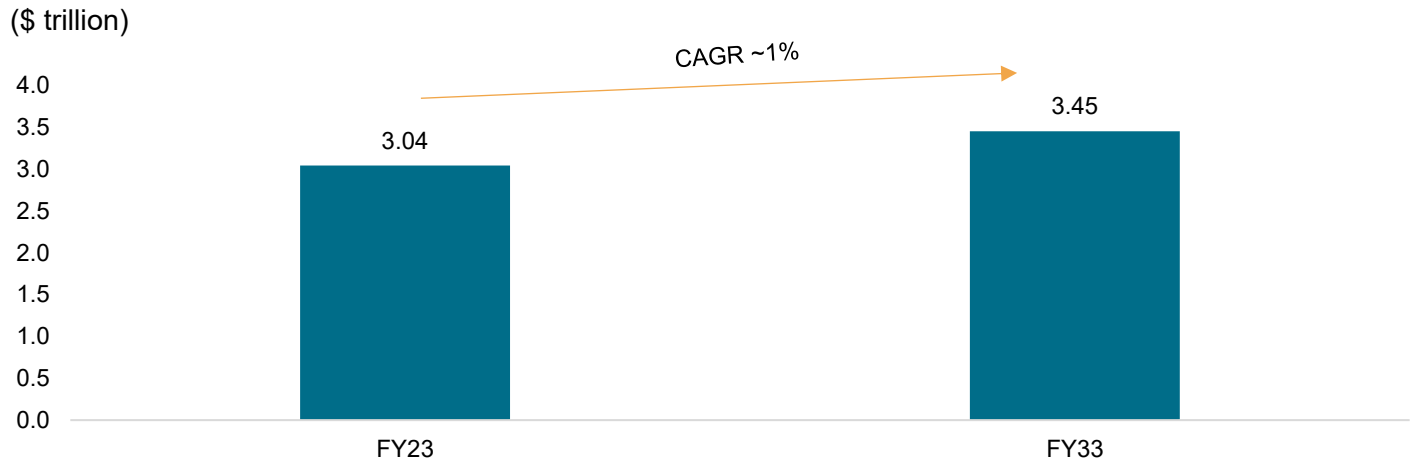
The agricultural sector has undergone significant transformation, with output increasing nearly four times between 1961 and 2020. However, future growth will need to be achieved with limited land expansion, as arable land is projected to expand only 70 million hectares globally. Water scarcity also remains a concern, particularly in South Asia and the Middle East/North Africa.

Figure 5: Agriculture and allied sector production



Source: OECD-FAO Agricultural Outlook 2024-2033, Crisil Intelligence

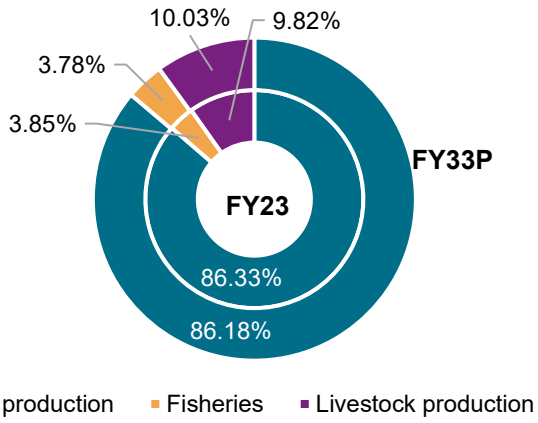
Figure 6: Net value of agricultural and allied sector



Source: OECD-FAO Agricultural Outlook 2024-2033, Crisil Intelligence

The global net value of agriculture and allied sectors is expected to register a CAGR of ~1.00% between FY 2023 and 2033 and to reach $ ~3.50 trillion, driven by factors such as increase in production led by growth in productivity and area under cultivation.

Figure 7: Segment-wise share in global production FY 2023 and FY 2033P

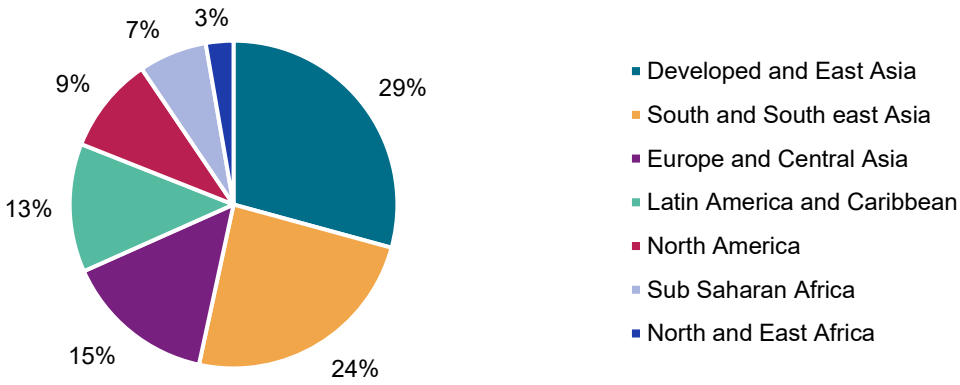


Source: OECD-FAO Agricultural Outlook 2024-2033, Crisil Intelligence
Note: The inner pie represents share in FY 2023 while the outer pie represents share in FY33

In terms of absolute growth, the South and Southeast Asia region is poised to lead the way, with an expected CAGR of ~1.80% between FY 2023 and 2033. This growth will be driven primarily by livestock production, which is projected to expand at a CAGR of ~3.00%, followed by crop production (~1.40% CAGR) and fisheries (~1.30% CAGR) over the same period. However, sub-Saharan Africa is expected to outpace other regions, with a projected CAGR of ~2.20% during the same period. The growth in this region will be fuelled by a ~2.3% CAGR in crop production and a ~2.20% CAGR in livestock production, between FY 2023 and FY 2033, making it a significant hub for agricultural expansion.

The global agriculture and allied sectors market is dominated by the developed and East Asia region, which accounts for ~29.00% of the total market share. China is the primary driver, contributing 90.00% of the region's total value during 2021-2023. The South and Southeast Asia region also contributes significantly to the global output of food products such as rice, wheat, and sugar.

Figure 8: Region-wise share in net value of agriculture and allied sectors in FY 2023



Source: OECD-FAO Agricultural Outlook 2024-2033, Crisil Intelligence

The Europe and Central Asia region commands ~15.00% market share, with the UK, France and Russia making significant contributions to crop and livestock production. The Latin America and Caribbean region account for ~13.00% of the total share, driven by its prominent position in soybean and maize production, as well as a considerable livestock sector.

Other key players in the global agricultural market include North America (comprising Canada and US, among other countries), a major contributor to global production of crops such as soybeans, maize and wheat. Sub-Saharan Africa is also vital, with a diverse array of products including cassava, yams and maize. The North and East Africa region plays a crucial role, with a mix of crops such as cereals, millets and legumes, as well as livestock and a thriving fisheries industry. These regions, despite their unique agricultural profiles, collectively enrich the global agricultural market and are essential to fulfilling the world's escalating food demands.

Key drivers of global agriculture sector

- **Growing global population and emphasis on food security:** By 2050, the global population will reach 9.80 billion. The demand for agricultural products will rise 70.00%, fuelled by rising incomes and urbanisation. The necessity to meet diverse food needs and address hunger will prompt investments in sustainable agriculture
- **Technological advancements and yield improvements:** The agricultural sector is transforming with artificial intelligence ("**AI**"), internet of things ("**IoT**"), drones and remote sensing, enabling precision farming, optimising inputs and maximising yields through data-driven techniques. Digital platforms enhance supply chains, provide crop advice and facilitate online marketplaces. This boost yields and productivity and paves the way for further growth and innovation.
- **Government policies and initiatives:** Governments worldwide are supporting agriculture with subsidies and financial aids, such as India's PM-Kisan scheme and US's precision farming aid. Kenya's National Agriculture Rural Inclusive Growth Project ("**NARIGP**") also empowers smallholder farmers, aiming to boost productivity, market access and agricultural growth, promoting development and improving farmers' livelihoods through technological interventions.
- **Investment in research, development and private sector funding:** The global agriculture sector is driven by research and development investments. Government agencies such as the United States Department of Agriculture ("**USDA**") and initiatives such as Horizon Europe (with a budget of €8.95 billion), along with private sector investments, enhance productivity, market access and innovation. Such initiatives, drive climate-resilient solutions and sustainable value chains.
- **Sustainability and organic farming trend:** The global agriculture sector is shifting towards sustainability and organic farming, driven by consumer concerns for environment and health. Farmers adopt practices such as crop rotation and regenerative agriculture, improving soil health and yields, fuelled by government initiatives, technology and rising demand for organic crops.
- **Entrepreneurship and agritech startups:** Agritech startups are transforming agriculture with digital technologies such as precision farming, AI and blockchain. They develop innovative solutions that increase efficiency, reduce waste and improve yields. With growing investment, they'll play a vital role in shaping the future of agriculture, meeting global food demands sustainably and minimising environmental impact effectively.

Emerging challenges and risks

- **Climate change:** The impact of climate change on global food production is a pressing concern that requires immediate attention. Rising temperatures, changing precipitation patterns and increased frequency of extreme weather events are expected to reduce global crop yields by 10.00% by 2050, and up to 50.00% in certain global region, resulting in a staggering economic loss

- **Degradation of natural resources:** Agriculture faces significant challenges from water scarcity and soil degradation, which will affect 40.00% of the global population by 2030. Soil degradation, exacerbated by climate change and population growth, costs US $44 billion annually. This threatens rural communities, biodiversity and human well-being. The economic and environmental impact highlight the need for sustainable practices to mitigate these effects and ensure global food security
- **Food waste and loss:** The global agricultural sector faces a significant challenge in reducing food waste and loss. In sub-Saharan Africa, 37.00% of produced food is lost between production and consumption and 20.00% of cereals are also lost this way. It affects food security, economy and environment, and highlights the need for efficient supply chains
- **Economic constraints:** The global agriculture sector faces challenges in adopting advanced technologies due to high costs, limiting access for small-scale farmers and developing countries. Costs, including initial investment, maintenance and training, hinder adoption, exacerbating inequalities and affecting productivity, while rising labour and input costs further limit technology adoption and competitiveness

Regional overview

The agriculture sector is a vital component of the global economy, providing food, fibre and livelihood to millions of people around the world. With the global population growing, the demand for agricultural products is increasing, putting pressure on the sector to produce more with limited resources. Emerging economies have increasingly driven developments in the global agricultural market over the past 20 years and are likely to continue doing so over the next decade. But regional shifts are now linked to changing demographics and new economic affluence, according to a report released by the Organisation for Economic Co-operation and Development ("**OECD**") and the Food and Agriculture Organization ("**FAO**"). Diverse regional conditions influence the agricultural landscape, leading to varied production systems, crop selections and farming practices, which are expected to drive the shift. Understanding these regional nuances is crucial to gain insights about the agriculture sector. This regional overview provides a summary of the agriculture sector across regions.

Table 3: Region-wise key agricultural parameters for FY 2024

Parameter	Asia	North America	Latin America	Russian Federation	West Africa
Agricultural land (million ha)	1,883	463	660	215	263
Arable land (million ha)	611	196	153	122	89
Production (billion tonne)	5.26	0.98	1.79	0.29	0.44
Share in global production (%)	49%	9%	17%	3%	4%
GVA-agri and allied ($ billion)	2,733	258	378	73	156
Cropping pattern	Rice, wheat, maize, sugarcane, tea, coffee, rubber, palm oil, cotton	Maize, soybean, wheat, cotton	Coffee, sugarcane, banana, corn, soybean, cotton	Wheat, sunflower, barley, maize, potatoes	Maize, millets, sorghum, groundnut, cotton, beans
Agricultural exports ($ billion)	455	251	330	24	13

Parameter	Asia	North America	Latin America	Russian Federation	West Africa
Share in global agri exports (%)	22%	12%	16%	1%	1%
Agricultural imports ($ billion)	790	274	128	21	18
Share in global agri imports (%)	38%	13%	6%	1%	1%

Source: World Bank Open Data, Food and Agricultural Organisation, ITC Trade Map, Crisil Intelligence

Note: 1) Agricultural land also includes pastures and grazing land, arable land includes cropped land.

2) Western African region includes Togo, Ghana, Nigeria, Mali, Côte d'Ivoire, Burkina Faso and Niger, among others. North American region includes US, Canada and Bermuda. Latin America region includes Brazil, Argentina, Mexico, Chile, and Jamaica, among others.

Asia leads global agriculture with nearly half of global production, driven by extensive arable land and population demand. North America and Latin America have a strong import and export orientation, respectively. Russia and West Africa offer untapped potential for growth and investment, highlighting opportunities for trade, investment and development in the sector. Furthermore, agricultural trade plays a crucial role in the global economy, with global exports skewing towards Asia, although a more detailed analysis reveals a more complex picture.

Table 4: Top 5 countries in global agricultural exports in 2024

Country	Export ($ billion)	% share
US	182	9.00%
Brazil	144	7.00%
Netherlands	132	6.00%
Germany	106	5.00%
France	90	4.00%

Source: ITC Trade Map, Crisil Intelligence

Among the key countries contributing to global agriculture, Brazil and India are expected to grow at a CAGR of 7.00% in CY 2023-2028, followed by China at 5.00% CAGR during the period.

Table 5: Market size and CAGR for key countries/regions

Country	Market size ($ billion)	CAGR (2023-28P)	Drivers
Brazil	243	7.00%	Increasing demand for soybeans and sugarcane
Western Africa	-	3.50%	Increasing demand for super foods like millets
Russia	143	4.80%	Increasing demand for grains and government support
China	543	5.10%	Increasing demand for high-quality food and technological advancements
India	243	7.00%	Increasing demand for wheat and rice

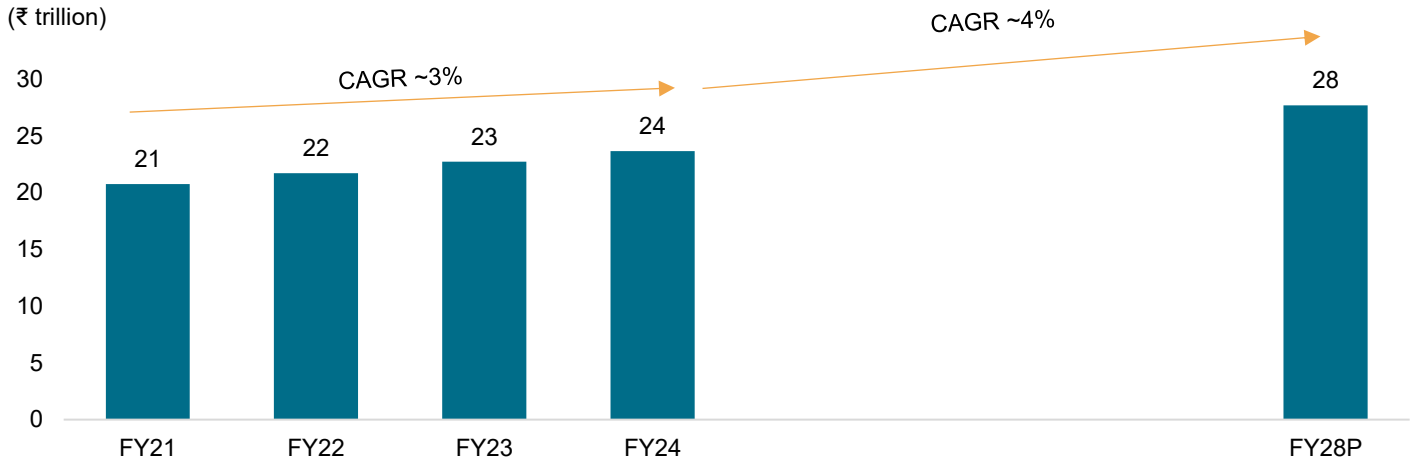
Note: Market size for western African region was not available

Source: - Brazil Institute of Geography and Statistics, Euromonitor, National Bureau of Statistics China, Crisil Intelligence

India’s agriculture sector

The agriculture and allied activities sector are the cornerstone of the Indian economy, significantly contributing to the country’s GDP and employment landscape. As of FY 2024, it accounted for around 15.00% of the GDP at constant prices and provided livelihood to approximately ~46.00% of the population. The sector’s performance not only ensures food security but also has a ripple effect on other industries, thereby driving economic growth and sustaining the well-being of the population.

Figure 9 Agriculture GVA (at constant prices) from FY 2021-2024

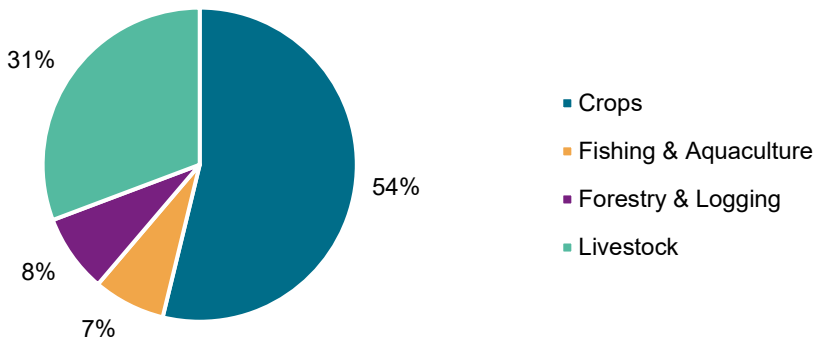


Source: Agriculture Statistics at a Glance 2023, Unified Portal for Agricultural Statistics, Department of Agriculture and Farmer’s Welfare, Crisil Intelligence

The GVA for the agriculture sector has registered a CAGR of ~3.00% from FY 2021 to FY 2024. The rise can be attributed to the growth in sub-categories such as crop production (~54.00%), livestock (~31.00%), forestry and logging (~8.00%) and fishing and aquaculture (~7.00%).

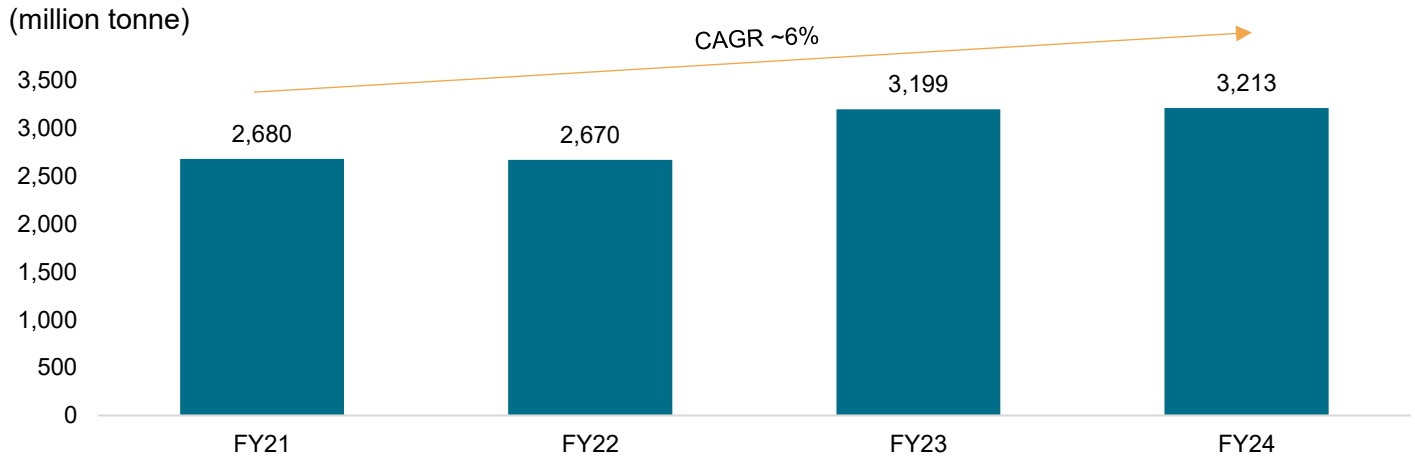
Furthermore, the GVA for agriculture sector is expected to grow with a CAGR of ~4.00% between FY 2024-2029 to ₹ ~28 trillion. The growth would be driven by growth in livestock, fisheries and crop production as demand increase on account of rising income levels for rural and urban population, which has grown by ~5.00% from ₹ ~69,000 per capita in FY 2014 to ₹ ~109,000 per capita in FY 2024

Figure 10 Segment -wise share in GVA in FY 2024



Source: Department of Agriculture and Farmer’s Welfare, Crisil Intelligence

Figure 11 Production trend in agriculture and allied sector



Source: APEDA, Crisil Intelligence

The Indian agriculture and allied sector achieved a growth rate of approximately 3.00% between FY 2020-2024, with production rising to a record high of around 3,200 million metric tonnes (MMT) from 2,800 million metric tonne ("**MMT**").

Region-wise agriculture trend

The growth trajectory of the agriculture sector is characterised by regional disparities, with varying levels of production across areas. The nation can be broadly categorised into four agricultural regions: north, east, west and south. The cropping patterns vary depending on the state or region and are shaped by factors such as climate, soil type and geographical features. This regional diversity gives rise to a varied agricultural landscape, with different regions specialising in different crops and contributing in different ways to the country's agricultural output.

Table 6: Regional-wise share in domestic production and in key crops

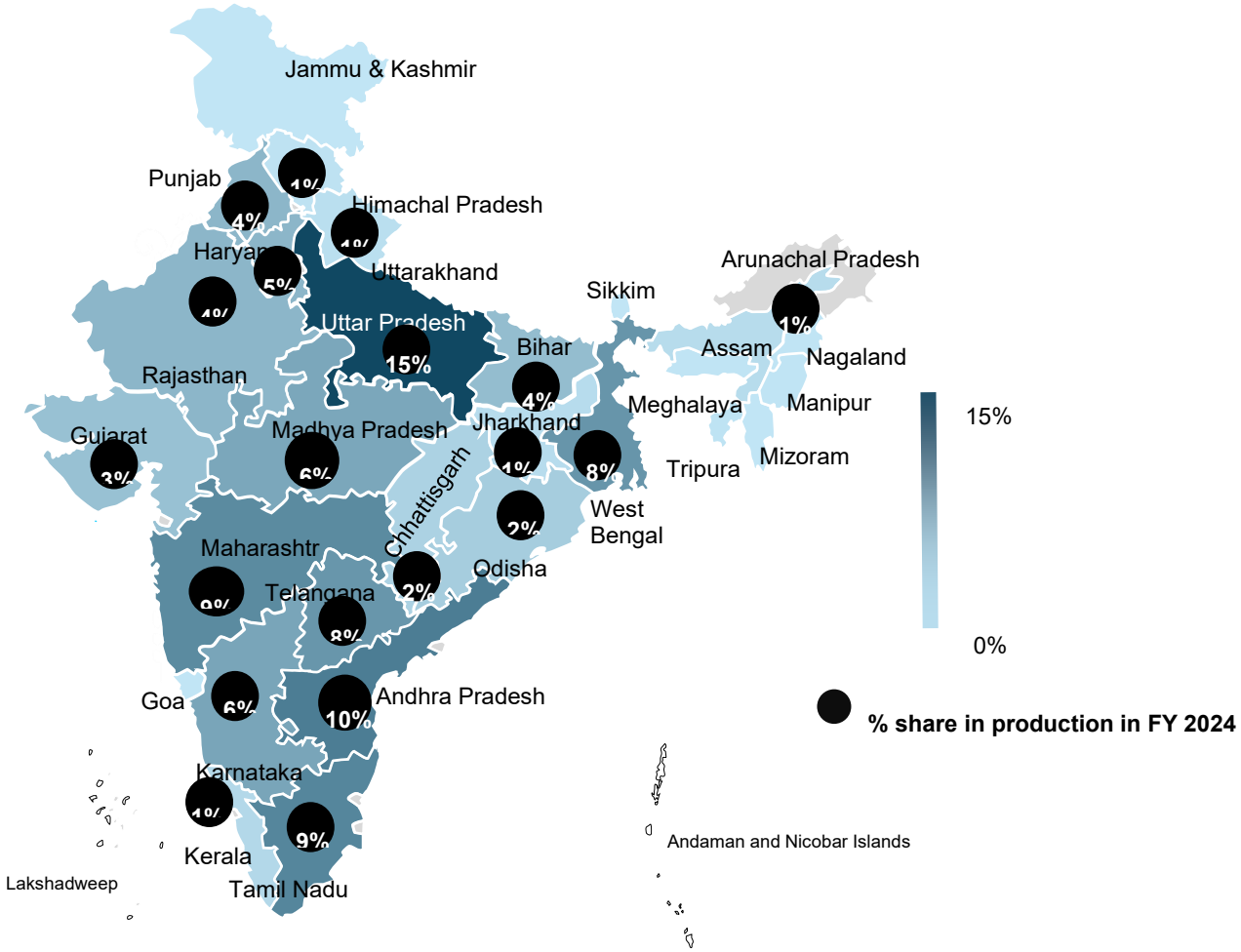
Region	Key states	Share in production (%)	Key crops (Share in domestic production)
North	Punjab, Haryana, Rajasthan, Uttarakhand and Uttar Pradesh	30%	Wheat (66%) and rice (28%)
East	West Bengal, Odisha, Jharkhand, Bihar, Chhattisgarh and the North-East	18%	Rice (37%), vegetables (36%)
West	Maharashtra, Madhya Pradesh and Gujarat	18%	Groundnut (58%), cotton (58%) and soybean (85%)
South	Tamil Nadu, Karnataka, Kerala, Telangana and Andhra Pradesh	34%	Rice (25%), maize (35%), fruits (33%) and plantations crop (89%)

*Source: Agricultural and Processed Food Products Export Development Authority ("**APEDA**"), Crisil Intelligence*

Notably, some states have demonstrated remarkable growth in agricultural production over the past few years. West Bengal, Odisha, Maharashtra and Telangana have achieved a CAGR of ~8.00%, ~6.00%, ~6.00% and ~6.00%, respectively, between FY 2020 and FY 2024. This regional distribution of agricultural production highlights the diverse strengths and specialisations of various parts of the country.

India's diverse climatic conditions enable year-round agriculture, driven by varied seasonal cycles: kharif, rabi and zaid. The kharif season accounts for 65.00% of the country's production, followed by rabi (32.00%). The zaid season, which has seen significant growth, now accounts for ~3.00% of the share. The trend showcases the country's ability to leverage its climate to grow crops all around the year, creating growth opportunities in the sector and the agrochemical industry. The increase in production across these seasons ensures food security and boosts the economy, making agriculture a vital contributor to the country's growth.

Figure 12 State-wise share in production for FY 2024



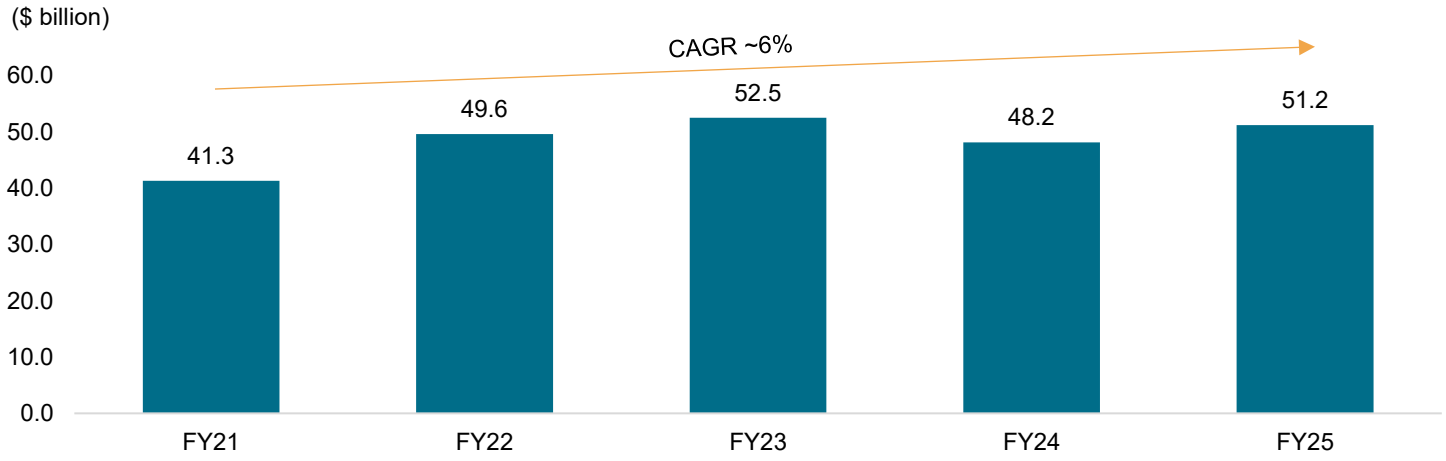
Source: APEDA, Crisil Intelligence

Agricultural export

India, with its agrarian economy, has seen a notable increase in agricultural exports in recent years, fuelled by government efforts to enhance farm productivity and quality. From FY 2021, the exports have grown at 6.00% CAGR and accounted for ~12.00% of total exports in FY 2025.

Leveraging its unique geographical location and diverse climate, India produces a broad spectrum of agricultural products such as spices, tea, coffee and fruits, which have a strong global demand.

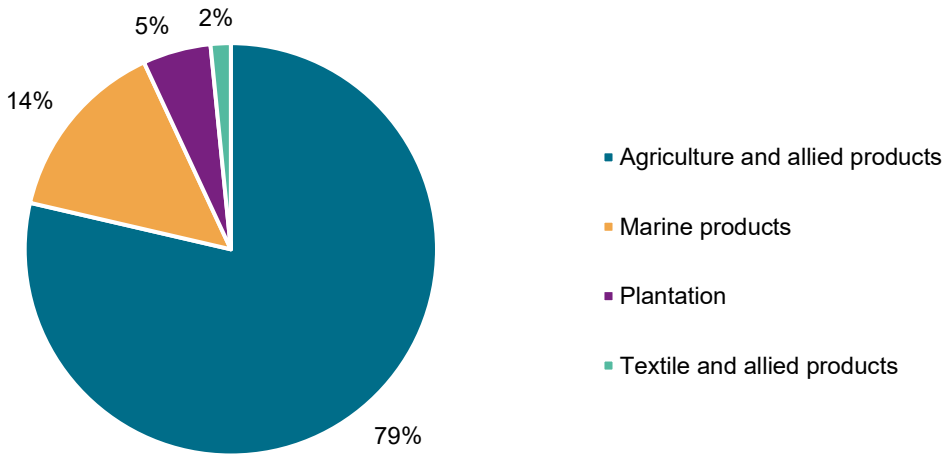
Figure 13 Export trend of agricultural products



Source: Department of Commerce, Crisil Intelligence

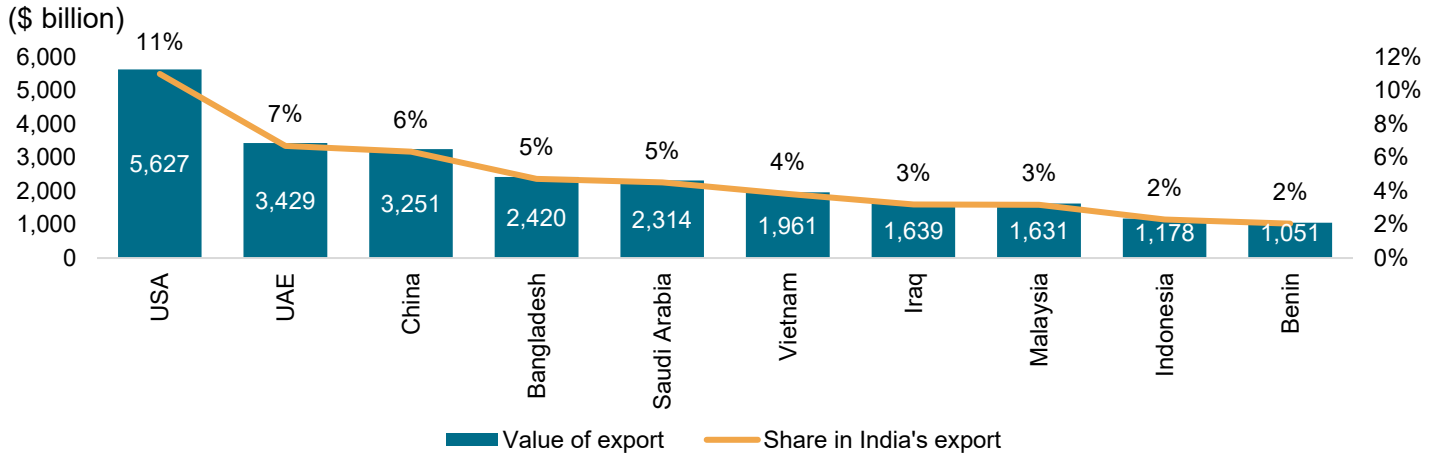
The export of agricultural products can be categorised into four main segments: Agriculture and allied products (such as fruits, vegetables, dairy products, etc.), marine products (frozen shrimp, frozen fish, etc.), plantation products (coffee, tea, etc.), and textile and allied products (cotton raw including waste). Agriculture and allied products account for approximately 79.00% of agricultural exports. The segment includes a wide range of commodities such as rice, livestock, fresh fruits and vegetables, and processed products. The other segments, in order of their share, are marine products (including frozen shrimp and prawns), plantation products (comprising coffee, tea and rubber), and textile and allied products (which includes raw cotton). The top three destinations are US, United Arab Emirates ("**UAE**") and China, contributing 11.00%, 7.00% and 6.00%, respectively, to India's agricultural exports in FY 2025.

Figure 14 Segment-wise share in agricultural exports in FY 2025



Source: Directorate General of Foreign trade, Crisil Intelligence

Figure 15 Top 10 destinations of agricultural product exports in FY 2025



Source: Directorate General of Foreign trade, Crisil Intelligence

Tailwinds and headwinds in the Indian agriculture sector

The Indian agriculture sector is poised to benefit from government initiatives and policies supporting farmer welfare, increasing adoption of technology and digitalisation, and rising demand for high-value crops. However, the sector also faces challenges such as climate change, water scarcity and rising pest infestation, which can impact crop yields and farmer incomes.

Still, adoption of technology, proliferation of education, and rising rural and agri-tourism, and research and development, can help transform the sector as well as propel its growth.

Tailwinds in the agriculture sector

The Indian agriculture sector, which accounts for a significant portion of the country's GDP and employment, has been undergoing a transformation. The government is focusing on doubling farmers' income and increasing agricultural productivity via:

- **Increasing access to credit and support:** Only 17.00% of farmers currently have access to formal credit. Schemes such as Pradhan Mantri-Kisan Samman Nidhi (“**PM-KISAN**”) and Pradhan Mantri Fasal Bima Yojana (“**PMFBY**”) are enhancing farmers’ financial resilience, reducing risk and boosting productivity
- **Growing demand for high-value crops**: Demand for fruits, vegetables and spices is rising, driven by domestic and international markets, with per capita monthly spending growing at 8.00-12.00% CAGR in rural areas and 7.00-10.00% in urban areas
- **Protected cultivation**: There is a proliferation of polyhouses and greenhouses, enhancing crop yields, improving crop quality and reducing influences such as weather and pests.
- **Rising adoption of technology**: Integration of AI, IoT and drones is revolutionising the sector, enabling precision farming, optimising inputs and yields, and providing real-time insights, thereby increasing the efficiency, productivity and profitability of farmers.

- **Improving irrigation infrastructure:** Irrigation penetration in the country increased to ~55.00% in FY 2022 from ~48.00% in FY 2014, supported by PM-Krishi Sinchayee Yojana. This can increase crop yields, reduce dependence on the monsoons and improve water management.
- **Adoption of climate-smart agriculture**: Climate-smart agriculture practices, such as micro-irrigation and alternate wetting and drying, are expected to gain traction, drive growth and promote sustainable practices
- **Increasing investment in agricultural research and development:** The government developed nearly 2,900 new crop varieties, including 2,661 climate-resilient ones, between FY 2014 and 2024, on the back of a significant increase in the budget for the Department of Agricultural Research and Education.
- **Regenerative agriculture and precision nutrient management**: The adoption of regenerative agriculture, carbon farming, biofertilisers, biopesticides and nano-inputs is expected to improve soil health, reduce environmental impact and increase crop yields.
- **Growing exports:** India's agricultural exports have grown at ~4.00% CAGR from FY 2018-2025, to ~$51 billion, driven by demand for rice, fruits, vegetables and nutraceuticals, which has increased the income of farmers and improved crop yields. Moreover, interventions such as cold chain expansion and farmer producer organisation ("**FPO**")-led value-chain are expected to reduce post-harvest losses.
- **Sustainable supply chain and ESG**: Investments in cold chains, food processing and storage, as well as the development of FPO-led value chains and agro-based industries, are expected to reduce post-harvest losses and promote sustainable, traceable supply chains aligned with ESG goals.
- **Government initiatives**: The government has launched various initiatives, including Per Drop More Crop, Micro Irrigation Fund and Pradhan Mantri-Kisan Sampada Yojana, to promote efficient use of water, boost food processing and support small and marginal farmers. These initiatives aim to make agriculture more productive, sustainable and climate-resilient, ultimately benefiting farmers and the agricultural sector.

Headwinds in the agriculture sector

The Indian agriculture sector, a vital component of the country's economy, is poised for growth, driven by government initiatives and rising demand for agricultural products. However, despite the positive trends, the sector faces several challenges that can hinder its growth and development, such as:

- **Climate change:** The Indian agriculture sector is heavily reliant on the monsoons, with ~45.00% of the country's net sown area rainfed, thereby making it vulnerable to unpredictable rainfall patterns owing to climate change, as well as rising temperatures, changing precipitation patterns and increased frequency of extreme weather events.
- **Water scarcity:** ~80.00% of India's freshwater resources are used for agriculture. However, the country has only ~4.00% of the world's freshwater resources. Exacerbating the issue is the fact that states are experiencing drought-like conditions, with a water stress index of >0.4, which means severe water stress for at least one month in a year This can reduce crop yields and lower farmer incomes.
- **Soil degradation:** According to the National Bureau of Soil Survey and Land Use Planning, ~146.8 million hectares, i.e. ~30.00% of the soil in India is degraded due to intensive farming practices, overuse of fertilisers and pesticides, and lack of crop rotation, reducing its fertility and affecting crop yields.
- **Volatile global commodity prices and inefficient supply chain:** The Indian agricultural sector faces challenges such as volatile global commodity prices and an inefficient supply chain. Price volatility affects farmers' incomes, while an elongated supply chain reduces prices for farmers and leads to higher prices for consumers. This results in increased food wastage and hinders the sector's growth. The supply chain is also marked by multiple intermediaries and high transaction costs.

- **Labour shortages:** The Indian agriculture sector faces a severe labour shortage, particularly during peak seasons, reducing crop yields and lowering farmer incomes. Rural-urban migration is a key contributor, with ~19.00% of internal migrants moving from rural to urban areas This trend exacerbates the labour shortage in agriculture, a primary occupation in rural areas. The shortage is driven by labourers seeking better job prospects and higher wages in urban centres.
- **Rising incidence of new pests, weeds and diseases:** The Indian agricultural industry is under severe threat due to the increasing occurrence of new pests, weeds, and diseases that are developing resistance to current crop protection products, posing a significant risk of substantial crop losses and jeopardizing the livelihoods of farmers.

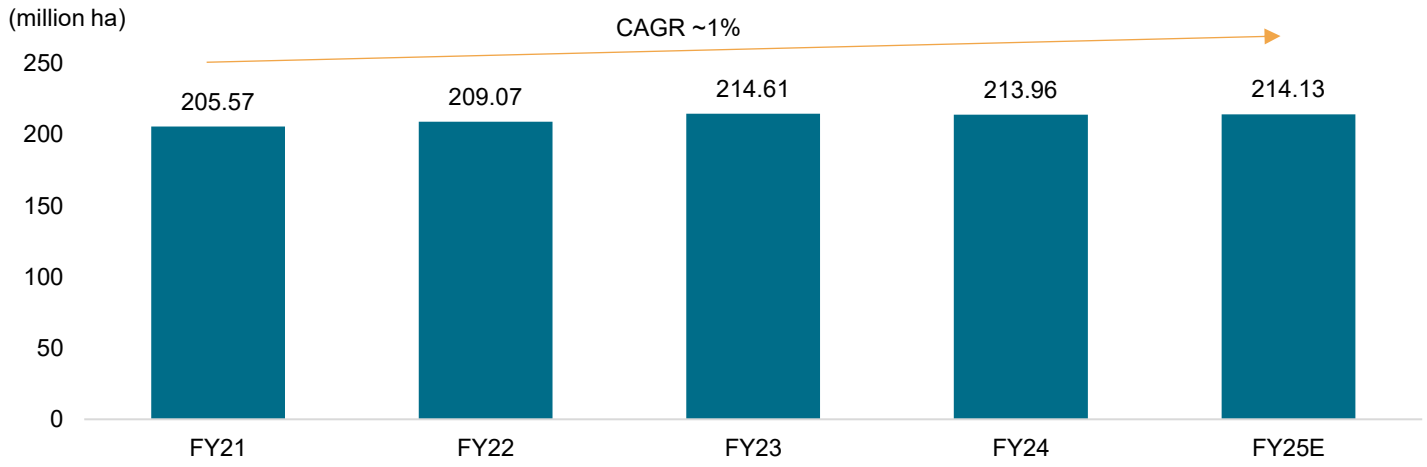
Crop situation in India

Gross cropped area

The gross cropped area in India has increased steadily over the past 10 years, at a CAGR of ~1.00%. Gross sown area in FY 2025 was ~214 million hectares, up from ~194 million hectares in FY 2018**.** India's gross sown area comprises food grains such as cereals and pulses, oilseeds, cash crops, fruits, vegetables, aromatic and medical plants, flowers, plantation crops, and spices.

The increase in crop acreage can be largely attributed to growth in cereals, which posted a CAGR of ~1.70%, while oilseeds, fruits and vegetables registered CAGRs of ~3.00%, ~1.00% and ~2.00%, respectively. Smaller segments such as aromatic and medicinal plants, flowers, plantation crops, and spices have also contributed to the overall growth, with a CAGR ranging 1.00-3.00% In contrast, the acreages of cash crops and pulses declined between FY 2018 and 2025E, at a CAGR of ~1.00% each.

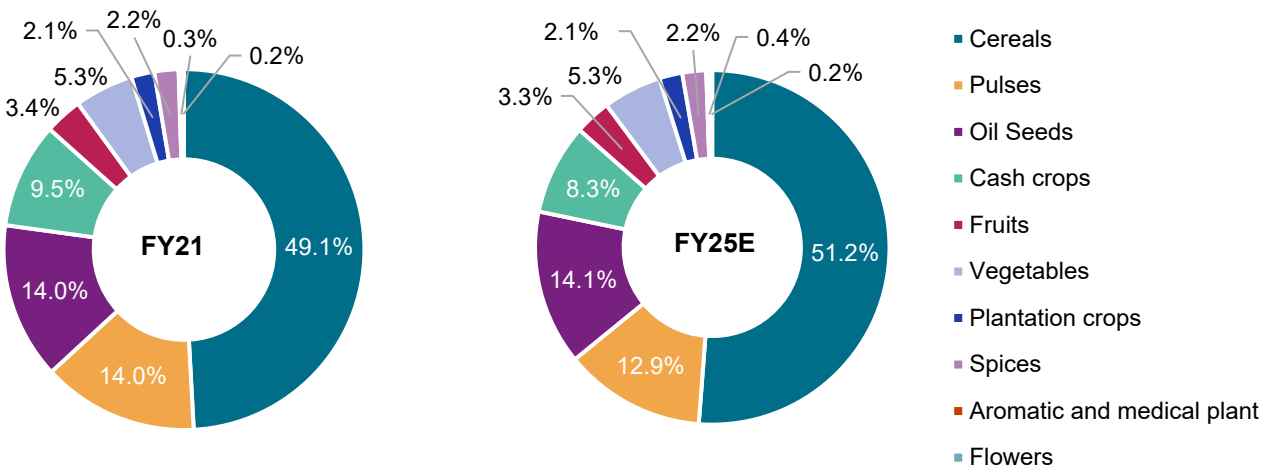
Figure 16 Gross showing area trend between FY 2021 and 2025



Source: Unified Portal for Agricultural Statistics, Department of Agriculture, Crisil Intelligence

However, India's crop distribution has remained relatively stable, with cereals dominating. But there have been shifts within the categories, owing to various factors such as shift in profitability. Paddy and maize are two crucial cereal crops, with paddy a staple for domestic consumption and export, and maize a vital source of food, feed and fodder. The use of crop protection chemicals is essential for the cultivation of both crops.

Figure 17 Crop segment -wise share in gross area and change share between FY 2021 and 2025E



E – estimated

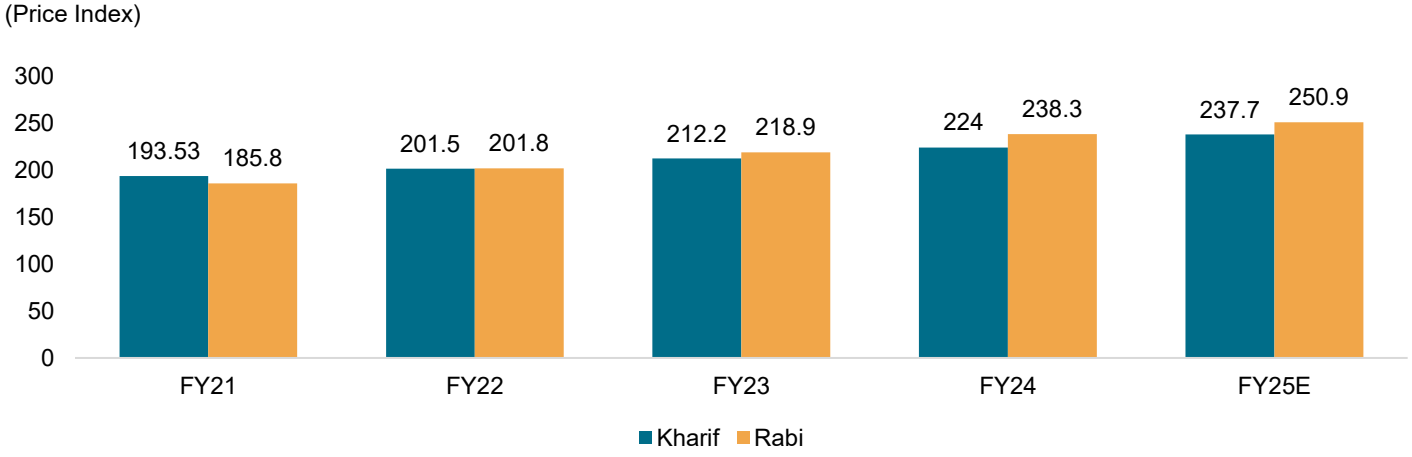
Note: The pie chart on the left depicts share of various crop categories in FY 2021. Right has share in FY 2025E.

Source: Department of Agriculture and Farmers Welfare, Crisil Intelligence.

Cost of cultivation

Cultivation cost is a crucial aspect of agricultural production, encompassing various expenses incurred by farmers to grow and harvest crops. From seeds and fertilisers to labour and equipment, these costs can significantly impact the profitability of farming operations. Additionally, biotic factors such as pest and disease outbreaks, as well as increased weed growth triggered by climate change, also significantly contribute to the rising cost of cultivation.

Figure 18 Composite Input Price Index for kharif and rabi for FY 2021-2025E



E – estimated

Source: Commission for Agriculture Costs and Prices, Crisil Intelligence.

In India, between FY 2021 and 2025E, the Composite Input Price Index ("**CIPI**") increased significantly, with growth rates of ~5.00% for the kharif season and ~8.00% for the rabi season. As a result, the CIPI rose 1.2-1.3x in value terms in both seasons over the four-year period.

The primary factors contributing to this surge in cultivation costs are:

- **Rising input costs:** The increasing cost of vital inputs such as seeds with higher seed replacement rates, fertilisers and pesticides are significantly contributing to the rising expenses of crop production. Notably, farm input indices for the kharif crop rose substantially, with seeds, fertilisers and pesticides posting a CAGR of ~6.00%, ~3.00% and ~3.00%, respectively, over FY 2016-2025.
- **Labour costs:** Labour costs are escalating due to a shortage of labour, hike in minimum wages, and other labour-related expenditure. Specifically, the cost of human, bullock and machine labour have all significantly increased, at CAGRs of ~6.00%, ~11.00% and ~5.00%, respectively, between FY 2016 and 2025.
- **Fuel and energy costs:** The surge in fuel and energy prices is also impacting farm expenses, as these resources are essential for irrigation, operating machinery and other critical farm operations. Notably, irrigation charges have risen at a CAGR of ~3.00% between FY 2016 and 2025.
- **Technology and equipment costs:** The adoption of advanced technologies and equipment, such as precision farming tools, drones and satellite imaging, can significantly increase the cost of cultivation. These technologies, while improving efficiency and productivity, require substantial investments in hardware, software and training. This can be a barrier for small-scale farmers, exacerbating the financial burden
- **Reduction in crop residue burning:** The government's initiative to minimise pollution by discouraging the burning of paddy crop residue or stubble in Haryana, Punjab and Uttar Pradesh is anticipated to have a significant impact on farming practices. Farmers are likely to resort to alternative methods of residue management, including increased use of chemical herbicides to clear their fields. This shift is likely to substantially increase the cost of cultivation

That said, the increase in cultivation cost differs among crops and states. For e.g., the cost of cultivating paddy in Haryana, Punjab and Andhra Pradesh rose at ~5.00%, ~7.00% and ~4.00% CAGR, respectively, between FY 2019 and 2025. A significant factor contributing to this growth was the rise in pesticide expenses, which increased at a CAGR of ~16.00% in Haryana, ~5.00% in Punjab and ~13.00% in Andhra Pradesh during the period.

The following data details the share of pesticide expenses in total cultivation cost, as well as the CAGR of pesticide expenses and overall cultivation costs across a few key crops:

Table 7: Share of pesticides and CAGR across key crops and states in FY 2025.

Crop	Key state	Share of expense on pesticide	CAGR of expense on pesticide	CAGR of cost of cultivation
Paddy	Haryana	8%	16%	5%
	Punjab	5%	5%	7%
	Andhra Pradesh	7%	13%	4%
Arhar	Maharashtra	5%	1%	9%
Soybean	Madhya Pradesh	6%	5%	3%
	Maharashtra	5%	18%	13%
	Rajasthan	4%	13%	16%
Cotton	Maharashtra	4%	8%	5%
Sugarcane	Uttar Pradesh	1%	1%	7%
	Maharashtra	1%	17%	1%

Crop	Key state	Share of expense on pesticide	CAGR of expense on pesticide	CAGR of cost of cultivation
	Tamil Nadu	1%	3%	4%
Wheat	Madhya Pradesh	0.40%	9%	2%
	Rajasthan	0.50%	12%	4%
	Punjab	3%	4%	1%

Notes:

1) The data of FY 2023 were extrapolated using past 5 years data to arrive at the share of insecticide expense in total cost of cultivation and cost of cultivation in FY 2025.

2) CAGR is for FY 2019-2025.

Source: Commission for Agriculture Costs and Prices, Crisil Intelligence

As India's agricultural landscape transforms, the need for robust and efficient crop protection solutions is expected to surge, fuelled by shifting weather patterns, increase in pests and diseases and the imperative to boost crop yields.

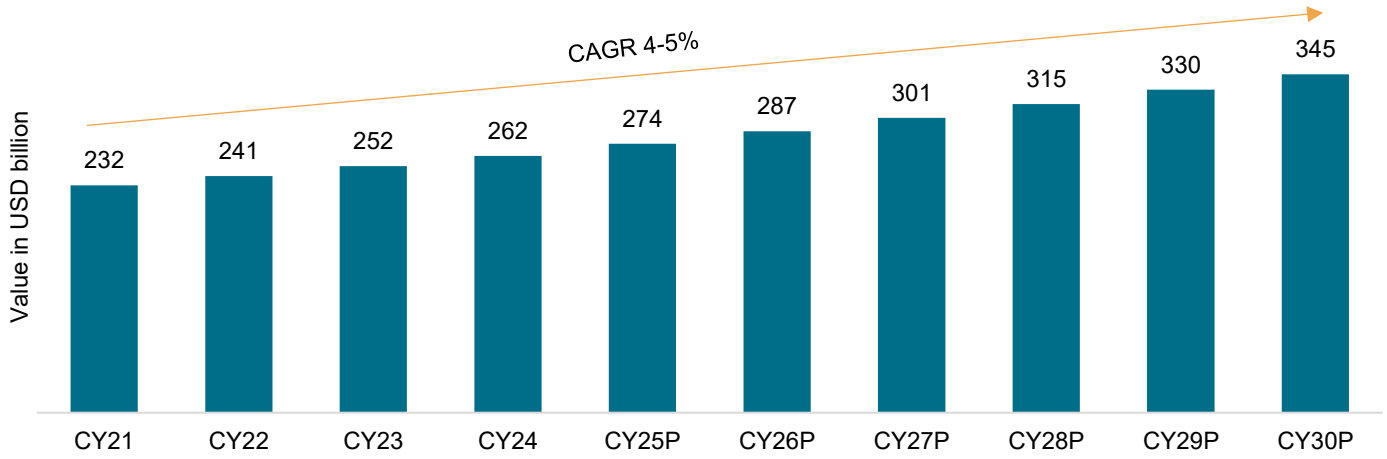
This creates a substantial opportunity for agrochemical companies to innovate and introduce cutting-edge products that cater to the changing requirements of farmers, driving growth and development of the sector.

Global agrochemical industry

Overview of global agrochemical industry

The world's growing population, along with escalating food demand and intensified agricultural practices, has led to a pressing need for effective crop management solutions. In response, agrochemicals, including fertilisers, crop protection chemicals and others (adjuvants and plant regulators), have become essential for protecting crops, boosting yields and preserving food quality. By leveraging these vital inputs, farmers can optimise agricultural productivity, ensuring a stable and sustainable food supply to meet the needs of an increasingly populous world.

Figure 19-Global agrochemical market (CY 2021-CY 2030)

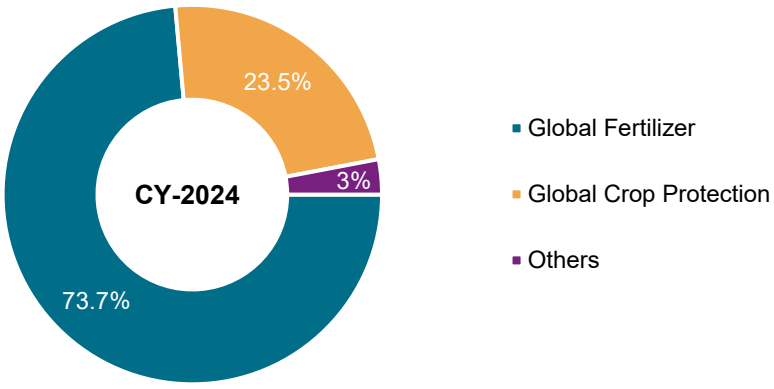


P – projected

Source: Industry interactions, Crisil Intelligence

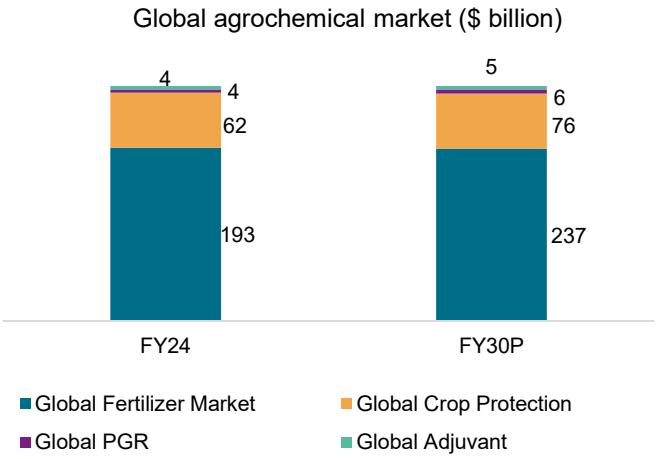
The global agrochemical market is poised for significant growth, fuelled by a growing population, increasing food demand and agricultural intensification. Agrochemicals will play a pivotal role in safeguarding crops, enhancing yields and maintaining food quality.

Figure 20-Agrochemical market bifurcation (% share)



Source: Industry interactions, Crisil Intelligence

Figure 21-Global agrochemical market segments (value share and CAGR)



Global agrochemical market segments-wise	CAGR (CY 2024-2030P)
Global fertiliser	3-4%
Global crop protection	3-4%
Global PGR	7-8%
Global adjuvant	4-5%
Global agrochemical	**4-5%**

PGR – plant growth regulators
Source: Industry Interactions, Crisil Intelligence

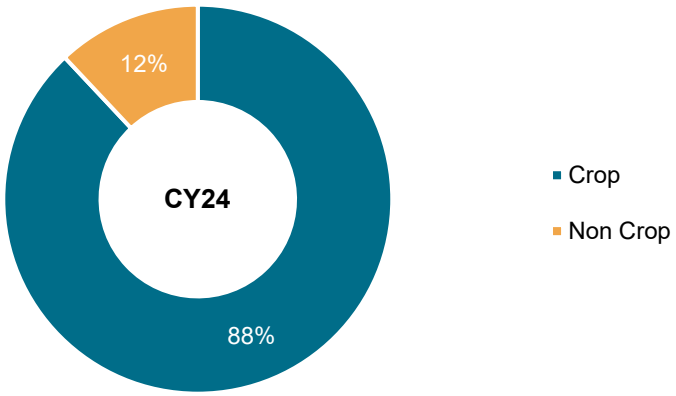
The global fertiliser market share was ~74.00% in 2024, followed by crop protection (~23.00%) and others plant growth regulators (PGR) and agricultural adjuvants: 3.00%. During calendar year 2024-2030P, fertiliser and crop protection is projected to grow at 3.00-4.00% CAGR, PGR at 7.00-8.00% CAGR and agricultural adjuvants at ~4.00-5.00% CAGR.

Crop vs non-crop protection market

The global agrochemical market, excluding fertilisers, can be further bifurcated based on application. The market is segregated into crop and non-crop protection. Crop protection is the major segments, with ~88.00% market share.

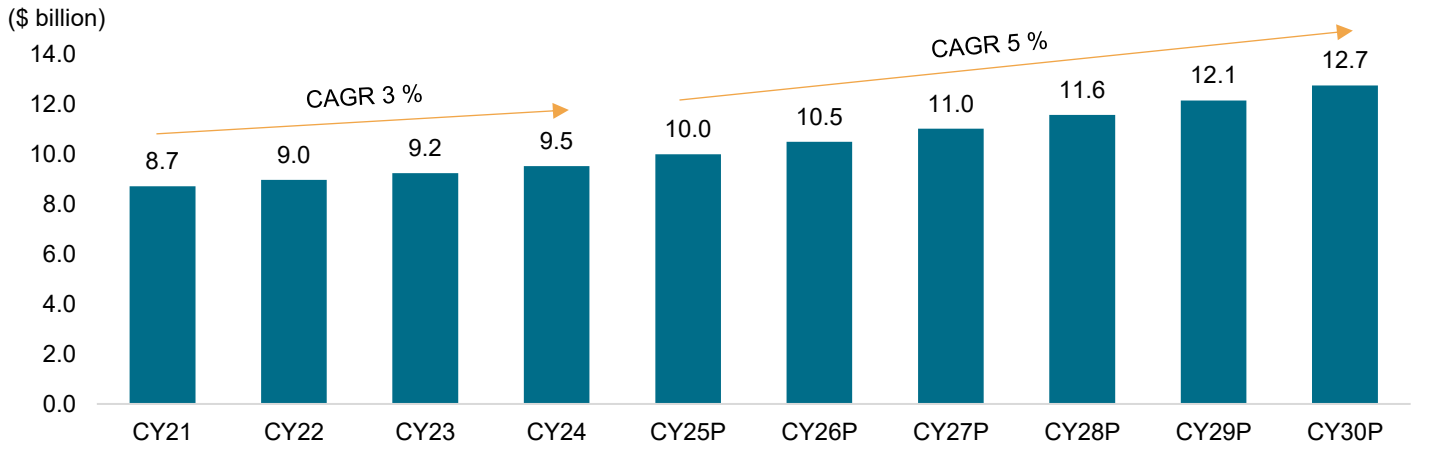
Crop protection chemicals control pests and diseases in agricultural crops, whereas non-crop protection chemicals control aquatic weeds, household pests and managing turfs. Non-crop protection is also used in industrial vegetation management and agroforestry for the control of weeds and unwanted vegetation.

Figure 22-Crop vs non-crop bifurcation



Source: S&P Global, Industry interactions, Crisil Intelligence

Figure 23-Global non-crop market



P – projected
Source: S&P Global Commodity Insights, Crisil Intelligence

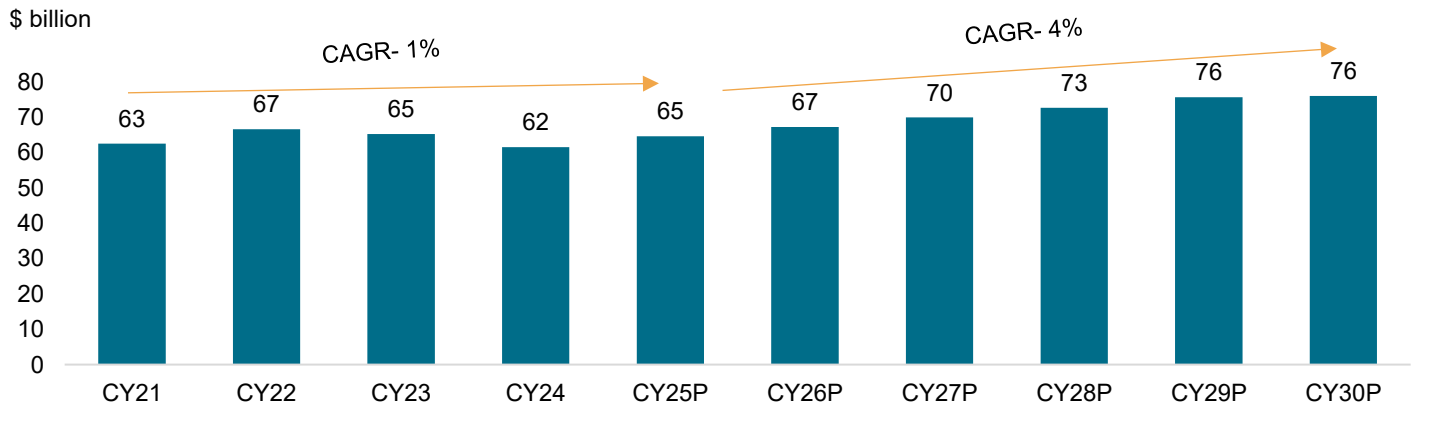
The global non-crop market, which was $9.5 billion in CY 2024, is projected to grow at 5.00% CAGR from 2025-2030, driven by rising demand for chemicals in industries and lawns, golf courses and for household pest control.

Global crop protection industry

The ~$65 billion global crop protection industry is projected to clock a CAGR of 4.00% over 2025-2030 (see chart below). As per the latest stats by FAO, the global use of crop protection chemicals in agriculture has been trending up. In 2022, 3 million tonnes of active ingredients were used—a 4.00% on-year increase, 13.00% rise over the past decade and a doubling of usage since 1990.

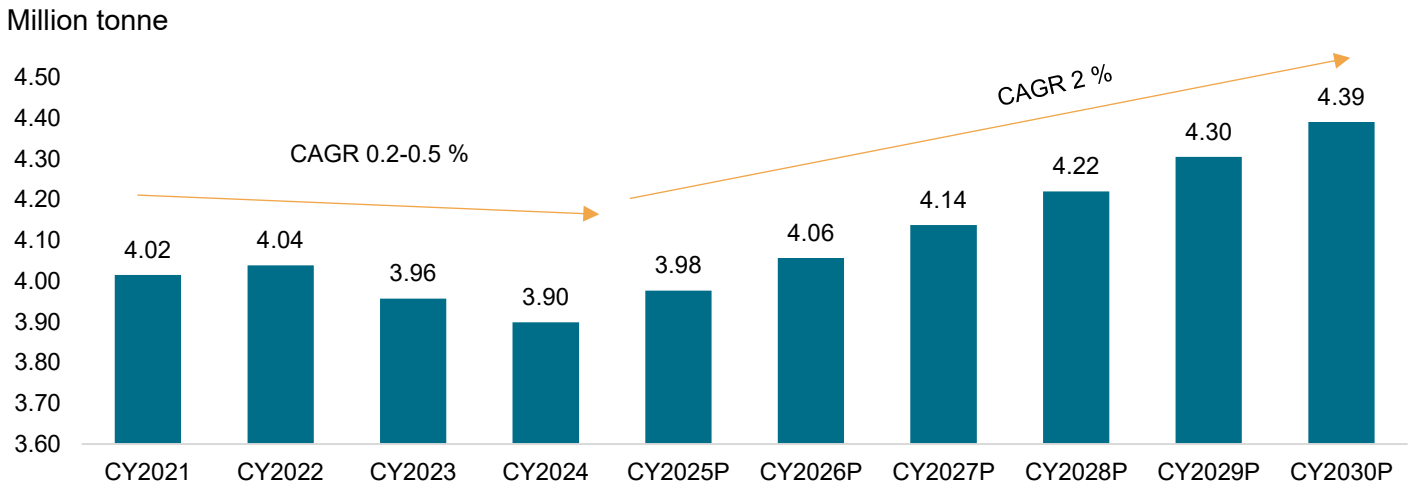
Over the past three decades, the intensity of pesticide use has increased at varying rates. The use of crop protection per cropland area has surged 94.00%, while use per value of agricultural production has risen 5.00% and use per person has increased 35.00% during this period.

Figure 24- Global crop protection market by value



Source: Industry Interactions, Crisil Intelligence

Figure 25 Global consumption of active ingredients



*Source: FAO STAT ("**Food and Agriculture Statistics**"), Crisil Intelligence*

The global crop protection market is estimated to have declined ~6.00% on-year in 2024, due to a combination of factors such as price, volume and currency fluctuations.

- Low agrochemical prices: The prices of crop protection products experienced a sharp downturn, driven by a global surplus of inventory and weak demand, with the decline being particularly pronounced during the 2024 agricultural season.
- Lower maize cultivation: Area under maize cultivation reduced in the key markets of US and Brazil.
- Unfavourable agriculture economics: High borrowing and input costs, and declining commodity prices contributed to the decline.
- Unfavourable weather conditions: Several key crop and country markets were impacted, including Europe, Brazil, India, Australia, China and Russia.
- High inventories: Excess inventory in most regions held back price rise and affected producers and suppliers of crop protection products.

The volume of crop protection products applied is estimated to have declined 3.40% in 2024, primarily due to unfavourable weather conditions. Prices reportedly declined for the second consecutive year, driven by low ex-factory prices from China and high inventory levels.

However, in 2025, the global crop protection industry is expected to rebound and grow at 4.00-5.00% on-year, driven by stable agrochemical prices, improved weather conditions in Europe, Asia and Brazil, as well as higher area under maize and soybean cultivation in US and Brazil. Inventory levels, particularly in North America and Europe, are expected to return to normal, reducing the downward pressure on prices. Recent introduction of novel active ingredients is also expected to drive growth.

The global crop protection industry is projected to clock a moderate 4.00-5.00% CAGR over 2024-2030, led by the below listed drivers.

Growth drivers

Regulations in the pesticide industry

The global pesticide industry is heavily regulated, with rules on residue limits, product registration and usage restrictions. For instance, India's Department of Plant Quarantine and Storage under the Ministry of Agriculture & Farmers' Welfare regularly updates the list of banned pesticides. The EU aims to replace half the highly hazardous crop protection chemicals with safer alternatives by 2030. Countries are shifting towards environmentally friendly options, making it crucial for companies to introduce new, alternative products to avoid obsolescence.

Innovation and technology

The growing resistance to key crop protection chemicals is driving the need for innovation and technological advancements. To address this issue, companies such as Syngenta, Bayer, BASF and FMC are investing in research and development to create new and unique products that can effectively manage pests and crop diseases. The rise of genetically engineered products is also pushing the industry towards diversification and innovation. Moreover, the adoption of technologies such as drone spraying is becoming increasingly popular as it helps to address labour shortage and drive growth in the global crop protection market.

IPM and precision agriculture

The adoption of integrated pest management ("**IPM**") practices, which combine chemical, biological and cultural methods to control pests, is gaining traction. This approach not only enhances crop protection but also promotes sustainable agriculture. Precision agriculture is also a game-changer for sustainable farming, using cutting-edge tech and data to boost efficiency, reducing environmental impact and increasing economic viability. It is revolutionising traditional methods to create a more sustainable future for farmers worldwide.

Mergers and acquisitions

The crop protection industry is consolidating through strategic acquisitions, driven by Indian and global companies expanding their portfolios and supply chains and some notable deals, including UPL's (United Phosphorus Limited) acquisition of PT Excel, Nutrien's Agroessence launch and Grupo Duwest's purchase of Syngenta's Paraquat assets. India's Dhanuka Agritech recently acquired global rights for two fungicide (Iprovalicarb and Triadimenol) products from Germany's Bayer AG for more than 20 countries spanning Latin America ("**LATAM**"), Europe, the Middle East, Africa and Asia. More mergers and acquisitions are expected as companies seek growth and an increased market presence.

Crop dynamics and farmers' income

Climatic conditions (temperature and humidity affect pest pressure) and the area allocated to different crops (different crops are susceptible to different pests and diseases) directly impact the consumption of crop protection chemicals. For instance, growing acreage under soybean and corn in Brazil can be reflected in increasing consumption of crop protection chemicals in the country. Other factors that influence chemical consumption include crop health, price realisation of key agriculture commodities by the farmers and eventually farmers' income.

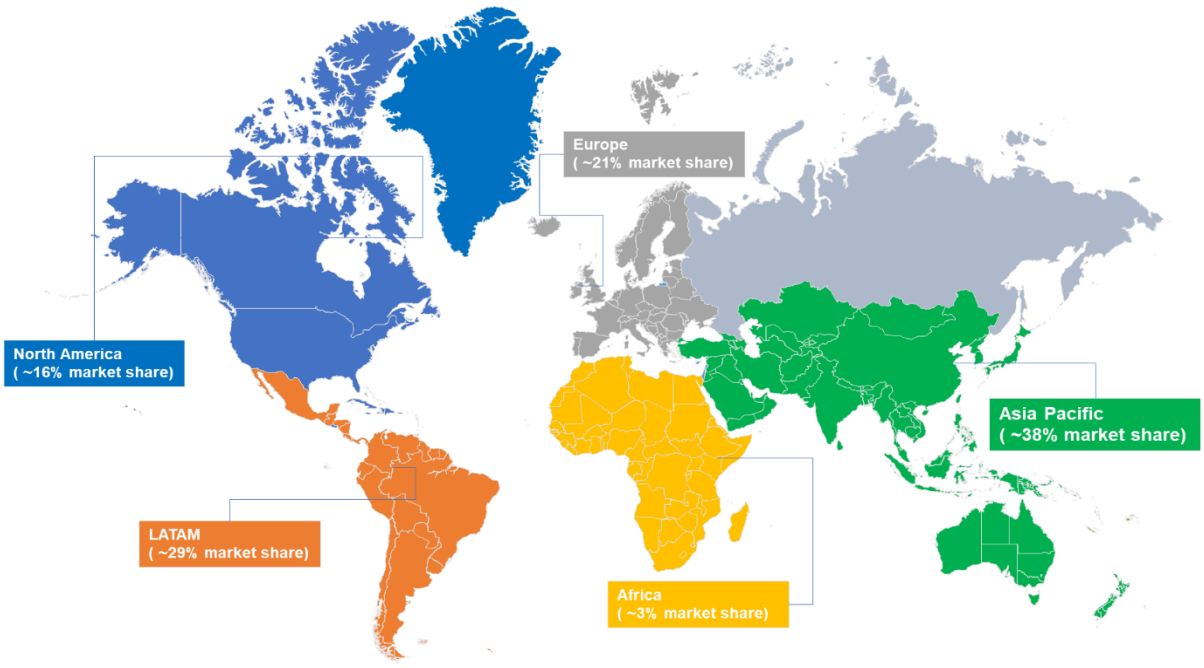
Table-9: Factors impacting global crop protection market

Key aspect	Impacting factors	Impacted geography	Rationale
Lag in R&D and technological advancement	Low active ingredient manufacturing	Africa	Because of low manufacturing of active ingredients, countries such as Egypt are importing technicals
Adoption of GM technology	Insecticide, herbicide resistance development in soybean (GM crops)	LATAM	Insect/weed resistance traits in soybean will impact the insecticide/herbicide market (
Strong demand for exportable production	Higher demand from exporting countries	LATAM	Demand for soybean is increasing from China, leading to rise in import of herbicides for soybean
Increasing agri production and acreage	Conducive climate, diverse cropping pattern	LATAM, Asia- Pacific (“**APAC**”), Europe	Acreage under key crops is increasing
Import prices of technical	Prices of technicals from China	LATAM, APAC	Prices of technical raw materials in China impact the imports and exports of formulations in many South American and Asian countries
Regulatory measures	European Green Deal, CAP (Common Agricultural Policy) measures to promote sustainable agriculture	Europe	Regulatory measures and reducing reliance on chemical pesticides are impacting exports and imports of crop protection chemicals in Europe

Source: Secondary Research, Crisil Intelligence

Regional dynamics of global crop protection industry

Figure 26- Region-wise market share of agrochemicals (2024)



Please note: The map is for illustrative purposes only and not for reference
Source: Crisil Intelligence

Table- 10: Region-wise growth of crop protection market

Regions	CAGR (2025-2030P)	Key drivers
Asia-Pacific	4.81%	Diverse agriculture landscape, monoculture and intensive cultivation
LATAM	4.40%	Major soybean and maize acreage, labour shortage
North America	4.40%	Changing pest patterns, increased usage in fruits and vegetables
Europe	4.20%	Higher fungicide usage in fruits and vegetables and diverse climatic conditions
Africa	3.43%	Increasing pesticide usage due to climate change, increasing imports of agrochemicals

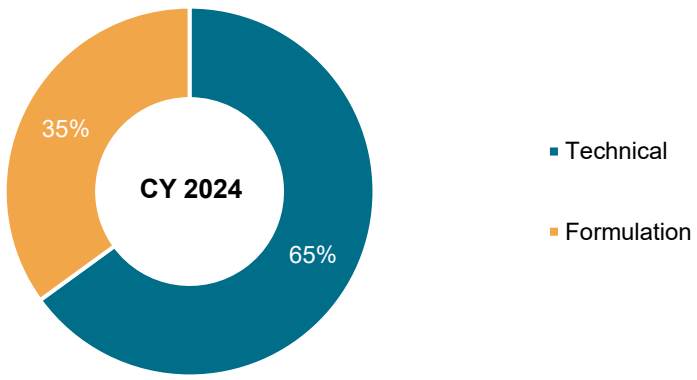
Source: Secondary research, Crisil Intelligence

The Asia-Pacific dominates the crop protection market globally, with ~38% market share. It is expected to clock a CAGR of 4.00-5.00% over 2025-2030, driven by increased usage of crop protection chemicals due to intensive cultivation, diverse cropping pattern and higher usage of insecticides. In the Asia-Pacific, the insecticide segment dominates with ~40.00% share, followed by herbicides (~35.00%). LATAM is the second-biggest market for crop protection chemicals with a share of ~29.00% and is projected to clock a CAGR of ~4.40% over 2025-2030. Market expansion can be attributed to increase in exports of maize and soybean and higher consumption of crop protection chemicals, especially herbicides, driven by labour shortage.

Global crop protection market categorisation by production stage

The agrochemicals market is broadly categorized into two primary categories: technicals and formulations. Technicals refer to the mass production of active ingredients that are not suitable for direct use. These are transformed through formulations into ready-to-use products—such as sprays and liquids—by adding substances that enhance their effectiveness, safety, and usability, making them suitable for direct application by farmers.

Figure 27- Technical vs formulation bifurcation



Source: Industrial Interactions, Crisil Intelligence

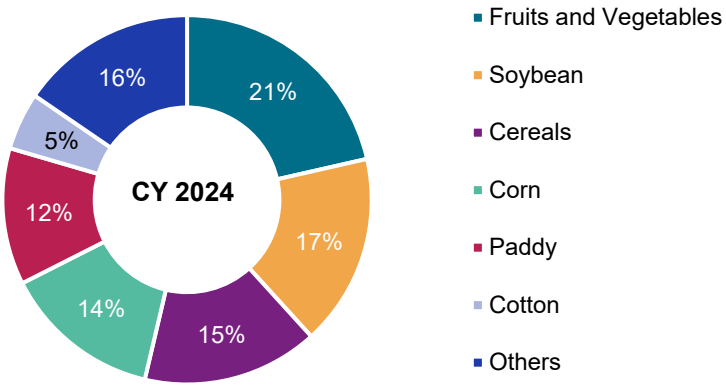
Technicals occupy a larger share in the market due to their role as traded products used to make formulations but offering relatively lower margins due to commoditization. In contrast, formulations, which add value to technicals through the inclusion of carriers, solvents, and stabilizers, enhance their effectiveness against diseases and pests, resulting in better outcomes and higher profit margins. As a result, while technicals dominate the market in terms of volume, formulations

generate more revenue due to their higher margins and added value, making them a more lucrative segment of the agrochemicals market.

Crop-wise share of global crop protection industry

The global crop protection industry is diversified in terms of crop-wise usage, with major consumption of crop protection chemicals reported under fruits and vegetables (21.00%), soybean (17.00%) and cereals (15.00%) due to high acreage and intensity of pesticide use. The widespread cultivation of staple crops such as wheat, rice and maize is crucial for global food security, but their vulnerability to pests and diseases necessitates the use of crop protection chemicals.

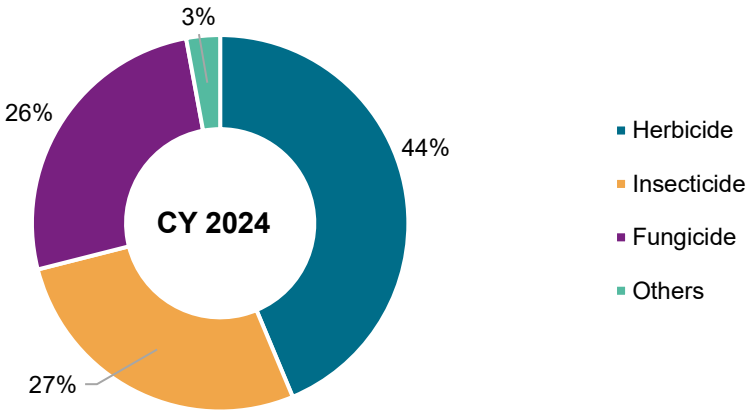
Figure 28- Global crop-wise market share



Source: Annual reports; Investor Report, Crisil Intelligence

Segment -wise analysis of global crop protection industry

Figure 29-Segment -wise market share



Source: Annual reports of global players, Crisil Intelligence

The global crop protection industry is divided into three main categories: insecticides (27.00% share), fungicides (26.00%) and herbicides (44.00%). The others category, with 3.00% share, comprises fumigants, pheromones and PGRs.

Table- 11: Segment -wise growth

Segment	CAGR (2024-2030P)	Rationale
Insecticide	4-5%	The insecticide market is expected to grow as older, low-cost chemistries are expected to phase out and newer, advanced chemistries with higher revenue are expected to gain market share
Fungicide	4-5%	The fungicide market is expected to grow in value as demand has been increasing for innovative solutions to tackle rising resistance challenges. Regulatory developments such as withdrawals of contact fungicides are creating opportunities for more advanced solutions
Herbicide	6-7%	The rise of herbicide-resistant weeds is driving the demand for rotational herbicides and herbicide-tolerant crop systems, with LATAM and North America leading consumption due to widespread adoption of GM crops

Source: Industry Interactions, Crisil Intelligence

Global consumption of crop protection chemicals

Brazil, US, Indonesia, Argentina and China are the top pesticide consumers. India ranks 19th, with a relatively low per-hectare consumption of ~0.60 kg, significantly lower than Brazil (~12.63 kg). The relatively low per-hectare pesticide consumption in India indicates a significant growth potential for the crop protection industry, as the country's increasing crop production and productivity are likely to drive demand for crop protection solutions, making the industry an integral part of this growth trajectory.

Table-12: Global consumption trend of crop protection chemicals.

Consumption in lakh (litre or tonne)	2018	2022	CAGR (2018-2022)
Brazil	5.50	8.00	10%
USA	4.60	4.70	1%
Indonesia	2.60	2.90	3%
Argentina	1.70	2.60	11%
China	2.90	2.40	-5%
Mainland China	2.80	2.20	-6%
Vietnam	1.40	1.60	3%
Canada	0.90	1.00	3%
Russian Federation	0.70	1.00	9%
Colombia	0.40	0.80	19%
India (forecast)	**0.40**	**0.52**	**7%**
Poland	0.23	0.22	-1%
Guatemala	0.12	0.14	5%
Morocco	0.14	0.14	0%

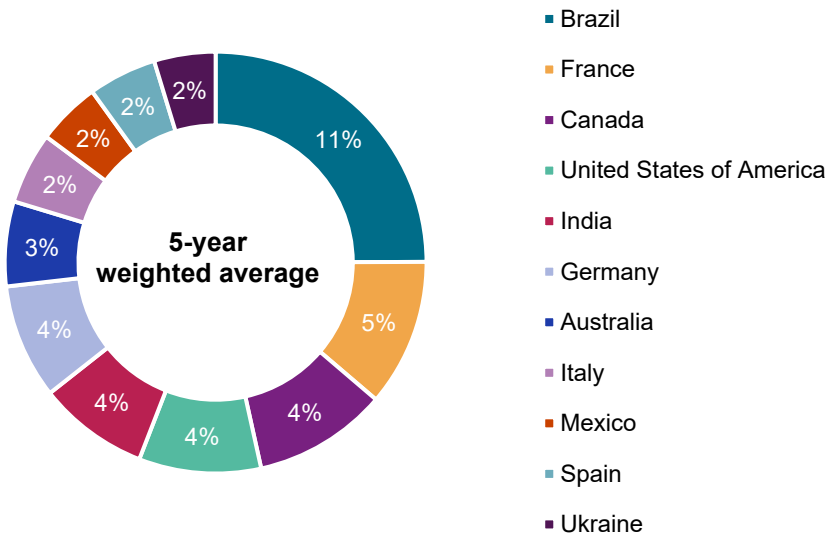
Source: FAOSTAT (Food and agriculture organization statistics), Crisil Intelligence

Crop protection chemicals export-import dynamics

Imports

Global imports of crop protection chemicals reached ~$41 billion in 2024, clocking a CAGR of ~3.00% over 2020-24 Based on a 5-year weighted average of country-wise import share, LATAM, Europe, North America and India collectively hold a considerable proportion. Notably, Brazil has seen a substantial surge in its import share over the past 5 years, driven by the expansion of cultivation area. India is the fifth-largest importer of crop protection chemicals, after Brazil, France, China and US. Despite being a net exporter of crop protection chemicals, India relies on imports for certain technical-grade chemicals due to factors such as cost, patent restrictions and supply chain dependencies.

Figure 30- Top importers by value share



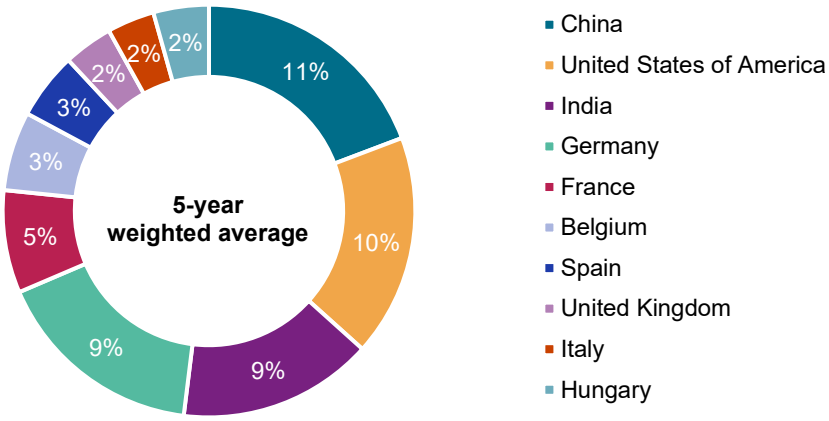
Source: ITC Trade Map, Crisil Intelligence

Global exporters of crop protection chemicals

Globally crop protection chemicals worth $42 billion were exported in calendar year 2024, with China, US, India, Germany and France being the top five exporters. India ranked third with an export value of ~$4.10 billion, (average value of five years) accounting for ~10.00% of global exports and 17.00% among the top five exporting nations.

China is a dominant player in global crop protection exports, leveraging its manufacturing capabilities, raw materials, supply chain and logistics, which grants it a cost competitiveness advantage. US leads due to its R&D and key agrochemical players, while India excels in launching post-patent products at competitive prices.

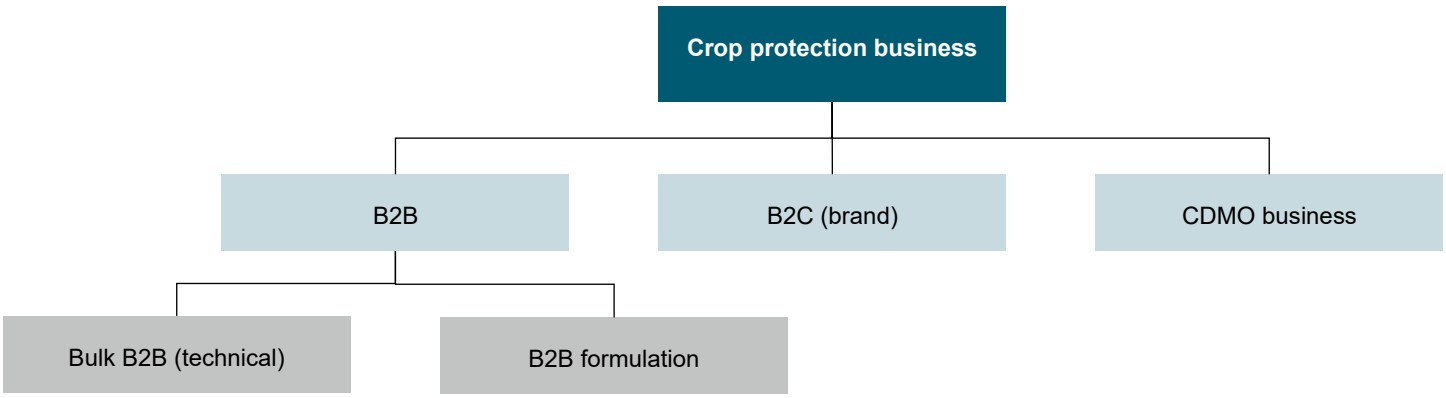
Figure 31- Top exporters by value share



Source: ITC Trade Map, Crisil Intelligence

Advantages of brand play in crop protection business

(India's export perspective)



The crop protection business is primarily divided into three categories as given in the flowchart.

- **B2B exports**: This involves selling formulations or technicals directly to another business or company located outside the country.
- **B2C exports**: In this business model, branded formulations are exported to a network of sub-national dealers and distributors in a foreign country, where they are sold to farmers, typically through a subsidiary company or a joint venture partnership established in that country, facilitating the distribution and sale of the products to the local agricultural market.
- **Contract development and manufacturing organisation ("CDMO") business**: This involves outsourcing formulations from a manufacturer in another country and then selling those products under one's own brand name, essentially acting as a distributor or marketer of the outsourced products.

Out of the three business segments, B2C exports or branded business is the most remunerative business in crop protection exports. Under brand business, the company has significant control over marketing and product development. The branded business is more sustainable and can provide consistent revenue over the years.

The brand business of the company has more advantages than other models in some aspects.

- **Established distribution network**: The company can use its existing distribution network and logistics infrastructure to reach farmers directly, streamlining the sales process.
- **Long-term sustainability**: Building a strong brand reputation fosters trust and loyalty among farmers, leading to repeat business and long-term, sustainable gains.
- **Higher profit margins**: Branded products are perceived to have higher value, resulting in higher profit margins for the company.
- **Regulatory compliance**: The B2C business model involves indirect transactions with farmers through retailers and dealers, which are governed by established regulatory frameworks, creating a level-playing field for major players and ensuring compliance with industry standards.

Comparison between different business models

Table -13: Comparison of B2B-B2C business models

Type of business	Advantages	Disadvantages
B2B bulk	There is no need for including additional expense on marketing/branding of products. No risk related to inventory. Importing countries can easily rebrand and sell the products under their own brand. No risk of formulation expiry (higher shelf life of technicals)	Lower margins than B2C. Lower margin than B2B formulations It is less sustainable model as partner can switch to other sources Highly price-sensitive market
B2B formulation	No need for further formulations It can be rebranded and sold. Margins are higher than in B2B bulk.	The shelf life of formulations is shorter than the shelf life of technicals.
B2C (brand)	Premium can be charged (higher margins) Brand equity comes into play. Can leverage from strong distribution network of company/subsidiary	Overhead costs Shelf life for formulations is short (inventory risk). Requires more time and effort for brand development
CDMO	The CDMO business is a high-volume, low-margin model with minimal overhead costs. It helps countries to decrease the cost of production by outsourcing production from countries that are well equipped in manufacturing the technicals/ formulations at a lower cost.	Lower margins compared with the brand business

Source: Industry interactions, Crisil Intelligence

Margin comparison - Branded business vs technical and formulation

In a highly competitive market, the agrochemicals industry presents distinct business opportunities with varying profit margins and shelf life. The technicals trade business offers a stable shelf life of 2-5 years, albeit with relatively lower profit margins of 10.00-15.00%. In contrast, the formulation-trade business, with a shorter shelf life, provides higher profit margins of 20.00-25.00%. However, the most lucrative approach is the brand business, which can generate substantial

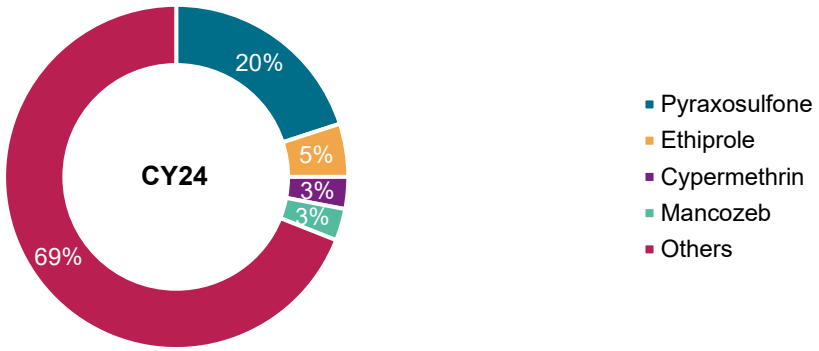
profit margins of up to 35.00-40.00%, contingent upon the product's strength and market positioning, making it the most attractive option for maximizing profitability.

The crop protection export sales have two major categories: technicals and formulations. The technical business dominates, accounting for ~71.00% of exports, while formulation accounts for ~29.00%.

Several Indian companies, including PI Industries Ltd, UPL Ltd, Rallis India Limited, Indofil Industries Limited and Parijat Industries (India) Limited., are major players in the global market, exporting technicals and formulations to numerous countries worldwide.

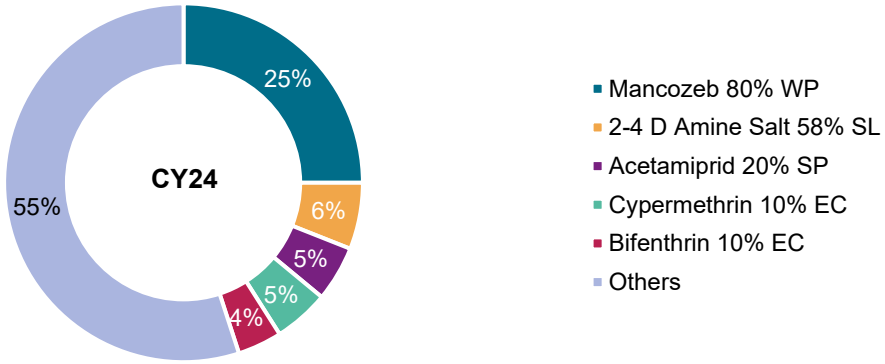
Technicals vs formulations (export business)

Figure 32 - Top technicals exported by India



Source: Industry Interactions, Crisil Intelligence

Figure 33 - Top formulations exported by India



Source: Industry Interactions, Crisil Intelligence

Among India's top five technical exports is Pyroxasulfone, a pre-emergence herbicide. PI Industries Ltd. has been the leading domestic player in this segment and has been actively exporting Pyroxasulfone. Recently, Best Agrolife Ltd. has also obtained registration for indigenous manufacturing of Pyroxasulfone, which is expected to enable cost-effective production and pave the way for large-scale exports. Other notable exports include Ethiprole, manufactured by Bayer. The technicals business is advantageous in competitive markets owing to its longer shelf life, ranging from 2-5 years, compared with formulations. The formulations business is more prominent in domestic sales as compared to exports. The overall margin in the formulations business is higher than the technicals business.

Entry barriers in global crop protection industry

The global crop protection industry is characterised by significant barriers to entry, which limit the ability of new companies to enter the market. These include high regulatory hurdles, substantial research, development-related investments and established distribution networks, making it challenging for new players to gain traction and compete with existing market participants.

Registering chemical formulations in foreign markets can be a daunting task due to stringent and lengthy regulatory requirements. The process of obtaining registration for agrochemical formulations is complex and time-consuming, requiring trial data on efficacy and toxicity for various geographical regions within a country, which can take several years to compile. Additionally, numerous other documents and clearances are necessary, including environmental clearance, toxicology reports, and other supporting documents, making the overall registration process cumbersome and protracted, often taking years to complete before a crop protection product can be successfully registered in a foreign country.

Africa: The African market poses significant entry barriers for global agrochemical players, with challenges such as climate change, limited agricultural mechanisation, underdeveloped infrastructure, inadequate financial systems and a lack of R&D capabilities hindering the ability of new companies to enter and operate effectively.The African region has a significant demand for crop protection chemicals, with countries such as Mali, Tanzania, South Africa, and Burkina Faso being among the major consumers. However, the registration process for agrochemicals in most African countries is a lengthy and complex procedure, except for countries like Zambia, Côte d'Ivoire and Mozambique to name a few. The registration process requires the submission of extensive documentation and data, as well as adherence to strict regulatory norms related to environmental clearance, making it a time-consuming and cumbersome process that involves significant administrative hurdles, ultimately delaying the introduction of new products to the market. For Instance, the Sahelian Pesticides Committee (“**CSP**”) oversees pesticide registration in Mali and 12 other West African countries, which share a common regulation. The CSP evaluates and approves pesticide registrations, ensuring they meet specific criteria and follow a standardised procedure, to facilitate safe use across member states. Any pesticide registered by the CSP must meet certain criteria, go through a well-defined procedure and submit a pesticide registration file. This poses a major challenge for companies looking to expand into most African markets, as they must navigate complex and often cumbersome regulatory requirements and bureaucratic procedures.

Russia: The Russian crop protection industry is heavily guarded by significant entry barriers, primarily the economic sanctions imposed by EU and US, which restrict the participation of global players. Additionally, the country's stringent and protracted regulatory process, characterised by substantial capital requirements and lengthy approval timelines, poses a further obstacle for international companies seeking to enter the market, making it challenging for them to navigate and establish their presence in Russia.

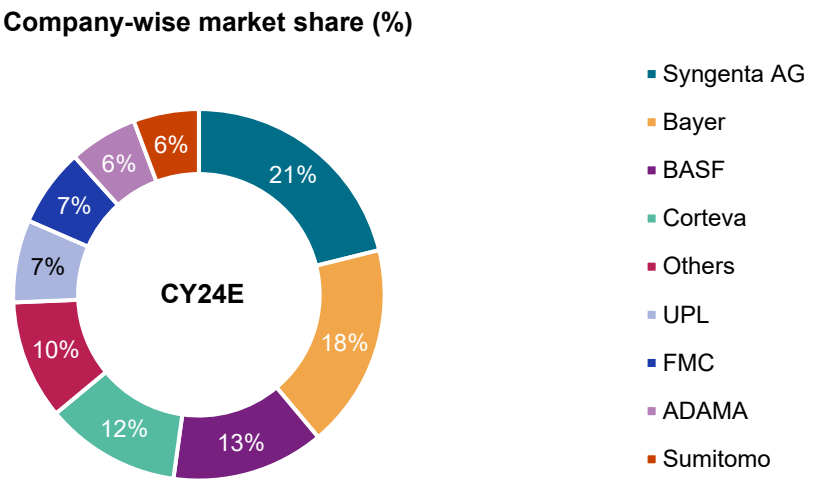
North America: The North American market, comprising US and Canada, is characterised by a stringent regulatory environment and high R&D costs, making it a challenging space for new entrants to establish themselves, with major multinational corporations dominating the landscape.

Europe: The European crop protection landscape is growing more restrictive, making it challenging to develop new active ingredients due to rising registration costs and increasingly stringent environmental assessments, which have led to the ban of several crop protection chemicals in recent times.

Global crop protection players

Multinational companies like Syngenta, Bayer, BASF and Nufarm dominate the global crop protection market. Global MNCs are dominating the market with robust R&D, innovative patented formulations and strong distribution networks.

Figure 34 - Key global crop protection players



Source: Annual reports of major players, Crisil Intelligence

Syngenta AG dominates the market with ~21.00 % of the market share, followed by Bayer AG and BASF SE with a market share of ~18.00% and ~13.00%, respectively.

Indian crop protection market

Overview of Indian crop protection industry

India is the fourth largest agrochemical producer in the world and third largest exporter of crop protection chemicals with an export of ~₹ 350 billion (FY 2024). Within total exports, insecticides alone amounted to ₹ 115 billion (FY 2024).

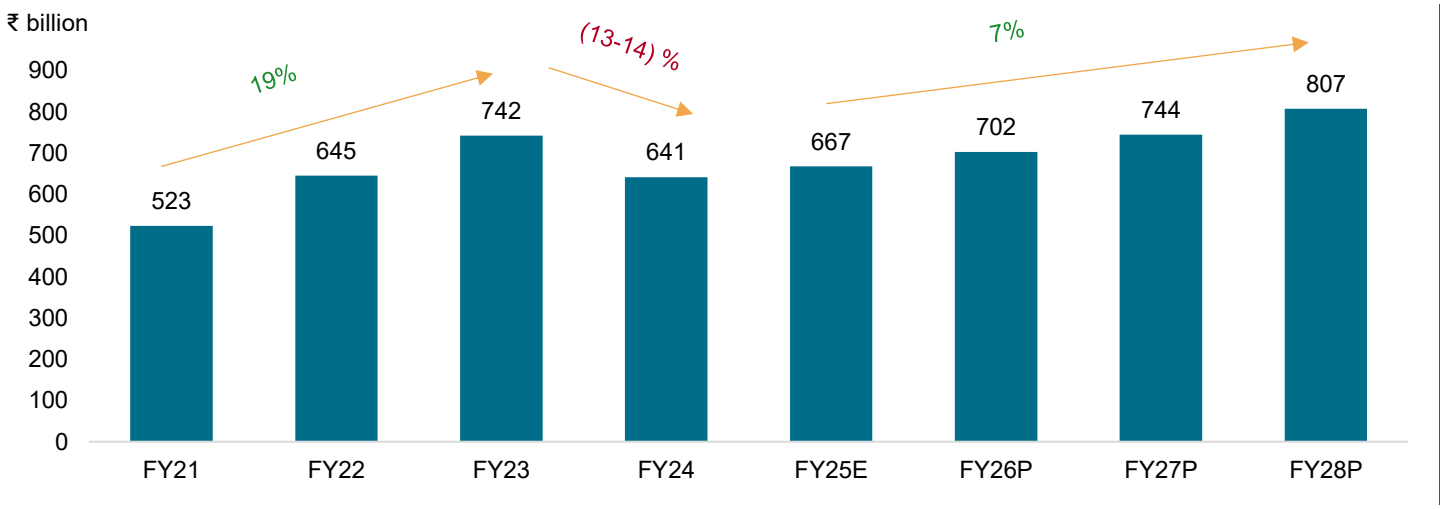
The Indian crop protection market was estimated at ₹ 667 billion in FY 2025 and is projected to grow to ~₹ 702 billion in FY 2026, driven by a stable domestic demand and a rebound in export volumes. This represents a 4.00-5.00% on-year growth from FY 2024 to FY 2025 and 5.00-6.00% YoY (growth from FY 2025 to FY 2026.)

India's strong global export position is driven by its cost-competitive manufacturing, robust registration pipeline and expanding technical production capabilities, making it an attractive hub for companies specialising in patented and specialty products.

In FY 2024, the Indian crop protection industry saw a decline of 13.00-14.00%, primarily due to price competition from Chinese suppliers and adverse climatic conditions caused by El Nino. Another factor contributing to the trend was the decline in prices of crop protection products in both Indian and global markets, resulting from a buildup of inventory and sluggish demand. Unpredictable rainfall patterns in various regions of the country also had a negative impact on the use of crop protection chemicals across different categories, further affecting demand. The domestic market contracted 5.00-6.00%, while exports volume fell 19.00-20.00%. Despite the contraction, differentiated players with less exposure to generics or bulk active ingredients demonstrated relative stability, highlighting the importance of portfolio quality and geographic diversification.

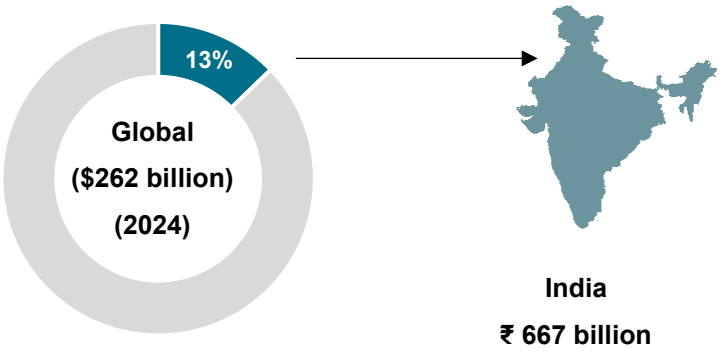
Going ahead, the market is expected to grow at a CAGR of 7.00% between FY 2025 and 2028.

Figure 35 - Indian crop protection market by value



Source: Industry Interactions, Crisil Intelligence

Figure 23 - India's share in global crop protection business

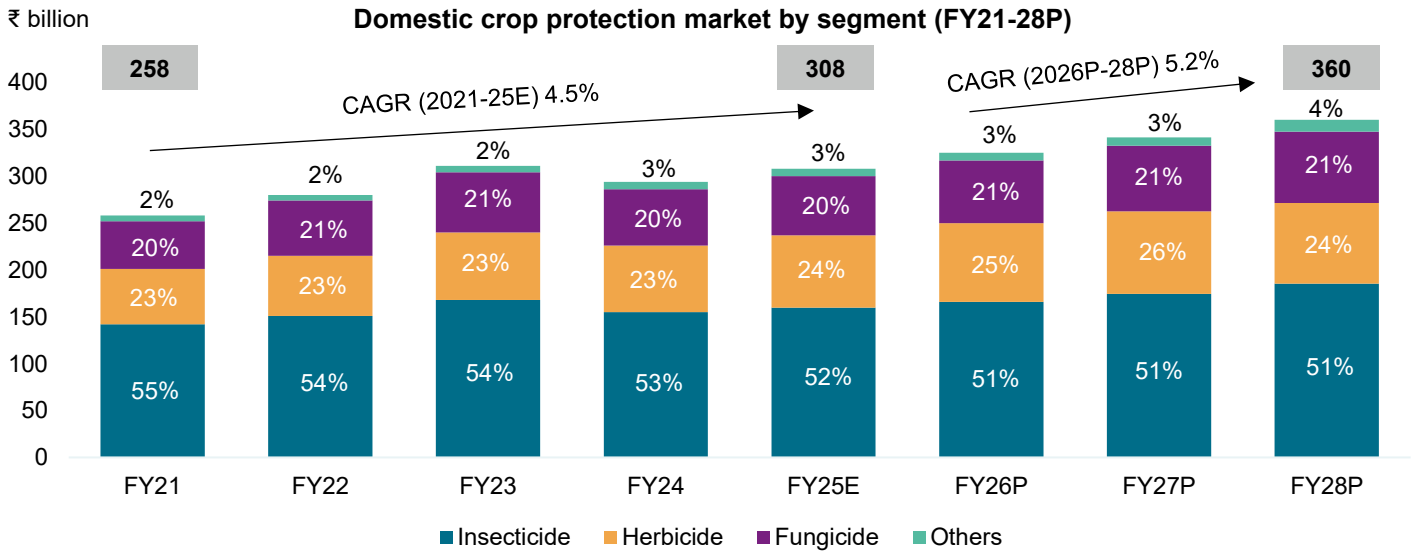


Source: Crisil Intelligence

India accounted for an estimated ~13.00% of the global crop protection market in FY 2025 and ranked third in terms of global crop protection exports valued at ₹ 350 billion. The country is rapidly strengthening its position as a preferred manufacturing hub for crop protection chemicals, supported by 100.00% automatic FDI, a streamlined registration ecosystem, and rising investments in domestic production infrastructure. These systemic tailwinds have particularly benefited integrated players with technical manufacturing capabilities, particularly those producing high value technicals — increasingly positioning India as an alternative to China.

Domestic crop protection business (along with segment bifurcation)

Figure 36 - Indian domestic crop protection market (₹ billion)



Source: Industry Interactions, Crisil Intelligence

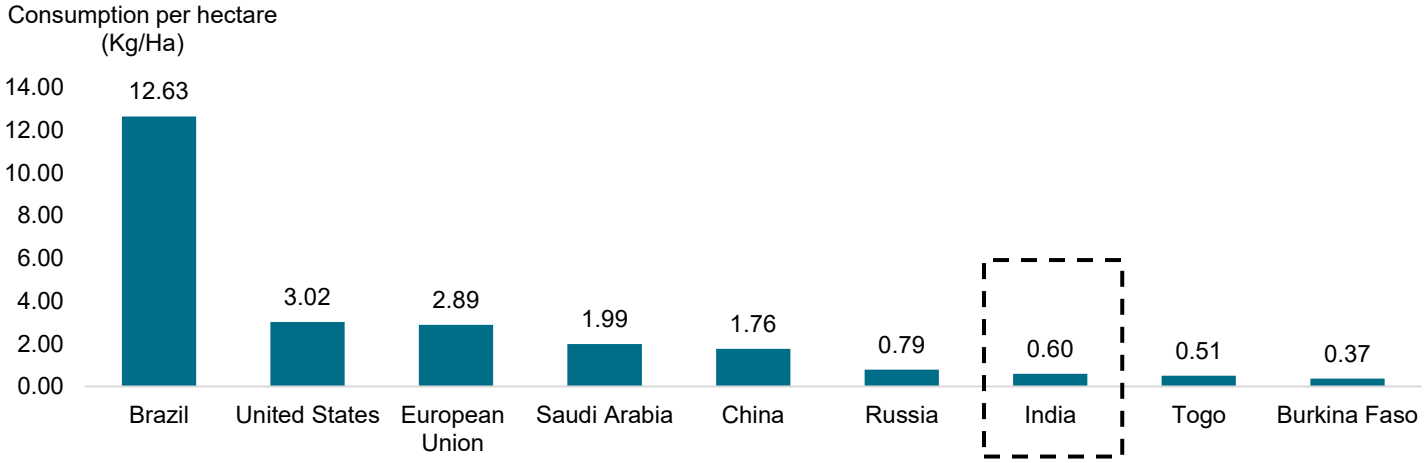
The domestic crop protection Industry is expected to grow at 5.00-6.00% per annum between FY 2025 and 2028.

The domestic crop protection market is expected to grow ~6.00% on-year in FY 2026, driven by a healthy monsoon, with herbicides leading the growth with a 10.00-11.00% increase. The Indian domestic crop protection market was valued at approximately ₹ 308 billion (FY 2025), largely driven by higher growth exhibited by the herbicide segment (especially the non-selective herbicides). The fungicide segment grew ~5.00% on-year, while the insecticide segment saw a modest ~3.00% growth, hindered by lower consumption of crops like chilli and cotton. In FY 2024, the market saw a decline of 5.00-6.00% on account of adverse weather conditions and other factors. The insecticide segment fell ~8.00%, while fungicides and herbicides dipped by ~6.00% and ~1.00%, respectively, due to the dry season.

Crop protection chemicals – penetration in India

Crop protection penetration is steadily increasing in India, and the average penetration was estimated to be ~51.00% in FY 2025. The penetration for insecticides was estimated to be the highest at ~59.00% in FY 2025, followed by fungicides at ~48.00% and herbicides at ~45.00%. It is anticipated that the average penetration will grow at 2.00-3.00% till FY 2027. In India, pesticide penetration per ha is very low as compared to other top pesticide exporting/importing countries.

Figure 37-Consumption of crop protection chemicals (Kg/Ha)

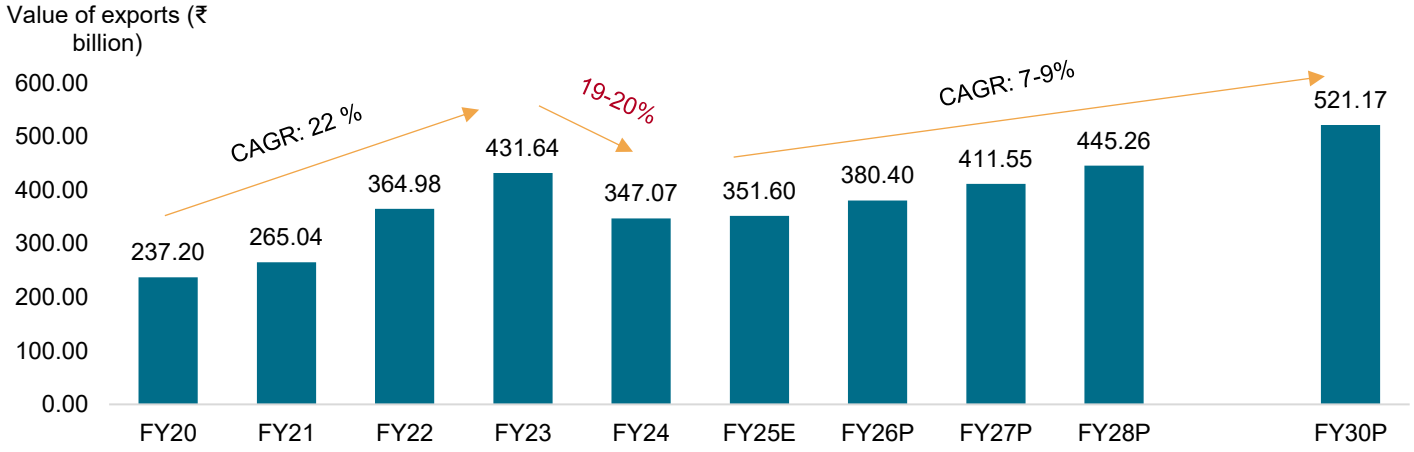


Source: FAO STAT (Food and Agriculture Organization Statistics), Crisil Intelligence

Export trends in Indian crop protection industry

Crop protection exports from India logged a CAGR of 22.00% between FY 2020 and 2023, driven by competitive pricing, technical capabilities and strong global demand. The country's export market declined 20.00% in FY 2024 due to global destocking, price pressure and competition from Chinese suppliers. India's pesticide exports rebounded last fiscal, growing 8.00% driven by stable global inventory levels, rising agricultural demand and a recovery in crop protection chemical prices. The country's crop protection exports to Brazil and US saw a significant increase last fiscal. This fiscal, they are expected to grow 8.00-9.00%. The exports from the industry are poised to clock a CAGR of 7.00-9.00% between FY 2025 and 2028.

Figure 38-Crop protection exports from India



Source: DGFT, ITC Trade Map, Crisil Intelligence

Region-wise export trends

India has established itself as a key exporter of crop protection chemicals, serving markets across continents. In calendar year 2024, top 5 countries accounted for 59.00% of total crop protection chemical exports from India with Brazil accounting for 25.00%, US 19.00%, Japan 9.00% and Belgium and Vietnam 3% each.

Table-14: Top importing regions from India (₹ billion)

Regions	CY 2024 (Rs billion)	Share (%)
South America	54	46
Asia-Pacific	27	42
North America	12	32
European Union	8	6
Middle East	6	4
West Africa	4	3
East Africa	3	3
CIS	1	1
Central America	1	1
North Africa	1	1

Source: DGFT, ITC Trade Map, Crisil Intelligence

Key destinations for pesticide exports from India

Top importing regions include South America (46.00%), APAC (42.00%), North America (32.00%) and the EU (6.00%). The Middle East, West Africa, East Africa and Commonwealth of Independent States ("**CIS**") are the other key regions accounting for ~11.00% of the overall exports. Brazil is the largest market, with pesticide use per hectare at 12.63 kg/ha, driven by soybean, corn and sugarcane production. US is the largest consumer in North America, with herbicides dominating imports. Asia, particularly Japan, Vietnam and China, also shows significant demand. Russia has a low

pesticide consumption rate of 0.79 kg/ha but offers growth opportunities due to its focus on domestic production and imports. African nations such as South Africa, Burkina Faso and Togo have varying consumption rates, driven by population growth and government initiatives supporting sustainable farming practices.

Geopolitical uncertainties have prompted Russia to shift towards domestic production of crop protection chemicals, driven by its significant wheat production and expanding agricultural land. However, it still relies on imports from India and China. Meanwhile, West African countries such as Mali, Cote d'Ivoire and Burkina Faso face climate change challenges, but their agricultural potential and growing demand for crop protection chemicals present a growth opportunity for companies globally. India has a significant presence in the Middle East's pesticide market, with countries such as UAE, Türkiye and Saudi Arabia importing technicals and formulations from the country for high-value crops, making the region an important destination for Indian exporters.

Companies such as UPL Ltd., Indofil Industries Limited and Parijat Industries (India) Limited are aggressively expanding their global presence by entering diverse markets, adapting to unique regulatory requirements and responding to local market conditions. UPL Ltd., for example, has established a significant presence in countries such as Canada, Togo, Guatemala, Brazil and the US, contributing substantially to India's exports to these nations. Meanwhile few companies such as Parijat Industries (India) Limited are targeting non-traditional markets, including Guinea, Senegal, Poland and Tanzania. The company’s exports to these markets account for approximately 30.00%, 23.00%, 8.00%, and 6.00% of total Indian exports of these chemicals, respectively. These emerging markets offer high growth potential, relatively low market saturation and opportunities for sustainable and profitable long-term business, making them an attractive destination for these companies to establish a strong foothold and drive future growth. Parijat Industries (India) Limited is leveraging Guinea and Senegal as key transshipment hubs to export crop protection products to Mali, a landlocked nation that heavily relies on its neighboring countries for imports. Similarly, the company is utilizing Poland as a transshipment point to supply crop protection products to Ukraine, bypassing traditional routes due to the ongoing conflict between Ukraine and Russia.

Table-15: Export share of crop protection companies to different countries (% of total exports from India)

Export share – average of three years (%)			
Countries/ companies	**Indofil Industries**	**Parijat Industries (India) Limited**	**UPL**
Guinea	0%	30%	0%
Senegal	2%	23%	1%
Canada	0%	9%	37%
Togo	0%	8%	24%
Poland	0%	8%	8%
Tanzania	11%	6%	3%
Russia	0%	6%	6%
Morocco	0%	3%	3%
Guatemala	18%	3%	23%
US	0%	0.20%	17%
Brazil	4%	0%	22%

Source: Trade Vision, DGFT, Crisil Intelligence

Note: - Impact of recent tariffs on export of CP chemicals:

The United States recently imposed 50% tariff on Indian exports. This may lead to increased export costs, making Indian crop protection products less competitive in US market. However, the impact on India is expected to be moderate, as the country

Specialty vs generics in domestic crop protection industry

The crop protection industry is experiencing a global shift towards branded and differentiated formulations, projected to grow at a CAGR of ~8.00-9.00% globally and 11.00-12.00 %in India between Financial Year 2025 and Financial Year 2030.The Indian crop protection market is largely driven by generic formulations, with domestic manufacturers excelling in making products that have recently lost patent protection. Indicatively, generic molecule margin averages ~8.00-10.00% while margin of recently off-patented molecules can average 15.00-20.00%. Several domestic companies capitalise on this opportunity by being the first to register and market these off-patent molecules, thereby generating significant revenue. Majority of the domestic companies like Crystal Crop Protection Limited, Tropical Agrosystem (India) Pvt. Ltd. and Parijat Industries (India) Limited are eventually transitioning their focus towards branded formulations, with the development and commercialization of key brands. For instance, as on March 31, 2025, Parijat's key brands include URUMI, VELEKTIN and XYFEN ULTRA in India.

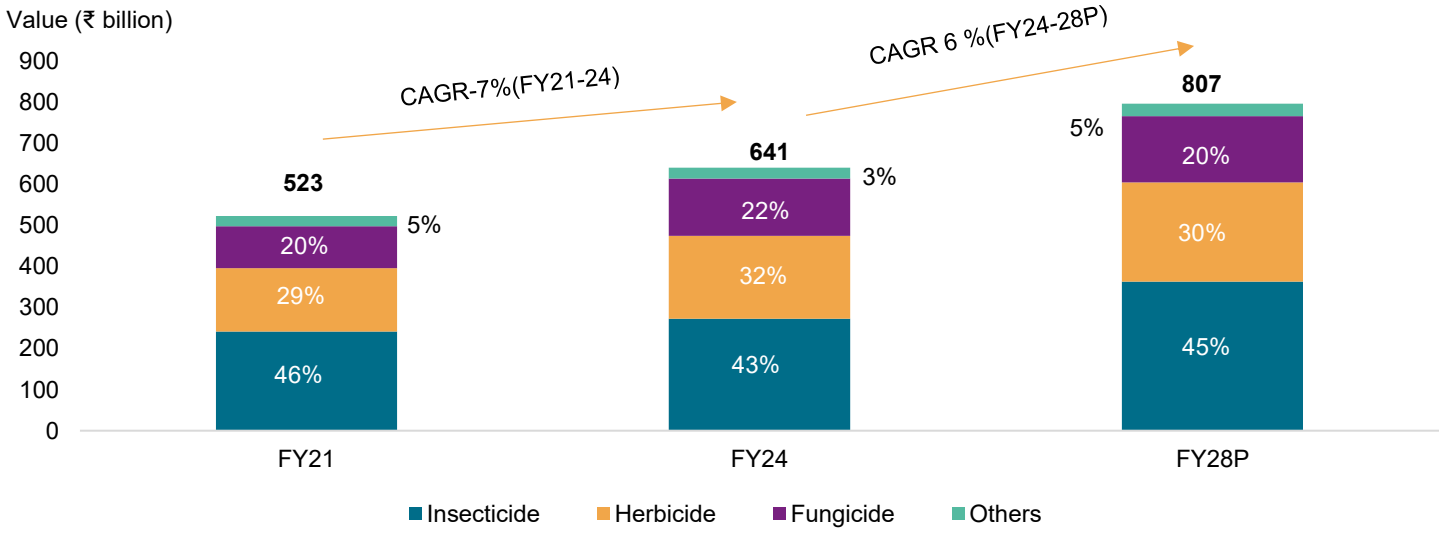
Table-16: Specialty vs generic comparison

Type of formulation	Average indicative margin range (gross margin)	Category
Patented	25-40%	Specialty
Recently off patented	15-20%	Specialty
Generic	8-10%	Generic

Source: Industry Interactions, Crisil Intelligence

Indian crop protection market: Segment -wise breakup

Figure 39-Crop protection industry categories (domestic sales + exports)



Source: ITC Trade Map, Crisil Intelligence

The domestic crop protection market is broadly divided into three product segments — **insecticides, herbicides and fungicides**. Each segment has distinct growth drivers. Last fiscal, herbicides are expected to have led the market, driven by a rise in exports and higher domestic consumption of non-selective herbicides. Insecticides grew ~4.00% supported by increased pest infestation in crops such as paddy, ground nut, and fruits and vegetables. The fungicides segment also grew with increased use of sprays on crops such as paddy to combat rice blast and sheath blight.

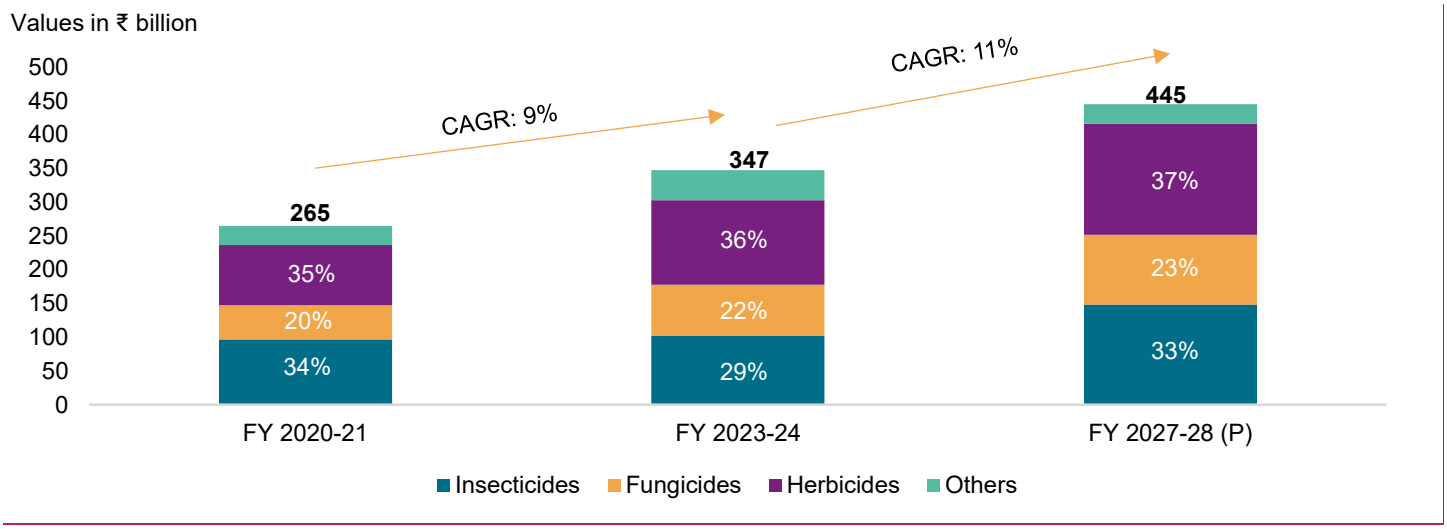
The outlook for this fiscal remains positive across categories, with a projected growth of ~6.00% for herbicides and ~4.00% each for insecticides and fungicides. Herbicide demand is expected to remain robust, fuelled by an expected increase in acreage under paddy and soybean, favourable monsoon forecasts and rising labour costs that are accelerating the shift toward chemical weed management.

Segmentation of Indian crop protection exports

The shares of insecticides, herbicides and fungicides in total crop protection exports in FY 2025 stood at 33.00%, 37.00% and 23.00%, respectively. Seed treatment, fumigants, rodenticides and bactericides accounted for the balance 7.00% share.

Between FY 2020 and 2023, exports of herbicides saw a significant CAGR of ~30.00%, fungicides 25.00% and insecticides ~11.00%. Increasing global farm labour costs, combined with India's capacity to provide cost-effective crop protection solutions, were the factors that fuelled the demand for Indian products.

Figure 40-Segment -wise break-up of Indian crop protection exports (FY21-28P))

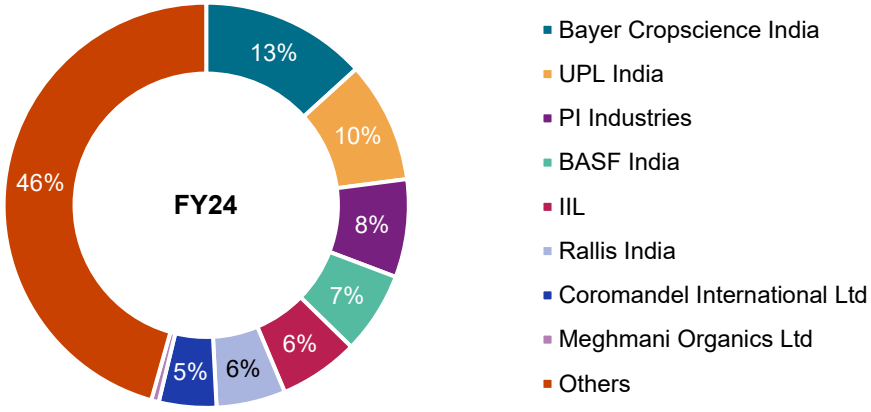


Source: ITC Trade Map, Crisil Intelligence

However, the situation became challenging in FY 2024 when China rebounded with enhanced production capacity after Covid-induced restrictions eased. India, as a result, saw a 19.00-20.00% on-year decline in exports. Insecticide exports declined ~24.00%, herbicides ~25.00% and fungicides ~11.00% during the fiscal. Higher inventories in major export destinations such as Brazil and the US and unfavourable weather events such as droughts and floods reportedly caused Indian exports to these countries drop 25.00% and 36.00%, respectively. In FY 2024, these two countries together had accounted for around 45.00%of the country’s pesticide exports.

Major domestic players

Figure 41-Estimated market share of domestic crop protection by players



Source: Industry, Crisil Intelligence

In the **domestic market**, estimated to have reached ~₹ 308 billion last fiscal (8.00% CAGR between FY 2020 and 2025), formulation-based products continue to dominate. Key players include Bayer Cropscience Limited (~13.00% share), UPL (~10.00%), PI Industries Limited and BASF India Limited. Both Indian and multinational players are increasingly focused on **branded, innovative offerings**, shifting away from commodity generics.

Note: Innovative offerings: Products for which company has received a patent; and products for which company was the first Indian company to register the product after innovator MNC, Crisil Intelligence

A significant trend in the industry is the increasing shift towards environmentally friendly “green chemistries” and advanced formulations that not only enhance efficacy but also ensure environmental compliance. Global giants such as Bayer AG and BASF SE are expanding their product portfolios in the domestic market by introducing patented or recently off-patent molecules. Meanwhile, leading Indian companies are also ramping up investments in innovative chemistries, branding and farmer engagement initiatives. Furthermore, Indian crop protection companies such as Indofil Industries Limited, Parijat Industries (India) Limited, GSP Crop Science Private Limited and Rallis India Limited are prioritising development of green chemistries that are less hazardous and more sustainable, underscoring their commitment to environmental stewardship.

This landscape underscores a strategic shift in India towards high margin, differentiated portfolios. While global majors dominate in patented products, several Indian companies, such as Best Agro Limited, Insecticide (India) Limited, Parijat Industries (India) Limited and Tropical Agrosystem (India) Private Limited, are now developing proprietary formulations, building technical manufacturing scale and competing in post-patent specialty categories.

Figure 42-Segment -wise new launches by key players.

Segment	Crop	Companies	New Products Launched -Name of Formulation (FY25, FY26)
Pre Emergence Herbicide	Paddy	1.Dhanuka Agritech 2.Parijat Industries India 3.Insecticide India Limited 4.FMC India 5.Tata Rallis, Parijat Industries India	1. Dinkar-Ipfencarbazone 25% SC 2.Tabah - Oxidiargyl 80% WP 3.Altair - Metazosulfuron 33% WG 4.Vayobel - Beflubutamid 2.5% GR 5.Allato, Dahan - Oxadiargyl 1% + Pretilachlor 6% GR
Post Emergence Herbicide	Paddy	1.Tropical Agro 2.Biostadt 3.Bayer Cropscience 4.Crystal Crop Protection 5.Parijat Industries India	1. Tag Proxy - Paraquat Dichloride 22.4% + Oxyfluorfen 1.99% EW 2.Pyankor - Pyribenzoxim 5% EC 3.Ricestar- Fenoxaprop-p-ethyl 69 EC (6.7% w/w) 4.Riceact - Triafamone 20% + Ethoxysulfuron 10% WG 5.Lukario - Metamifop 10% EC
Post Emergence Herbicide	Maize	1.Insecticide India Limited 2.Parijat Industries India	1.Torry Super - Tembotrione 9% + Atrazine 45% WG 2.Zorya - Mesotrione 40% w/w SC
Broad Spectrum Herbicide	Soybean	1.Best Agrolife 2.UPL India 3.Parijat Industries India 4.Tata Rallis	1. Shot down -Haloxyfop-R Methyl 12.8 % + Imazethapyr 10 % (w/w) ME 2. Centurion EZ - Clethodim 13% w/w EC 3.Vostrix - Metamifop 8% + Imazethapyr 4% + Imazamox 3% ME 4. Mark Plus - Diclosulam 0.9% + Pendimethalin 35% SE
Broad Spectrum Insecticide	Paddy	1.JU Agrisciences 2.Tropical Agro 3.Insecticide India Limited 4.BASF India 5.Parijat Industries India	1.Ayaka - Emamectin Benzoate 1.25% + Lambda Cyhalothrin 1.5% + Bifenthrin 4.5% EC 2.Tag Stem Lee - Thiamethoxam 1.25% + Fipronil 1.25% + CTPR 0.6% GR W/W 3.Centran - Chlorantraniliprole 0.35% + Fipronil 0.35% GR 4.Prexio® Active 5. Moyo- Dinotefuran 15% + Pymetrozine 45% WG
Broad Spectrum Fungicide	Multiple Crops	1.BASF India 2.FMC India 3.Syngenta India 4.Parijat Industries India	1.Mibelya -Mefentrifluconazole 200 g/l and Fluxapyroxad 200 g/l 2.Velzo - Valifenalate 6% + Mancozeb 60% WG 3. Miravis - Duo Difenoconazole 125 g/L + Pydiflumetofen 75 g/L with ADEPIDYN® technology 4. Paribact-K - Kasugamycin 3% SL

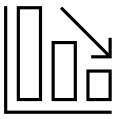
Source: Crisil Intelligence

Note: New product information as of FY25 and FY26 (year to date)

Opportunities and challenges in domestic crop protection industry

Table-17: Tailwinds and headwinds in domestic crop protection industry

Category of factors that impact the industry	Factor	Details
Tailwinds	Impetus for manufacturing	India is the fourth largest producer of agrochemicals. As per an article by the Crop Care Federation of India dated September 18, 2024, the country is all set to receive ₹ 125 billion as investments in crop protection business over the coming 3 years (2025-2028). Several companies are expanding their manufacturing capabilities by acquiring new registrations and increasing their capacities. For instance, Rallis India Limited has made capital expenditure for its Dahej plant to augment its pendimethalin capacity to 2,000 Metric Tons annually, to boost manufacturing and Tagros Chemicals India Private Limited has acquired 5.50 acres in Cuddalore, Tamil Nadu, to strengthen its supply chain.
	Focus on research and development	Indian players are involved in R&D of novel crop protection active ingredients. Either they are developing new chemistries by collaborating with other global majors or are developing novel chemistries on their own. Recently PI Industries Limited's insecticide pyridine amide produced through its own R&D received ISO common name approval. Parijat Industries (India)

Category of factors that impact the industry	Factor	Details
		Limited has patented products such as VELEKTIN, DAHAN and XYFEN ULTRA to combat fall army worm, broad and narrow leaf weeds in paddy and whitefly infestation, respectively.
	Mergers and acquisitions	Many Indian companies are collaborating with global companies for product launches. Some are also acquiring other Indian companies. Recently UPL Global (UGL)acquired PT Excel and Crystal Crop Protection Limited acquired Bayer AG's herbicide assets for Ethoxysulfuron to expand their businesses. Also, Coromandel International Limited acquired NACL Industries Limited, a deal that is expected to significantly enhance Coromandel's crop protection business by expanding its product portfolio and strengthening its market presence.
	Registrations of novel/ generic pesticide products	The domestic crop protection industry is witnessing an increase in registration of both novel and generic crop protection chemicals. In the first half of 2024, the Central Insecticides Board and Registration Committee recorded 416 product agendas, which included 333 technical registrations and 83 formulation registrations. Domestic players are also registering novel crop protection molecules such as Dicloromezotiaz, Pydiflumetofen, Triflumezopyrim, Mesotrione and Triafamone. PI Industries Limited has registered Dicloromezotiaz and Parijat Industries (India) Limited has registered Mesotrione for catering to the domestic market/ exports.
	Digital penetration in rural India	Digital penetration is increasing in India. In a recent press release, the government said approximately 95.00% villages in the country have access to internet with 3G/4G connectivity. As much as 55.00% people in rural areas are internet users (more than in urban areas). Out of 405 million users who use mobile phone for digital payments, 40.00% are from rural India. The increasing rural connectivity is revolutionising agriculture, enabling greater internet access and driving growth in digital payments for retail, crop insurance and agricultural credit.
	Moving towards green triangle chemistries	The Indian agrochemical industry is shifting towards eco-friendly practices, adopting zero discharge solutions and introducing environmentally friendly products. This has led to significant benefits, including water conservation and reduced pollution. Companies are also focusing on R&D of green molecules and bio-based products. Companies such as BASF India Limited, Bayer Cropscience Limited, UPL India Limited and Parijat Industries (India) Limited are focusing more on green and blue triangle products and slowly replacing the red triangle products.
 **Headwinds**	Regulatory process	Slow pace of registration is a major challenge. For instance, the total time taken for importing a new technical ingredient can range from 45-54 months. The process is very time consuming and complex. Despite the government's focus on green chemistries and bio-stimulants, the regulatory environment is riddled with slow registration speed and lack of clarity. Prior to the FCO (Fertilizer Control Order) inclusion of bio-stimulants in 2021, there were significant delays in the registration process. However, the situation has improved, with 11 new products recently added. Additionally, companies that were selling bio-stimulants without prior registration were granted provisional registration (G3) until March 17, 2025. Once the deadline ends, they were required to formally register their products to continue selling them.
	Data protection for patented products	The Indian crop protection industry faces a challenge as global majors tend to extend data protection for patented products from 20 to 25 years, which would delay Indian generic manufacturers' entry into the market, limiting their access to affordable crop protection solutions. This hinders not only the

Category of factors that impact the industry	Factor	Details
		growth of the companies but also affect agricultural productivity and food security in the country.
	Raw material dependency	Increasing cost of technical grade raw material is also one of the major problems the domestic crop protection industry faces. India imports ~50.00-55.00% of technical grade raw materials from China, which heightens margin pressure due to several macroeconomic factors and high inventory resulting from seasonal demand. It is important for the government to create clusters for manufacture of technical grade raw material.
	Risk of spurious and counterfeit products	The industry is also grappling with widespread counterfeiting of crop protection solutions, which has far-reaching consequences on food production, health of farmers and consumers and environmental well-being. Spurious products form a staggering 25.00% of the pesticides market in the country. To combat this issue, it is essential to implement rigorous customs procedures to detect and analyse chemical compounds at various entry points.

Source: Secondary Research, Crisil Intelligence

Opportunities in the crop protection market

Off-patent crop protection market

The off-patent market is crucial for India's crop protection industry as the country is a leading global exporter of generics.

Table-18: Patents expiring before 2030

Year	Insecticide	Fungicide	Herbicide	Others	Total
2026	0	2	3	0	5
2027	2	5	1	0	8
2028 to 2030	8	7	5	2	22
2026 to 2030	10	14	9	2	35

Source: S&P Global | Plant Protection Report, Crisil Intelligence

Table-19: Turnover of crop protection chemicals getting off patent

Row Labels	₹ Billion Global Turnover (FY 2024)
Fungicide	128
Herbicide	77
Insecticide	44
Grand Total	**249**

Source: S&P Global | Plant Protection Report, Crisil Intelligence

As indicated in the table above, 35 active ingredients will expire by 2030, indicating the upcoming potential of the off-patent molecule market, which will create a great opportunity for domestic players. Out of the 35 active ingredients, ~ 9

are herbicides, 14 are fungicides and 10 are insecticides. The total global turnover of these active ingredients is ~₹ 248 billion (FY 2024), representing a significant chunk of the global industry. Indian companies that have in-house capabilities for manufacturing active pharmaceutical ingredients ("**APIs**") and are engaged in developing branded formulations are well-positioned to capitalise on this opportunity.

Patented crop protection market

While the generic crop protection market is larger, patented formulations offer higher margins and a competitive edge due to their superior efficacy and farmer preference, particularly in high-value crop categories. Several innovative companies such as Best Agrolife Limited, Parijat Industries (India) Limited, GSP Crop Science Private Limited, have acquired patents of advance chemistries to capture this growing market as these products are gaining more traction compared with generics in Indian domestic markets. Parijat Industries (India) Limited has obtained registrations and patents for several formulations in India. The company was first to market, register and obtain patents for herbicide formulations, including Oxadiargyl 1%+Pretilachlor 6% GR, marketed under the brand DAHAN and Metamifop 8% + Imazethapyr 4% + Imazamox 3% ME, marketed under the brand VOSTRIX. In addition, Parijat Industries (India) Limited has been the first to register and obtain patents for the insecticide formulation, Diafenthuron 30% + Pyriproxyfen 8% SE, sold under the brand name Xyfen Ultra. One of the Parijat's formulations was first patented insecticide formulation in India to receive permanent registration from the Central Insecticide Board and Registration Committee ("**CIB**") for the control of fall armyworm in maize crops — marketed under the brand VELEKTIN. The registration has been extended to several African countries, and the patent has also been granted in countries under the ARIPO patent office, Nigeria and Ethiopia.

Best Agro Life Limited has also launched two patented formulations, Tricolor, a fungicide for controlling early and late blight in vegetables, and Orisulam, an herbicide for transplanted paddy. These formulations are combinations of various active ingredients, including Trifloxystrobin, Difenoconazole, Sulphur, Bispyribac Sodium, Penoxsulam and Pyrazosulfuron Ethyl. These products are available in the Indian market, providing additional options for farmers. Insecticide (India) Limited and Tropical Agrosystem (India) Private Limited have made a recent foray into the patented formulation market, with the launch of two new products, marking one of the newest entries in this space. The two formulations, Altair, a pre-emergent herbicide for paddy, and Tag Stem Lee, a non-selective, non-crop herbicide, contribute to the growing portfolio of patented formulations, with these companies being the latest contributors to this market.

Table-20: Patented formulations by crop protection companies

Brand	Formulation	Patent Year	Company
Dahan	Oxadiargyl 1%+Pretilachlor 6% GR	2023	Parijat Industries (India) Limited
Tricolor	Trifloxystrobin 10% + Difenoconazole 12.5% + Sulphur 3% SC	2023	Best Agrolife Ltd
Xyfen Ultra	Diafen 30% + Pyripr 8% SE	2021	Parijat Industries (India) Limited
Prachand	Cyclaniliprole 10% DC	2024	Coromandel International Ltd
Vostrix	Metamifop 8% + Imazethapyr 4% + Imazamox 3% ME	2023	Parijat Industries (India) Limited
Tag Stem Lee	Thiamethoxam 1.25% + Fipronil 1.25% + Chlorantraniliprole 0.60% w/w GR	2025	Tropical Agrosystem (India) Private Limited
Aadat	Fipronil 5%+Isoprothiolane 28%EC	2019	Parijat Industries (India) Limited

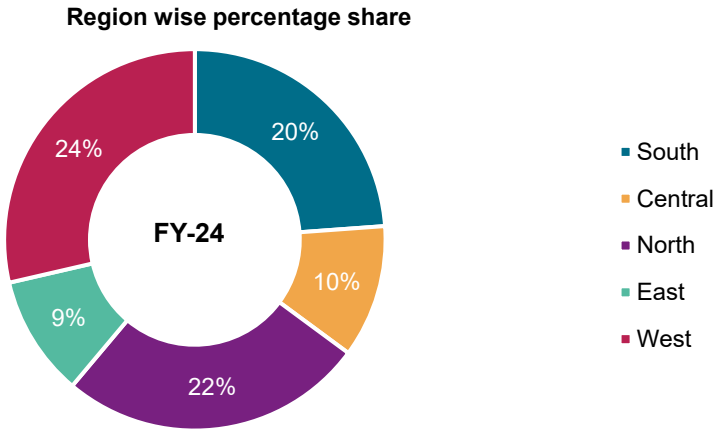
Brand	Formulation	Patent Year	Company
SLR-525	Pyriproxifen 5% and Diafenthuron 25% SE	2014	GSP Crop Science Private Limited
VELEKTIN	Emamactin1.5%+Profenofos35% WDG	2021	Parijat Industries (India) Limited
Context	Wheat herbicide	2023	Parijat Industries (India) Limited
Orisulam	Bispyribac Sodium 0.25%, Penoxsulam 0.25%, and Pyrazosulfuron Ethyl 0.20% GR	2023	Best Agrolife Limited
Altair	Metazosulfuron 33% WG	2025	Insecticide (India)Limited

Source: Investor Reports, Crisil Intelligence) IP India and annual reports, Crisil Intelligence

Region-wise market dynamics of crop protection in India

The western region constitutes ~24.00% of the total market size, followed by North India, with a share of ~22.00%. While western regions of Maharashtra and Gujarat have higher acreages of Fruits and Vegetables ("**F&V**"), such as grapes and potatoes, northern markets have higher acreages of cereal crops, such as wheat, maize and paddy, along with F&V crops such as apple, mango and litchi. The southern region has a consumption share of ~ 20.00%. Andhra Pradesh and Telangana have higher acreages of crops, such as chilli, paddy and pulses, hence the usage is higher. In Madhya Pradesh, the acreages of soybean, chilli, F&V and paddy is high hence the consumption and the market share of crop protection chemicals are higher. In Uttar Pradesh, the acreages of sugarcane, paddy and potato are higher, hence the consumption of pesticide is higher. The western and southern region of the country makes up ~45.00% of the pesticide consumption (*source Crisil Intelligence)* .

Figure 43- Region-wise share of pesticide consumption



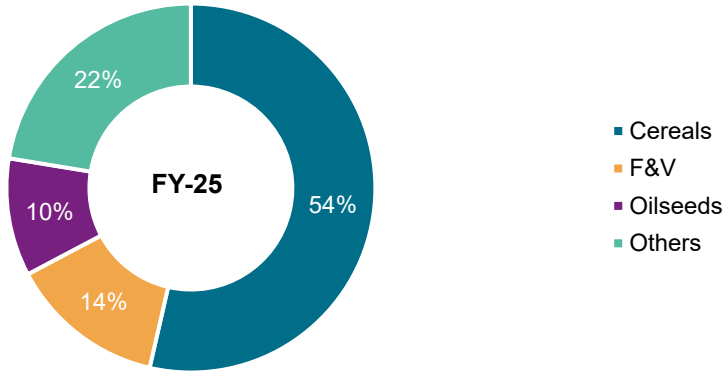
Source: Crop Life India| Crisil Intelligence | Industry Interactions

Crop protection market share by crop category and segment

Crop category-wise market share

The crop protection chemicals market is dominated by the cereals category, which accounted for ~54.00% of the total consumption, with paddy and maize being the primary crops driving this demand. The F&V category is the second largest, holding ~22.00% of the market share, with key crops, including grapes, pomegranate, tomato, onion and potato. The oilseeds category ranks third (~10.00% consumption), with soybean being the major crop driving demand in this category.

Figure 44- Crop category-wise crop protection market



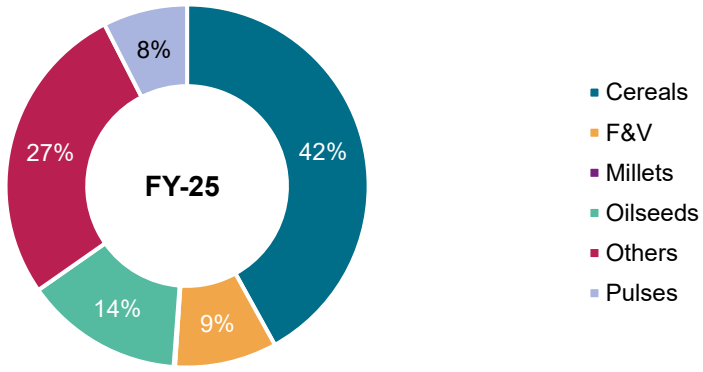
Source: Crop Life India| Crisil Intelligence | Industry Interactions

Segment -wise market share

Crop-wise consumption of insecticides (₹ billion)

Paddy, cotton and soybean are the crops with maximum consumption of insecticides. The consumption of insecticide is expected to increase at a CAGR of ~5.00% (FY 2025-2028). Maximum growth is observed in categories such as F&V and paddy. Paddy crop insecticide application is done for hopper complex, leaf folder and stem borer. In cotton crops, the major infestation is done by pink bollworm and whiteflies. In soybean, the major pests are the girdle beetle, stem fly and white fly.

Figure 45- Crop-wise market share insecticides (FY 2025)



Source: Industry Interactions, Crisil Intelligence

Figure 46-Top five insecticide formulations (share by value of domestic insecticide industry)

Top 5 insecticide formulations (% share by value)				Top Companies
S.NO	Insecticide	% Share of total domestic insecticide industry	Major Players	
1	Chlorantraniliprole 18.5%SC	7%	FMC, GSP, Dhanuka, UPL	
2	Chlorantraniliprole 0.4% GR	5%	FMC, BASF, Adama, Coromandel, Parijat	
3	Emamectin Benzoate 5% SG	4%	Crystal, Krishi Rasayan, Dhanuka, Best Agro, Parijat	
4	Broflanilide 30% SC	3%	BASF, PI, Indofil	
5	Chlorantraniliprole 0.5 w/w + Thiamethoxam 1.0 w/w GR	2%	Crystal Crop Protection, Parijat, Syngenta, Godrej, Bharat Certis	

Source: Industry Interactions, Crisil Intelligence

Table-21: Other key insecticide formulations

S. No	Formulation	Major Players
1	Chlorfenapyr 10 % SC	BASF, Krishi Rasayan, Parijat
2	Pyriproxyfen 10% EC	Sumitomo, Best Agro, Agrostar, Parijat, Multiplex
3	Lambda Cyhalothrin 9.5% + Thiamethoxam 12.6% ZC	Dhanuka, Syngenta, Dharmaj, Parijat
4	Pymetrozine 50%WG	Rallis, Dhanuka, Best Agro, JU Agrisciences, Parijat
5	Tolfenpyrad 15% EC	PI Industries, Rallis India, Nichino, Parijat, NACL
6	Profenophos 40%+Cypermethrin 4% EC	NACL, PI Industries, Atul, Meghmani, Parijat

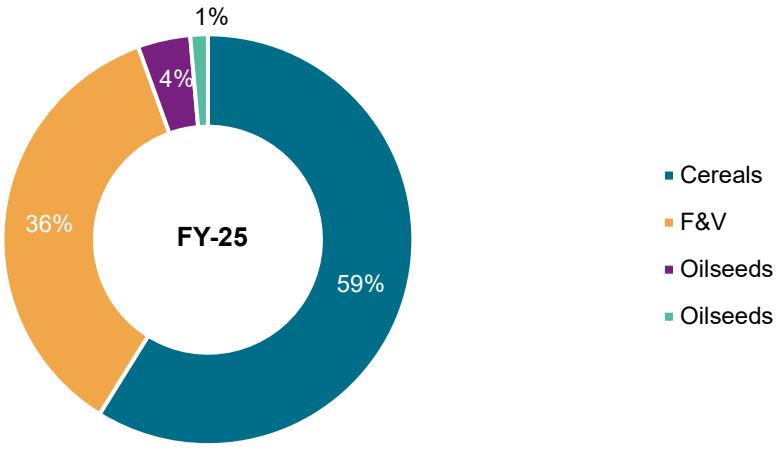
Source: Crisil Intelligence

Parijat Industries (India) Limited has introduced first-of-its-kind combination formulation in India that integrates both insecticidal and fungicidal active ingredients for paddy crop — marketed under the brand *Aadat*.

Crop-wise consumption of fungicides (₹ billion)

Paddy, vegetables and fruits have the highest consumption of fungicide due to infestation of paddy bacterial leaf blight and rice blast. In vegetables, the consumption of fungicide is also high due to infestation of early and late blight, powdery mildew, and downy mildew in tomato and potato. In fruits, major consumption is driven by botrytis, powdery mildew and downy mildew in grapes, scab in apple, anthracnose in mango and chilli and root and collar rot in different F&V crops. Fungicide consumption is increasing at a CAGR of ~5.00% (FY 2025-2028).

Figure 47- Crop-wise market share fungicides (FY 2025)



Source: Industry Interactions, Crisil Intelligence

Figure 48-Top 5 fungicide formulations (share by value of domestic fungicide industry)

Top 5 fungicide formulations (% share by value)				Top Companies
S.NO	Fungicide	% Share of the domestic fungicide industry	Major Players	
1	Trifloxystrobin 25 + Tebuconazole 50 WG	6%	Bayer, FMC, Godrej , Tropical Agro	
2	Mancozeb 75% WP	6%	Indofil, UPL, Dhanuka, Syngenta, NACL, Rallis, Parijat	
3	Carbendazim 12% + Mancozeb 63% WP	5%	UPL, Indofil, Dhanuka, Parijat	
4	Azoxystrobin 18.2% + Difenconazole 11.4% SC	3%	Syngenta, Dhanuka, Adama, Parijat, Best Agro	
5	Propineb 70% WP	3%	Bayer, Coromandel, PI, Krishi Rasayan, Bharat Certis, Parijat	

Source: Industry Interactions, Crisil Intelligence

Table-22: Other key fungicides formulations

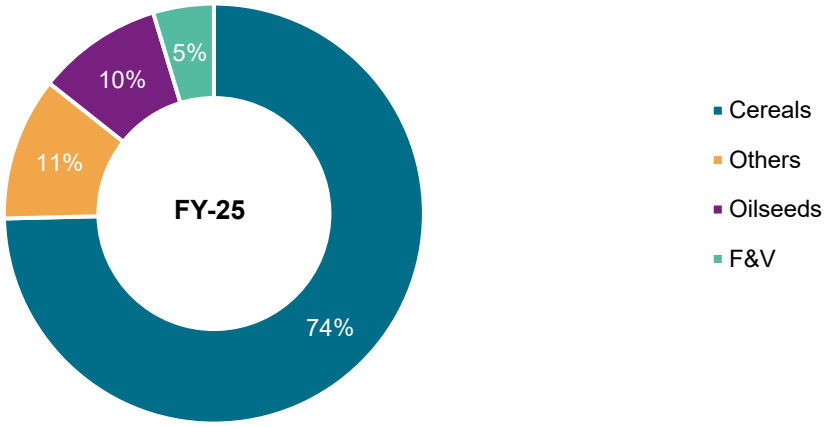
S. No	Formulation	Major Players
1	Isoprothiolane 40% EC	Parijat, Rallis India, Atul, Nichino
2	Dodine 65% WP	Best Agro, Indofil, Parijat, FIL, Dhanuka
3	Thiophanate Methyl 70% WP	Coromandel, Biostadt, IIL, Parijat
4	Hexaconazole 4% + Zineb 68% WP	Indofil, Parijat, FMC
5	Propiconazole 25% EC	Dhanuka, Crystal, Indofil, Adama, Nagarjuna

Source: Crisil Intelligence

Crop-wise consumption of herbicides (₹ billion)

Consumption of herbicide is higher in row crops, such as paddy, wheat and soybean, as the acreages of these three crops are relatively higher and, in the recent past, the shortage of labour has also been a prominent growth driver. The CAGR of herbicide segment is projected to be ~6.00%. (FY 2025-2028). In paddy, major weeds are *Echinochloa species (grasses) and Cyperus spp.,* major weeds of wheat are *Phalaris minor and Avena fatua* and major weeds of soybean are *Trianthema portulacastrum, Amaranthus spp., and Commelina benghalensis.*

Figure 49- Crop-wise market share herbicides (FY 2025)



Source: Industry Interactions, Crisil Intelligence

Consumption of herbicide is higher in row crops such as paddy, wheat and soybean as the acreages of these three crops are relatively higher and, in the recent past, the shortage of labour for spraying jobs is also prominent. In crops, such as maize and paddy, the growth of herbicide consumption is the highest at ~6.00%. (FY 2025-2028. Consumption is also significant in crops, such as soybean and cotton, as the acreages are significant.

Figure 50-Top five herbicide formulations (share by value of domestic herbicide industry)

Top 5 herbicide formulations (% share by value)				Top Companies
S.NO	Herbicide	% Share of total domestic herbicide industry	Major Players	
1	Glyphosate 41 SL	15%	Bayer, Excel Crop Care, Adama, Dhanuka, Parijat	
2	Glufosinate-ammonium 15% SL	6%	Bayer, Syngenta, BASF, Excel Crop Care, UPL, Parijat	
3	Tembotrione 34.4 % SC	5%	Bayer, Godrej, Rallis, Crystal Crop Protection	
4	Imazethapyr 10% SL	4%	BASF, UPL, Adama,Parijat, Willowood	
5	Metribuzin 70% WP	4%	Bayer, UPL, Rallis, Dhanuka	

Source: Industry Interactions, Crisil Intelligence

Table-23: Other key herbicides formulations

S. No	Formulation	Major Players
1	Oxadiargyl 80% WP	Adama, HPM, Bayer, Parijat
2	Imazethapyr 70% WG	Willowood, Parijat, Ichiban, Dharmaj
3	Mesotrione 40% w/w SC	Parijat
4	Metamifop 10% EC	FMC, Parijat
5	Mesotrione 2.27%+Atrazin 22.7% SC	Syngenta, Parijat, Gharda, Dhanuka, JU Agriscience

Source: Crisil Intelligence

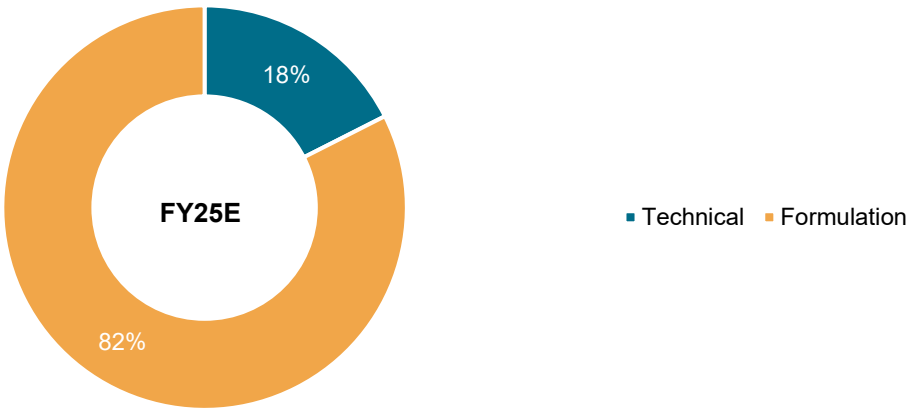
Technical vs formulation (domestic market)

The Indian crop protection market remains **formulation-driven**, with formulations accounting for ~82.00% of the market in FY 2025. Formulation sales logged a CAGR of 5.00-6.00 % over FY 2021-2025, driven by branded product strategies, farmer engagement and increasing demand for ready-to-use solutions.

By contrast, technical-grade sales constitute ~18.00% of the domestic market, logging a slower 3.00% CAGR. While this segment represents a smaller share by value, it plays a critical role in supply chain stability, margin preservation and regulatory leverage. Technical manufacturing involves high entry barriers — such as compliance, capital expenditure, process chemistry and backward integration, which limits competition and allows integrated players to maintain control over cost structures and product availability.

Indian players with in-house technical capacities are increasingly using technicals to support both domestic formulation brands and international sales, especially in high-value molecules.

Figure 51-Technical vs formulation market (% share)



Source: Crisil Intelligence, Industry Interactions

Indian companies such as UPL India, Indofil, Willowood Chemicals, Crystal Crop Protection Limited and Parijat Industries (India) Limited are proactively registering newly *off patent* technicals, following the expiry of the original patents held by MNCs. By being the first Indian registrant of these technicals, these companies aim to gain a competitive edge, enabling them to manufacture combination formulations at a lower cost and increase their market share. In India, several companies were the first to register various technicals. Crystal Crop Protection Limited led the way with Penoxsulam and

metiram under the Technical Indigenous Manufacturing ("**TIM**") category. Meanwhile, Parijat Industries (India) Limited was the first Indian registrant of fipronil, Isoprothiolane, Pyriproxyfen, Chlorfenapyr and Imazamox under the Technical Imports ("**TI**") category, and Parijat, in conjunction with its subsidiary Crimsun Organics Private Limited, achieved a milestone as the first Indian company to register Mesotrione, a selective herbicide for controlling broadleaf weeds in maize and sugarcane crops, and Metamifop, a crucial herbicide for paddy cultivation, particularly in southern India where herbicide resistance is a significant issue, under the TIM (Technical Indigenous Manufacturing) category. Parijat Industries (India) Limited, along with its subsidiary Crimsun Organics Pvt Limited, was the first Indian registrant of Mesotrione, a selective herbicide used primarily to control broadleaf weeds in maize and sugarcane crops, and Metamifop, a critical herbicide for paddy cultivation, particularly in southern India where herbicide resistance is a growing concern. Both technicals were registered under the TIM category. Parijat Industries (India) Limited along with its subsidiary Crimsun Organics Pvt Ltd was also the second Indian registrant of Oxadiargyl technical under TIM. Additionally, UPL Ltd and Indofil Industries Limited were the first to register Cymoxanil and Pyrazosulfuron in the country under TIM and TI, respectively.

Table-24: First Indian registrant companies of a few technicals

Technical name	Registration type	Year	Category	Company name
Fipronil Technical 92% min	9(3)-TI	2007	First Indian Registrant	Parijat Industries (India) Limited
Cymoxanil Technical 96% min	9(3)-TIM	2008	First Registrant	Indofil Industries Limited
Pyrazosulfuron ethyl Technical 98% min	9(3)-TI	2009	First Registrant	United Phosphorus Limited
Isoprothiolane Technical 96% min	9(3)-TI	2012	First Indian Registrant	Parijat Industries (India) Limited
Pyriproxyfen Technical 95% min	9(3)-TI	2016	First Indian Registrant	Parijat Industries (India) Limited
Diafenthiuron Technical 97% min	9(3)-TI	2016	First Indian Registrant	Willowood Chemicals Pvt Ltd
Penoxsulam Technical 98%	9(3)-TIM	2017	First Registrant	Crystal Crop Protection Limited
Metiram Technical 84% min	9(3)-TIM	2021	First Registrant	Crystal Crop Protection Limited
Chlorfenapyr Technical 98% min	9(3)-TI	2022	First Indian Registrant	Parijat Industries (India) Limited
Oxadiargyl Technical 96% min	9(4)-TIM	2022	Second Indian Registrant	Crimsun Organics Pvt Ltd
Imazamox Technical 97% min	9(3)-TI	2022	First Indian Registrant	Parijat Industries (India) Limited
Mesotrione Technical 98% min	9(3)-TIM	2022	First Indian Registrant for Indian Market	Crimsun Organics Pvt Ltd
Metamifop Technical 96% min	9(3)-TIM	2024	First Indian Registrant	Crimsun Organics Pvt Ltd

Source: Ppqs.gov.in, minutes of RC meetings, Crisil Intelligence

B2B and B2C markets in the domestic crop protection industry

India's domestic crop protection industry operates through two primary channels: **B2C (branded retail)** and **B2B (bulk technical and formulation supply)**. As of FY 2025, B2C accounted for ~65.00 of the domestic market and B2B, ~35.00, with the latter logging a CAGR of 7.00-9.00% over FY 2022-2025.

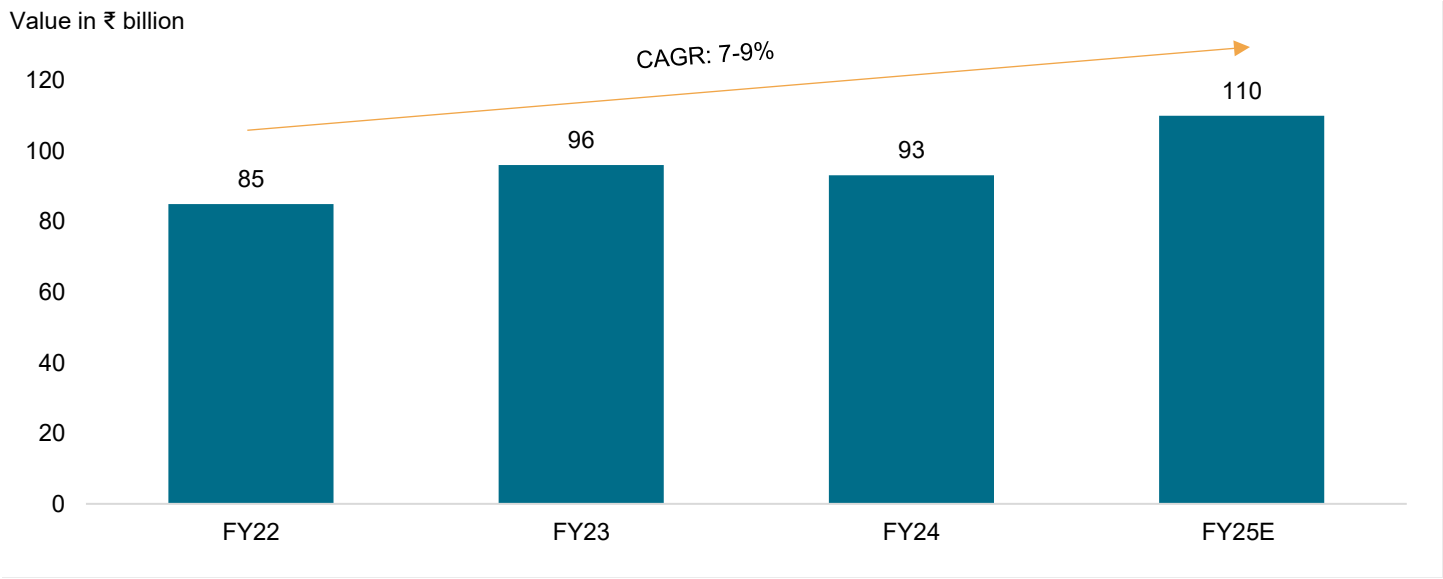
The B2C segment is driven by **farmer-facing brands**, extensive dealer networks and on-ground promotion, offering higher margins but requiring significant investment in field teams, brand building and stewardship. In contrast, the B2B segment — comprising sales to other agrochemical companies, institutional buyers and export formulators — offers volume stability and lower go-to-market costs, especially for companies with technical manufacturing capabilities.

There has been an existing practice of **collaborations between MNCs and Indian players**, where the Indian company co-markets a formulation under its own brand 2-3 years ahead of patent expiry, while complying with licencing terms. These partnerships have allowed Indian companies to access **innovative chemistries,** while MNCs benefit from local reach and regulatory support.

There is an increasing trend of this kind of collaboration between Indian players as well, where Indian companies with innovative, patented formulations are opening their products for co-marketing with other players to expand reach and product acceptance by farmers.

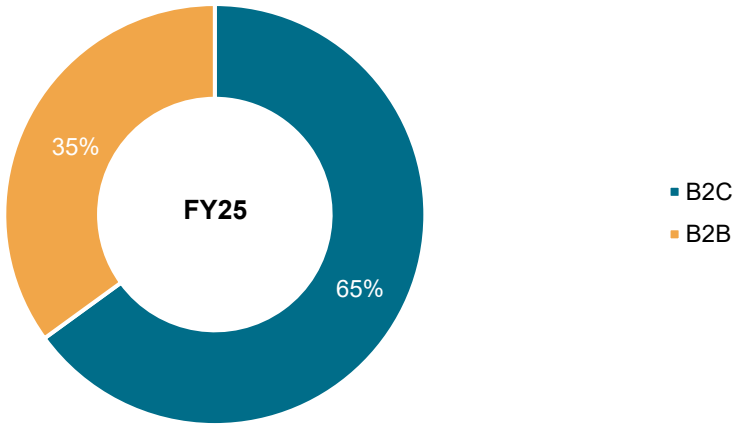
These transactions generate the highest value and margin in the B2B business, followed by sale of bulk generic products and sale of technicals.

Figure 52-B2B domestic market in Rs billion (FY22-25E)



Source: Industry Interactions, Crisil Intelligence

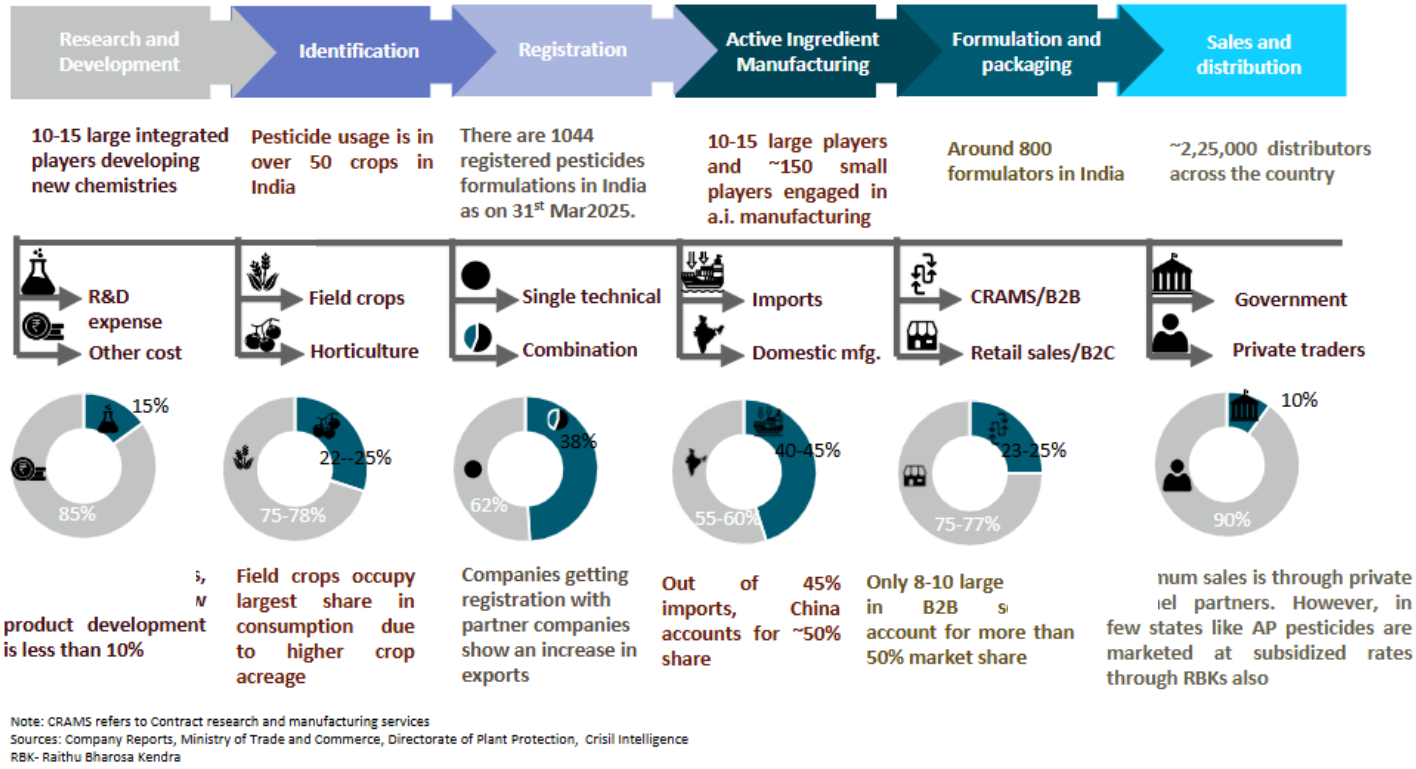
Figure 53-B2B-B2C market share bifurcation (%)



Source: Crisil Intelligence

In the Indian market, Mancozeb, Prophenophos and Prophenophos + Cypermethrin are among the top-selling molecules through the B2B domestic channel, with mancozeb being the leading one. Additionally, some active ingredients and formulations are imported from countries such as China and sold through B2B channels in India.

Value chain analysis (Indian crop protection)



Note: CRAMS refers to Contract research and manufacturing services
Sources: Company Reports, Ministry of Trade and Commerce, Directorate of Plant Protection, Crisil Intelligence
RBK- Raithu Bharosa Kendra

Source: Industry Interactions, Crisil Intelligence

The infographic shows the journey of a pesticide product from R&D to farmer purchase, highlighting the stages involved in bringing it to the market.

Research and development: The crop protection value chain starts with R&D, where new molecules are developed to address pest management challenges. R&D plays a vital role in the agrochemical industry, with top companies investing heavily in developing new products and ingredients.

Identification: The next step is identifying opportunities in specific crops and pest categories, such as cereals, pulses, and fruits and vegetables.

Registration: As on March 31, 2025, 1,044 crop protection chemicals were registered with the CIB & RC in India, under the Ministry of Agriculture and Farmers Welfare ("**MoAFW**"). To register, companies must meet strict toxicity and safety parameters under the online Computerized Registration of Crop Protections ("**CRCP**") system, allowing them to legally use or sell their products in India.

Active ingredient manufacturing: The active ingredient is the key component that makes a pesticide effective, and companies either produce or import it to create pest control solutions. Companies import active ingredients from top producers such as China, the US and Japan, with global MNCs such as Bayer, FMC, BASF and Syngenta being major manufacturers.

Companies that manufacture active ingredients in-house are better placed in the market.

Formulation and packaging

Agrochemical formulations combine active ingredients and additives to protect crops. Companies such as Parijat and Coromandel, and global players such as Bayer, BASF and Syngenta package and sell their own branded formulations, which are high-margin and lucrative businesses.

Companies distribute their formulations and technicals to the market through the following channels:

- B2C domestic business
- B2B domestic business
- B2B exports
- B2C exports (subsidiary)
- CDMO business

Sales and distribution

In India, most crop protection sales are facilitated through a network of rural retailers and distributors, whereas sales through cooperatives are relatively negligible — a stark contrast to the fertiliser sales landscape in the country. A strong distribution network is crucial for agrochemical sales, increasing a company's presence and revenue. Major MNCs and domestic players have established robust distribution networks in India and globally.

Regulatory framework in the Indian crop protection industry

India's regulatory framework is undergoing significant transformation, presenting both opportunities and challenges. The country's policy framework has several key aspects that contribute to its global competitiveness, including a mix of supportive and challenging elements that shape its position in the international market.

India adheres to the OECD's Good Laboratory Practices ("**GLP**") principles for testing crop protection chemicals and is managed by the National GLP Compliance Monitoring Authority ("**NGCMA**"). India also participates in the OECD's Mutual Acceptance of Data ("**MAD**") system, which reduces redundant testing and streamlines pesticide registration.

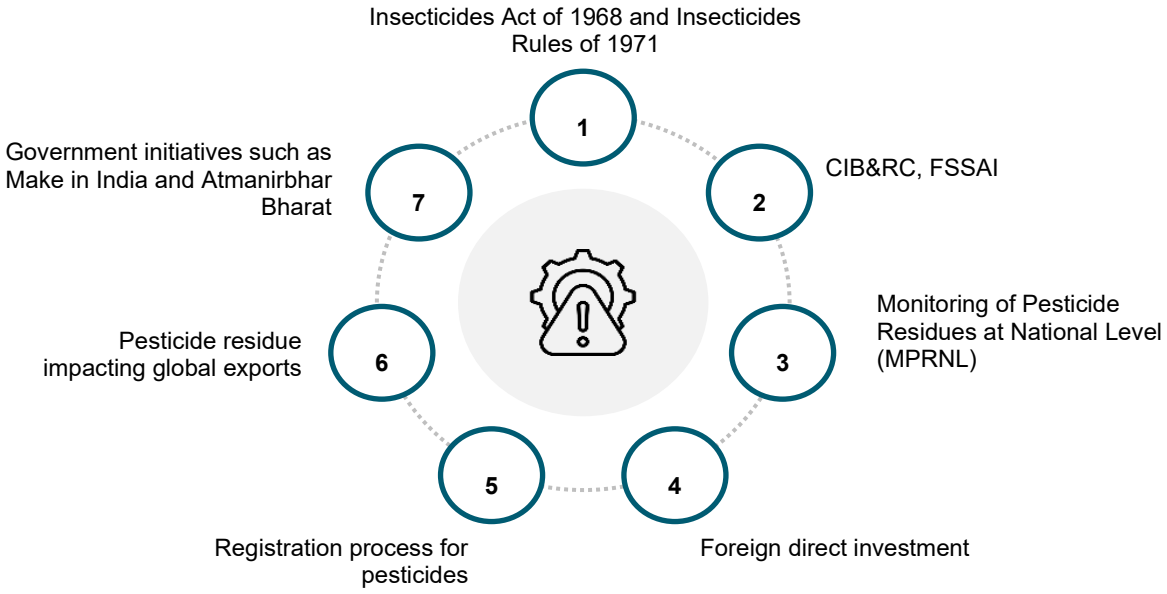
Registration process for crop protection chemicals

In India, pesticide registration is governed by the Insecticides Act of 1968, with different sections applying to various scenarios.

- **Regular Registration u/s 9 (3) – New registration**
- **New registration for technical/formulation imports (FI/TI) 9 (3)**: It includes registration of technicals that are imported from some new source (new supplier)
- **New registration for technical/formulation indigenous manufacturing (FIM/TIM) 9(3):** It consists of registration of technicals/formulations that are manufactured indigenously with some new specification
- **Provisional Registration u/s 9 (3b)**: Usually granted for two years before the formulation/technical gets registered under 9(3)
- **"Me-Too Registration" u/s 9 (4):** It is a consecutive registration of original 9(3) registration of a molecule. It is done if the specification of the technical/formulation is same as the previously registered 9(3)

Each section has unique data requirements. The application is submitted online in Form-1 and approved by the CIB&RC, taking two months to one year. After CIB&RC approval, the product must be registered with the state government. India is OECD-compliant with required GLP laboratories.

Figure 54-Regulatory landscape in the domestic crop protection industry



Source: Crisil Intelligence

Table-25: Regulations governing the Indian crop protection industry

Regulatory framework	Details
Insecticides Act of 1968 and Insecticides Rules of 1971	India's agrochemical industry is supported by regulatory and policy measures, providing a structured framework. The Insecticides Act of 1968 and the Insecticides Rules of 1971 regulate the import, production, sale and use of crop protection chemicals, ensuring human and animal health safety. The Insecticides Rules of 1971 outline the roles of key entities, including the CIB&RC and Central Insecticides Laboratory, which collectively oversee pesticide regulation in the country
CIB	The CIB advises the government on technical matters and regulates the entry of new pesticide substances or formulations in India. It evaluates their registrability through a committee of subject matter experts, and upon approval, adds the new molecule to the Insecticide Schedule, enabling the applicant to proceed with registration
RC	The Registration Committee ("**RC**") verifies the formulae, efficacy and safety of crop protection chemicals for humans and animals and registers them after approval. To sell, trade, manufacture or import a new molecule in India, applicants must obtain registration under Section 9(3) and a certificate of registration ("**CR**") from the RC after a satisfactory online application review
FSSAI and MPRNL	The Food Safety and Standards Authority of India ("**FSSAI**") sets maximum residue levels ("**MRLs**") for crop protection chemicals in food products, based on residue data from field trials conducted by SAUs (State Agricultural Universities) and ICAR, to ensure food safety. MoAFW monitors pesticide residues in food and environment through MPRNL

Source: CIB&RC, FSSAI and Crisil Intelligence

Entry barriers

High capital requirement: The production, promotion, and research and development of crop protection chemicals, as well as the acquisition, registration and development of patents, require significant investments of capital, making it a highly capital-intensive industry.

Regulatory hurdles: The registration process for formulations and technicals is frequently hindered by long delays, as regulatory authorities grapple with a substantial backlog of pending applications, resulting in significant waiting times for approval.

Extreme competition: The domestic crop protection industry, encompassing both domestic and export markets, is characterised by intense competition, with a multitude of players operating in the space, resulting in a highly fragmented and competitive landscape.

Unpredictable supply chain: The domestic crop protection industry is subject to volatile supply-chain dynamics, driven by fluctuating raw material costs and high reliance on imports from various countries. This, combined with inventory accumulation, makes it extremely challenging to predict and manage the supply chain, introducing significant uncertainty and complexity.

Disaggregated and rural-centric industry: The Indian agrochemical market is highly fragmented and rural-focused, making it difficult and costly to identify and establish relevant channel networks, as the industry's dispersed nature and rural orientation require significant time and resources to navigate and penetrate effectively.

Indian market outlook: Biostimulants, PGRs and specialty fertilisers

Introduction

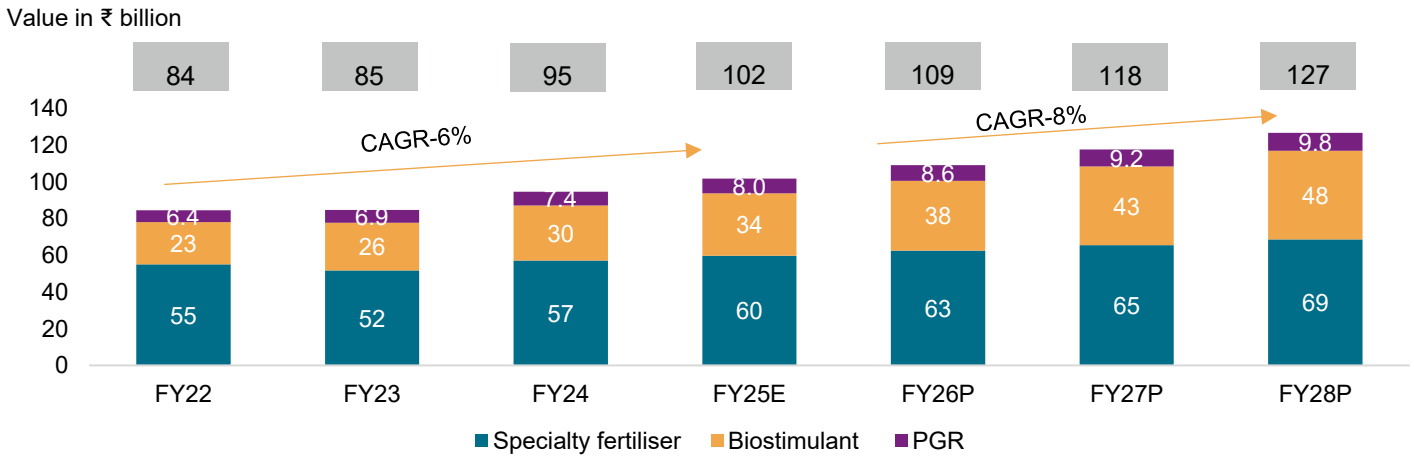
The integration of plant biostimulants and growth regulators in agriculture offers a holistic approach to crop management that increases crop yields, enhances soil fertility and provides long-term agricultural sustainability, while also prioritising environmental health and minimising reliance on synthetic chemicals and input. Farmers are increasingly preferring quality crop nutrition products due to rising awareness, a greater emphasis on protecting yield and food quality, and the need to mitigate abiotic stress (climate change) while improving deteriorating soil health. Increasing investments and strategic initiatives by crop protection and fertiliser companies augur well for the growth of biostimulants in India. India is an emerging market for biostimulants and presents a unique opportunity for continued growth on a sustainable basis.

While diverse categories can be considered under crop nutritional product categories, this section largely focuses on Indian specialty fertilisers, biostimulants and PGRs:

- Specialty fertilisers include **water-soluble nitrogen, phosphorous and potassium ("NPK") fertilisers, micronutrients (zinc, boron, etc.)**, sulphur-based products and liquid nutrient solutions
- Biostimulants comprise seaweed extracts, amino acids, humic substances and microbial formulations. They are now regulated under the **FCO**, leading to formalisation and accelerated growth
- **PGRs** are plant hormone analogs used to manipulate physiological processes. Key molecules include **GA3 (gibberellic acid), naphthaleneacetic acid, cytokinins** and **ethephon**

The Indian market for specialty fertilisers, biostimulants and PGRs is estimated to be valued at approximately **₹ 102 billion in FY 2025**. It logged a **CAGR of 50-60%** over FY 2021-2025 and is further expected to grow 8.00-9.00% over FY 2026-2028, driven by an expected increase in consumption led by increasing government impetus, rising farmer awareness and increased penetration of micro-irrigation in India.

Figure 55- Specialty fertiliser, PGR and biostimulant market trend



Source: Industry Interactions, Crisil Intelligence

Segments -wise market overview (Table 26)

Segment	CAGR FY22-25E	Projected CAGR FY26P-28P
Biostimulant	14%	~13%
PGR	8%	7%
Specialty	8.50%	9%

Source: Industry Interactions, Secondary Research, Crisil Intelligence

Figure 56-Segment -wise trend of biostimulant, PGR and specialty fertilisers (FY22-28P)

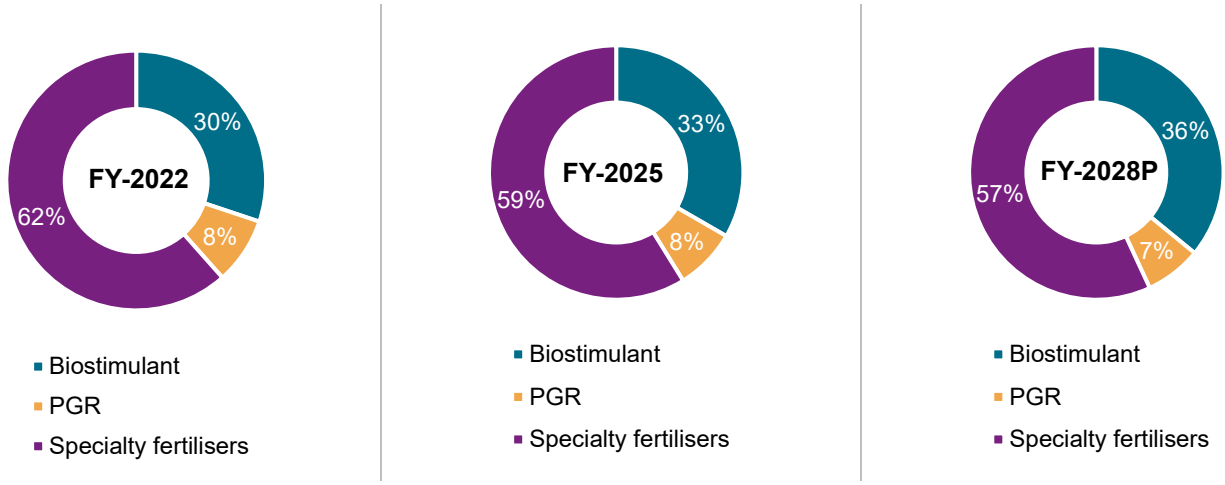


Figure 57-Top product categories of biostimulants (% share of the domestic biostimulants industry)

Product Category	% Share by value of domestic biostimulant industry	Major Players	Major Companies
Sea weed extracts (Granules)	28%	IFFCO, Biostadt, Dhanuka, PI, Coromandel	
Mycorhiza	29%	UPL, PI Industries , Novonesis, Coromandel, Tata Rallis, Sumitomo, Parijat	
Amino acids Gr	2%	Biostadt, Coromandel, Sumitomo, PI, Syngenta	
Sea weed extracts (Liquid)	13%	IFFCO, Biostadt, Dhanuka, PI, Coromandel, Aries , Parijat	
Amino acids	7%	Biostadt, Syngenta, PI Industries , Bayer	

Source: Industry Interactions, Crisil Intelligence

Figure 58-Top product categories of PGRs (% share of domestic PGR industry)

Product Category	% Share by value of the PGR Industry	Major Players	Major Companies
GA 3	28%	Sumitomo	
Gibberellic Acid 0.001% L	15%	Tata Rallis, Crystal, Parijat, Dhanuka, JU Agrisciences	
Paclobutrazole 23% SC	13%	Syngenta, Best Agro Life, Parijat, Tata Rallis, Sumitomo, Adama	
Silicon based Adjuvant	9%	Sumitomo, Dhanuka,Tata Rallis, Coromandel , Indofil	
Napthelene Acetic Acid	7%	Bayer, Multiplex, Agrostar	

Source: Industry Interactions, Crisil Intelligence

Adoption drivers

The uptake of specialty fertilisers, biostimulants, and PGRs in India is being driven by a combination of **agronomic needs**, **infrastructure expansion** and **regulatory evolution**. These inputs are increasingly viewed as integral to modern, sustainable crop management systems.

Specialty fertiliser growth is spurred by expansion of fertigation and the need for micronutrient deficiency correction. Meanwhile, regulatory inclusions in FCO, the need for resilient solutions for crops in the context of climate change and increasing acreages of fruits and vegetables requiring high quality output are the growth drivers for biostimulants. PGRs are finding offtake because of the need to increase shelf life with the switch to high-value crops.

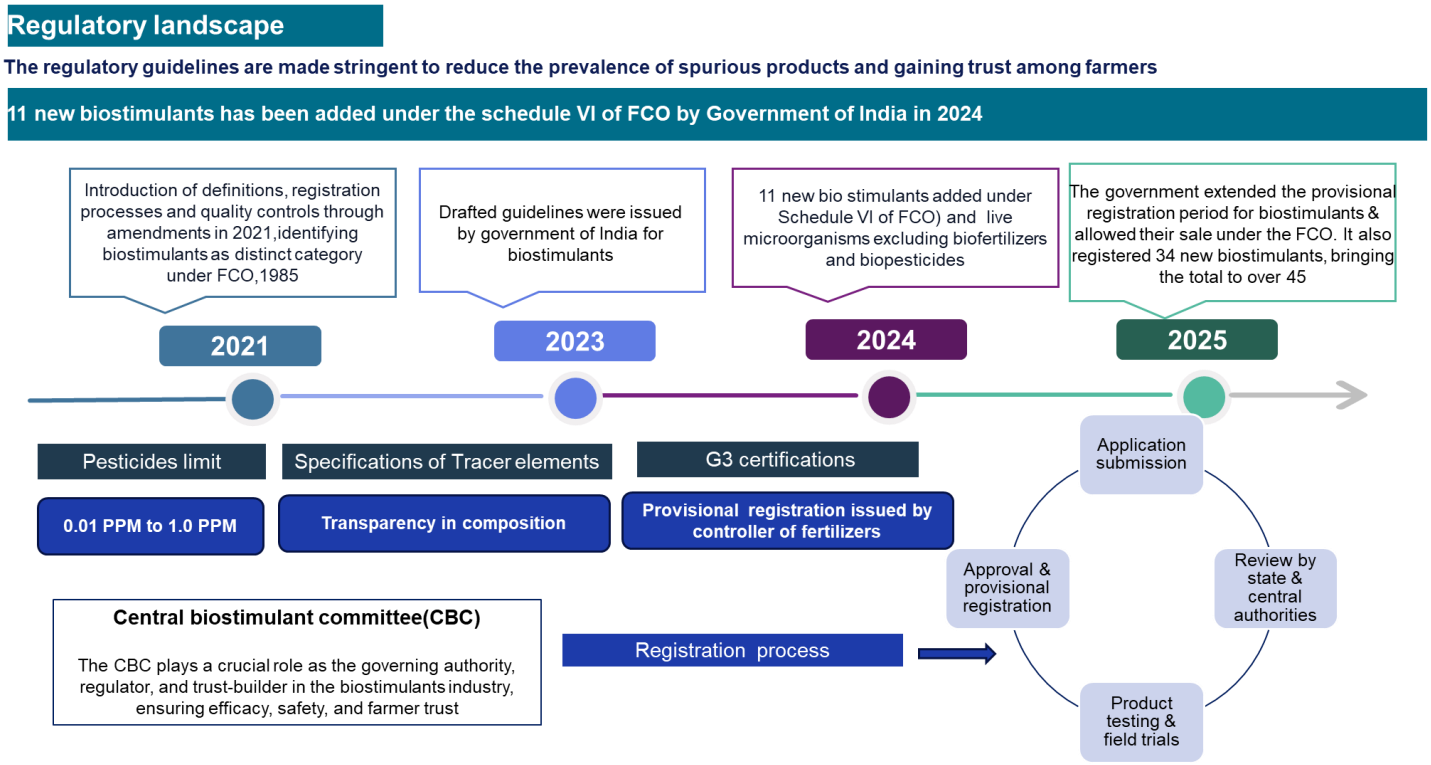
Table-27: Growth drivers for PGR, biostimulants and specialty fertilisers

Key growth drivers	Description
Abiotic stress and climate variability	Rising incidence of heat, drought, and salinity is increasing demand for inputs that can enhance stress tolerance and plant resilience.
Soil health and input efficiency	Depleted micronutrients and overuse of bulk fertilizers have created demand for precision nutrition solutions like zinc, boron, sulphur, and slow-release fertilizers.
Drip irrigation and fertigation expansion	Programs under PMKSY have increased the area under drip, enabling higher adoption of water-soluble fertilizers and liquid nutrient formulations.
Shift towards high-value crops	Increased acreage under fruits, vegetables, grapes, spices, and floriculture is pushing demand for bio stimulants and PGRs that improve shelf-life, uniformity, and quality.
Regulatory support	The inclusion of bio stimulants under the FCO, and schemes like PM-PRANAM that promote reduced chemical usage and emphasis on organic foods, have provided a supportive policy backdrop.
Increased farmer awareness and brand push	Rising literacy, mobile connectivity, and private-sector-led extension are improving awareness and technical adoption at the farmer level.

Source: Crisil Intelligence

Biostimulant regulatory landscape

Figure 59: Regulations in the biostimulants market



Source: Industry Interactions, Crisil Intelligence

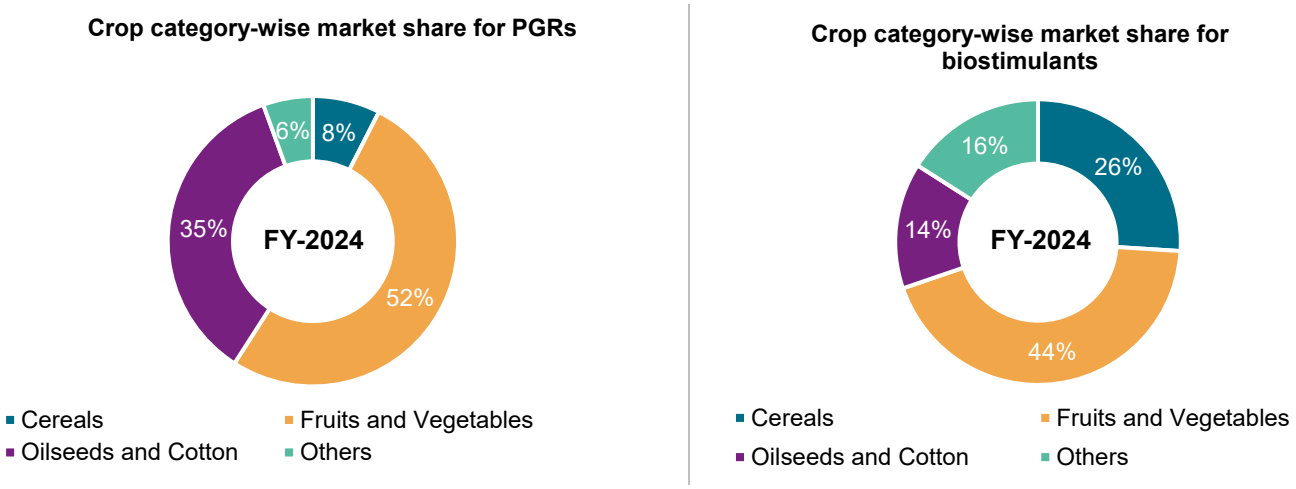
The biostimulant market in India has undergone significant transformations in recent years, driven by changes in the regulatory landscape. Given above is a snapshot of these changes.

Crop-wise consumption

F&V crops account for the highest usage intensity of biostimulants and PGRs due to their sensitivity to stress and quality-based pricing.

Sulphur and micronutrients are most prevalent in oilseeds, pulses and maize; deficiencies are widespread and impact yields. PGRs are most intensively used in cotton and grapes, where they are linked to growth regulation, yield formation and export quality specifications.

Figure 60: Crop category-wise percentage for PGRs and biostimulants



Source: Industry Interactions, Crisil Intelligence

Challenges and barriers

Despite strong growth potential, this agri-input segment faces several structural and operational challenges that could impact its scalability, adoption and regulatory certainty.

Table-28: Challenges and Barriers (PGR, biostimulants and specialty fertilisers)

Category	Description
Low farmer awareness	Many farmers remain unaware of biostimulants and PGRs, or are unclear on the timing, dosage and benefits. These limits lead to repeated usage and lower return on investment.
Lack of standardised efficacy data	Variability in field performance, especially in biostimulants, has led to trust deficits among both farmers and agri-retailers.
Fragmented market structure	Many small-scale, regional players with limited technical capacity have historically dominated the space, resulting in inconsistent product quality.
Regulatory uncertainty (pre-FCO)	Until the FCO formalisation, biostimulants operated in a loosely governed environment, leading to confusion around product approvals and marketing claims.
Dependence on advisory systems	PGR adoption is tightly linked to technical guidance; weak extension services can severely restrict uptake outside commercial crops.
Raw material dependence	The major active ingredients and raw materials for specialty, biostimulants and PGR are imported from China, Italy and US. Recently, China stopped the supply of specialty chemicals to India, which is expected to increase prices led by supply issues and will likely impact the Indian specialty fertiliser industry this fiscal.
Risk of spurious and fake products	Fake and spurious bio-products are flooding the market, posing a threat to farmers and legitimate companies since as they are ineffective and erode market share.

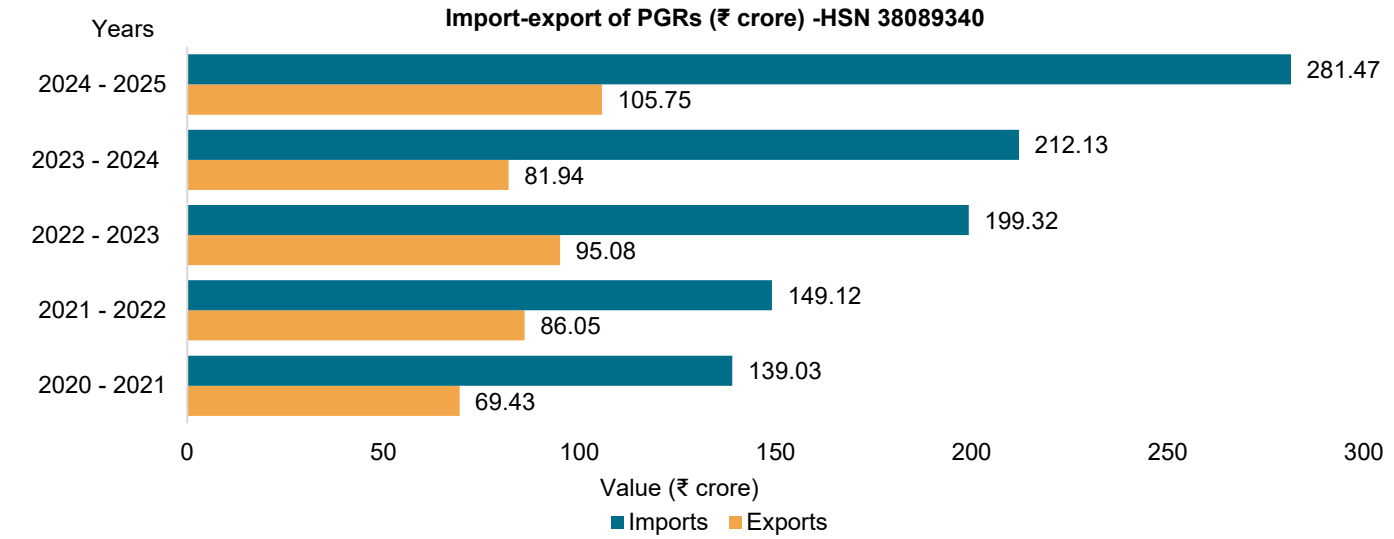
Source: Crisil Intelligence

Dependency on imports (PGR, biostimulants and specialty)

India depends heavily on imports from China, Italy, US and Canada to meet its domestic requirements for PGR, biostimulants and specialty fertiliser.

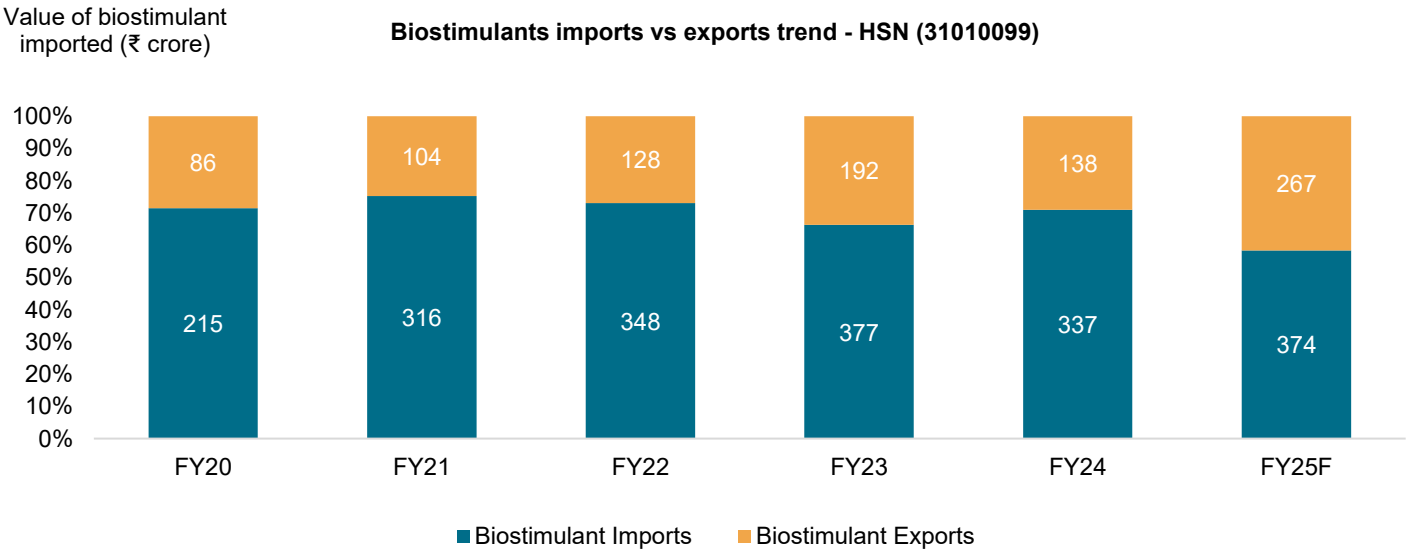
For biostimulants, imports have been highest from Italy, the US and China at ~55.00% *in* FY 2025. India imports ~81.00% of its total imports of PGR from China, Italy and the US (FY 2025F). For WSF and specialty chemicals, China is the biggest exporter to India. India imported 1.50 to 1.60 lakh metric ton of specialty fertiliser (constituting 15.00-20.00% of consumption) from China from June-December of FY 2025.

Figure 61: Imports vs exports of PGRs



Source: DGFT and ITC Trade Map, Crisil Intelligence

Figure 62: Imports vs exports biostimulants



Source: DGFT and ITC Trade Map, Crisil Intelligence

As evident from the graphs, India relies heavily on imports for PGR and biostimulants, with a consistent increase in net imports over the years. The dependence makes India vulnerable to supply chain disruptions and price volatility, resulting in challenges in maintaining a stable supply of these essential products.

PGR, specialty and biostimulants (portfolio presence)

The figure given below indicates the presence of different companies in specific portfolios.

Table-29: PGR, biostimulant and specialty fertiliser portfolio (FY24)

Company	PGR	Number of products	Specialty fertiliser	Number of products	Biostimulant	Number of products
Parijat Industries (India) Limited	Yes	3	Yes	3	Yes	2
Bayer Cropsciences Limited	Yes	3	No	-	Yes	1
Dhanuka Agritech Ltd	Yes	1	No	-	Yes	11
Rallis India Limited	Yes	2	Yes	15	Yes	4
Sumitomo Chemicals India Limited	Yes	14	No	-	Yes	14
Crystal Crop Protection Limited	Yes	5	Yes	2	Yes	1
GSP Crop Science Private Limited	Yes	1	No	-	Yes	1
Indofil Industries Limited	Yes	1	Yes	2	Yes	6
Safex Chemicals (India) Limited	Yes	3	Yes	5	Yes	1
Tropical Agrosystem (India) Private Limited	Yes	7	Yes	4	Yes	13+
Willowood Chemicals Private Limited	Yes	9	No	_-	No	-_

Source: Annual reports of key companies, Crisil Intelligence

Note: These examples are illustrative and not exhaustive, intended to provide a general understanding rather than a comprehensive listing.

Many companies are planning launches in their PGR, biostimulants and specialty portfolios this fiscal. Sumitomo is planning to launch a product named Top grain in their biorationals portfolio and had launched two PGR products in the previous two years. Rallis India launched three products under the SPH (soil plant health) category in FY 2025 with two product launches of WSF fertiliser and one product launch of ‘carrier-based NPK consortia’.

Dhanuka Agritech has rebranded its biological range as ‘BilogiQ’, which comprises six products.

Major crop protection companies are expanding their product portfolios by launching new offerings in the PGR, specialty and biostimulant categories, which provide a lucrative additional revenue stream with attractive margins.

Competitive benchmarking

Peer Profile

Parijat Industries (India) Limited: Parijat Industries (India) Limited is a leading player in the crop protection industry with a presence in over 65 countries. The company has a portfolio of 795 (domestic and global) registered formulations and has reportedly enhanced its manufacturing capabilities of key agrochemicals in India, reducing its import dependency

In India, Parijat Industries (India) Limited's pan-India presence spans 20 states as on March 31, 2025, including all major agricultural states through its network of dealers/ domestic channel partners, it could benefit from the Indian agrochemical business being highly disaggregated and rural-centric, wherein identification of relevant channel networks is time-consuming and costly. Parijat Industries (India) Limited has embarked on a digital transformation journey, introducing Parijat Wallet, a digital platform designed to enhance its marketing and distribution efforts, as well as those of its domestic channel partners in India. This online platform offers a range of functionalities aimed at improving operational efficiencies, including access to customer data and ledgers, sales history and product information, thereby streamlining business processes and enabling more informed decision-making. Parijat Industries (India) Limited's portfolio of formulations for crop protection and crop nutrients is among the largest in terms of the total number of registrations and product spread in the Indian agrochemical industry. It serves a range of different crops such as paddy, cotton, maize, soyabean, vegetables, sugarcane, wheat and others. Parijat Industries (India) Limited's product range covers the entire crop lifecycle from seed to harvest, for key crops.

Parijat Industries (India) Limited's strategic focus on international markets is evident in its export efforts, targeting countries in western Africa, the Russian Federation, Canada and Poland. The company was first to launch Flyer Plus, a formulation containing Bifenthrin 5.50% + Dinotefuran 22.00% EC, in Mali and Togo, demonstrating its commitment to the west African region, particularly in addressing the control of jassids.

Dhanuka Agritech Limited: With a strong focus on partnerships and in-licensing, Dhanuka Agritech has established itself as a key player in the Indian agrochemical market. The company's product portfolio, comprising over 300 registrations, is supported by a network of 6,500 distributors across the country. Its manufacturing facilities, located at Noida and Neemrana, are complemented by a backward-integration initiative at Dahej, which enables the company to secure its raw material supply and expand its in-house active ingredient capabilities.

Rallis India Limited: As a subsidiary of Tata Chemicals, Rallis India has developed a robust presence in the Indian agrochemical market. The company's product offerings, which include a range of crop protection chemicals and biofertilizers, are manufactured at its facilities in Maharashtra and Gujarat. Rallis India's research and development capabilities, housed in its Mumbai centre, enable the company to stay at the forefront of innovation in the industry.

Sumitomo Chemicals India Limited: Sumitomo Chemicals India has adopted a strategic approach to the Indian market, focusing on the importation, licensing and formulation of proven global active ingredients. The company's manufacturing facilities, located at Roha and Ahmednagar, are designed to support the local production and registration of a range of chemistries, including those used in cereals, cotton and horticultural applications.

Bayer Crop Science Limited: Bayer's Indian arm has established a comprehensive crop science platform, which encompasses the discovery of novel molecules, toll manufacturing and the marketing of premium crop protection products. The company's QPP plant at Ankleshwar is a key manufacturing facility, while its research and development hubs in Bengaluru and Monheim provide critical support to its product development initiatives.

Crystal Crop Protection Limited: Crystal Crop Protection has carved out a niche for itself in the Indian market by focusing on the licensing, registration and formulation of third-party active ingredients. The company's manufacturing

facilities, located at Sanand and Dahej, are designed to support the rapid registration and commercialisation of new products. Its emphasis on tailored adjuvant blends enables it to enhance the efficacy of its offerings across key crop categories.

Tropical Agrosystem (India) Private Limited: With a history dating back to 1969, Tropical Agro has established itself as a leading player. The company's product portfolio, which spans a range of crop protection chemicals, biofertilisers and biostimulants, is supported by a strong research and development capability and a pan-India distribution network. Tropical Argo’s manufacturing facilities, located at Himatnagar and Samalkha, are designed to produce a range of botanical extracts and microbial biocontrol agents.

Willowood Chemicals Limited: Willowood Limited has emerged as a rapidly growing global provider of crop protection solutions, with a presence in over 50 countries worldwide. The company's manufacturing facilities, located in Vadodara, are supported by a research and development centre and a network of 29 strategically located warehouses, which enable it to provide a comprehensive range of products and services to its customers.

Indofil Industries Ltd: Indofil Industries has established itself as a leading player in the Indian agrochemical market, with a dual focus on agricultural chemicals and specialty performance chemicals. Its manufacturing facilities, located at Thane and Dahej, are designed to support the manufacture of a range of products, including fungicides, insecticides and herbicides, while its research and development capability enables innovation.

Safex Chemicals (India) Limited: Safex Chemicals is a leading agrochemical company in India, specialising in branded formulations, specialty chemicals and CDMO. With a manufacturing presence across eight sites, it has emerged as one of the fastest-growing players in the industry. Its robust product portfolio comprises over 140 products. The company's multi-brand strategy enables deeper market penetration and wider shelf space.

GSP Crop Science Private Limited: GSP Crop Science Private Limited is a research-driven agrochemical company with over 39 years of experience in India, specialising in the development and manufacturing of a range of crop protection products, including insecticides, herbicides, fungicides and PGRs. The company operates four state-of-the-art manufacturing units, strategically located in Gujarat and Jammu & Kashmir, enabling it to cater to the diverse needs of the agricultural sector.

Financial benchmarking

As shown in Table 30, Parijat and several of its peers saw a decline in revenue in FY 2024. The downturn was attributed to lower consumption of crop protection chemicals, resulting from the adverse effects of El Nino, which led to reduced rainfall across India. Those having significant export revenue experienced a more pronounced decline in revenue. The re-entry of China into the market following the lifting of Covid-induced lockdowns and global destocking of inventories further contributed to the decline in exports by driving down prices. The production capacity of the global market for generic molecules has surged, particularly in India and China, where new plants are operational since the past two years. This has led to an oversupply of generic molecules, resulting in lower prices that have reportedly persisted for over a year due to the excess capacity.

Table-30: Revenue from operations (₹ million)

Financials	Revenue from operations (value in ₹ million)					
Companies	FY 25	GOLY (%)	FY 24	GOLY (%)	FY 23	GOLY (%)
Parijat Industries (India) Limited	10,453.39	10.06%	9,497.74	-7.65%	10,285.03	NA
Bayer Cropsciences Limited	54,734.00	7.19%	51,062.00	-0.65%	51,397.00	NA

Financials	Revenue from operations (value in ₹ million)					
Dhanuka Agritech Limited	20,351.52	15.73%	17,585.44	3.43%	17,002.20	NA
Rallis India Limited	26,629.40	0.55%	26,483.80	-10.74%	29,669.70	NA
Sumitomo Chemicals India Limited	31,485.24	10.71%	28,439.47	-19.00%	35,109.68	NA
Crystal Crop Protection Limited	NA	NA	22,295.37	-11.17%	25,098.60	NA
GSP Crop Science Private Limited	NA	NA	11,521.61	-4.25%	12,033.09	NA
Indofil Industries Limited	NA	NA	30,687.70	0.73%	30,466.30	NA
Safex Chemicals (India) Limited	15847.80	12.83%	14,045.91	20.98%	11,610.18	NA
Tropical Agrosystem (India) Private Limited	NA	NA	14,177.00	13.40%	12,501.63	NA
Willowood Chemicals Limited	NA	NA	17,861.71	-0.92%	18,028.37	NA

Source: Annual reports and MCA (Ministry of Corporate Affairs), Crisil Intelligence

Note: All listed companies are reported on a consolidated basis, wherever applicable, while single business entities are reported on a standalone basis.

Table-31: Gross profit (₹ million)

Financials	Gross profit (₹ million)					
Companies	% margin	FY 25	% margin	FY 24	% margin	FY 23
Parijat Industries (India) Limited	35.46%	3,706.47	32.32%	3,070.02	27.63%	2,841.49
Bayer Cropsciences Limited	37.90%	20,746.00	42.98%	21,946.00	45.21%	23,237.00
Dhanuka Agritech Limited	40.10%	8,160.96	39.03%	6,863.50	34.39%	5,847.66
Rallis India Limited	40.64%	10,821.10	40.43%	10,706.30	34.5%	10,236.40
Sumitomo Chemicals India Limited	40.96%	12,896.00	37.58%	10,688.70	35.33%	12,403.39
Crystal Crop Protection Limited	NA	NA	34.78%	7,753.86	30.37%	7,623.48
GSP Crop Science Private Limited	NA	NA	35.35%	4,072.67	27.12%	3,263.85
Indofil Industries Limited	NA	NA	40.25%	12,352.10	36.29%	11,054.90
Safex Chemicals (India) Limited	51.07%	8,093.61	48.41%	6,799.76	41.35%	4,801.05
Tropical Agrosystem (India) Private Limited	NA	NA	41.70%	5912.07	39.44%	4930.50
Willowood Chemicals Limited	NA	NA	26.96%	4815.29	20.43%	3684.05

Source: Annual reports and MCA (Ministry of Corporate Affairs), Crisil Intelligence

Note: All listed companies are reported on a consolidated basis, wherever applicable, while single business entities are reported on a standalone basis.

Table-32: EBITDA (₹ million)

Financials	EBITDA (₹ million)					
Companies	% margin	FY 25	% margin	FY 24	% margin	FY 23
Parijat Industries (India) Limited	12.4%	1,317.68	7.84%	749.43	8.90%	923.58
Bayer Cropsciences Limited	14.79%	8,093.00	20.27%	10,350.00	21.24%	10,919.00
Dhanuka Agritech Limited	22.24%	4,527.13	20.61%	3,624.05	19.02%	3,234.46
Rallis India Limited	12.00%	3,196.50	12.36%	3,274.30	7.81%	2,316.70
Sumitomo Chemicals India Limited	23.89%	7,521.53	20.05%	5,702.44	20.26%	7,114.48
Crystal Crop Protection Limited	NA	NA	11.13%	2,481.19	9.91%	2,487.28
GSP Crop Science Private Limited	NA	NA	11.32%	1,304.05	6.75%	812.82
Indofil Industries Limited	NA	NA	16.04%	4,923.80	13.7%	4,173.70
Safex Chemicals (India) Limited	12.63%	2,000.87	9.38%	1,317.10	8.57%	994.61
Tropical Agrosystem (India) Private Limited	NA	NA	8.57%	1214.89	12.28%	1,535.46
Willowood Chemicals Limited	NA	NA	12.01%	2,144.62	10.23%	1,844.18

Source: Annual reports and MCA, Crisil Intelligence

Note: All listed companies are reported on a consolidated basis, wherever applicable, while single business entities are reported on a standalone basis.

Table-33: Profit after tax (PAT) (₹ million)

Financials	PAT (₹ million)					
Companies	% margin	FY 25	% margin	FY 24	% margin	FY 23
Parijat Industries (India) Limited	5.09%	540.26	1.03%	98.35	4.09%	424.02
Bayer Cropsciences Limited	10.38%	5,680.00	14.50%	7,405.00	14.75%	7,582.00
Dhanuka Agritech Limited	14.59%	2,969.60	13.59%	2,390.00	13.73%	2,335.08
Rallis India Limited	4.70%	1,251.30	5.58%	1,478.70	3.10%	919.40
Sumitomo Chemicals India Limited	16.09%	5,064.43	13.00%	3,697.44	14.30%	5,022.09
Crystal Crop Protection Limited	NA	NA	3.91%	872.37	3.05%	766.00
GSP Crop Science Private Limited	NA	NA	5.32%	612.88	1.79%	215.54
Indofil Industries Limited	NA	NA	10.82%	3,321.60	7.91%	2,411.40
Safex Chemicals (India) Limited	-0.9%	-142.86	-1.62%	-227.88	-0.09%	-10.17
Tropical Agrosystem (India) Private Limited	NA	NA	6.36%	901.06	5.33%	666.93
Willowood Chemicals Limited	NA	NA	0.37%	65.24	2.70%	487.25

Source: Annual reports and MCA (Ministry of Corporate Affairs), Crisil Intelligence

Note: All listed companies are reported on a consolidated basis, wherever applicable, while single business entities are reported on a standalone basis.

Table-34: Return on equity (%)

Financials	Return on equity (%)		
Companies	FY 25	FY24	FY23
Parijat Industries (India) Limited	18.60%	3.64%	17.81%
Bayer Cropsciences Limited	19.93%	25.99%	27.96%
Dhanuka Agritech Limited	21.17%	19.03%	22.00%
Rallis India Limited	6.57%	8.08%	5.31%
Sumitomo Chemicals India Limited	17.46%	15.14%	21.09%
Crystal Crop Protection Limited	NA	6.61%	6.18%
GSP Crop Science Private Limited	NA	16.54%	5.93%
Indofil Industries Limited	NA	8.32%	8.27%
Safex Chemicals (India) Limited	-2.12%	-3.38%	-0.15%
Tropical Agrosystem (India) Private Limited	NA	18.86%	15.12%
Willowood Chemicals Limited	NA	0.53%	4.01%

Source: Annual reports and MCA (Ministry of Corporate Affairs), Crisil Intelligence

Note: All listed companies are reported on a consolidated basis, wherever applicable, while single business entities are reported on a standalone basis.

Table-35: Net debt (₹ million)

Financials	Net debt (₹ million)		
Companies	FY25	FY24	FY23
Parijat Industries (India) Limited	2612.13	2,907.35	2,133.39
Bayer Cropsciences Limited	-8855.00	-11568.00	-8608.00
Dhanuka Agritech Limited	416.10	-0.41	3.29
Rallis India Limited	-267.80	-251.00	596.30
Sumitomo Chemicals India Limited	-382.33	-461.30	-468.91
Crystal Crop Protection Limited	NA	5,476.02	5,959.86
GSP Crop Science Private Limited	NA	2,054.73	3,037.98
Indofil Industries Limited	NA	51.40	4,184.80
Safex Chemicals (India) Limited	7,374.19	6,144.08	5,869.91
Tropical Agrosystem (India) Private Limited	NA	2,742.91	2,449.96
Willowood Chemicals Limited	NA	8,372.79	7,122.78

Source: Annual reports and MCA (Ministry of Corporate Affairs), Crisil Intelligence

Note: All listed companies are reported on a consolidated basis, wherever applicable, while single business entities are reported on a standalone basis.

Table-36: Net debt to equity (multiples)

Financials	Net debt to equity (multiples)		
Companies	FY25	FY24	FY23
Parijat Industries (India) Limited	0.89	1.18	0.91
Bayer Cropsciences Limited	-0.31	-0.41	-0.32
Dhanuka Agritech Limited	0.03	0.00	0.00
Rallis India Limited	-0.01	-0.01	0.03
Sumitomo Chemicals India Limited	-0.01	-0.02	-0.02
Crystal Crop Protection Limited	NA	0.41	0.47
GSP Crop Science Private Limited	NA	0.55	0.84
Indofil Industries Limited	NA	0.00	0.14
Safex Chemicals (India) Limited	1.10	0.91	0.86
Tropical Agrosystem (India) Private Limited	NA	0.57	0.56
Willowood Chemicals Limited	NA	0.67	0.59

Source: Annual reports and MCA (Ministry of Corporate Affairs), Crisil Intelligence

Note: All listed companies are reported on a consolidated basis, wherever applicable, while single business entities are reported on a standalone basis.

Table-37: Net debt to EBITDA (multiples)

Financials	Net Debt to EBITDA (multiples)		
Companies	FY25	FY24	FY23
Parijat Industries (India) Limited	1.98	3.88	2.31
Bayer Cropsciences Limited	-1.09	-1.12	-0.79
Dhanuka Agritech Limited	0.09	0.00	0.00
Rallis India Limited	-0.08	-0.08	0.26
Sumitomo Chemicals India Limited	-0.05	-0.08	-0.07
Crystal Crop Protection Limited	NA	2.21	2.40
GSP Crop Science Private Limited	NA	1.58	3.74
Indofil Industries Limited	NA	0.01	1.00
Safex Chemicals (India) Limited	3.69	4.66	5.90
Tropical Agrosystem (India) Private Limited	NA	2.26	3.90
Willowood Chemicals Limited	NA	3.90	3.86

Source: Annual reports and MCA (Ministry of Corporate Affairs), Crisil Intelligence

Note: All listed companies are reported on a consolidated basis, wherever applicable, while single business entities are reported on a standalone basis.

Table-38: Return on capital employed (%)

Financials	Return on capital employed (%)		
Companies	FY25	FY24	FY23
Parijat Industries (India) Limited	21.06%	11.16%	18.59%
Bayer Cropsciences Limited	26.76%	35.26%	38.93%
Dhanuka Agritech Limited	30.83%	25.55%	28.66%
Rallis India Limited	12.00%	13.54%	8.93%
Sumitomo Chemicals India Limited	24.48%	21.70%	27.94%
Crystal Crop Protection Limited	NA	10.27%	10.36%
GSP Crop Science Private Limited	NA	21.42%	10.04%
Indofil Industries Limited	NA	9.88%	10.36%
Safex Chemicals (India) Limited	9.04%	5.78%	5.67%
Tropical Agrosystem (India) Private Limited	NA	15.15%	20.97%
Willowood Chemicals Limited	NA	6.09%	8.91%

Note: All listed companies are reported on a consolidated basis, wherever applicable, while single business entities are reported on a standalone basis.

Table-39: Return on assets (%)

Financials	Return on assets (%)		
Companies	FY25	FY24	FY23
Parijat Industries (India) Limited	5.25%	1.04%	4.87%
Bayer Cropsciences Limited	10.83%	16.11%	16.21%
Dhanuka Agritech Limited	16.50%	15.14%	16.62%
Rallis India Limited	4.21%	4.92%	3.29%
Sumitomo Chemicals India Limited	12.77%	11.16%	14.91%
Crystal Crop Protection Limited	NA	3.42%	3.08%
GSP Crop Science Private Limited	NA	6.25%	1.90%
Indofil Industries Limited	NA	6.44%	5.83%
Safex Chemicals (India) Limited	-0.69%	-1.18%	-0.05%
Tropical Agrosystem (India) Private Limited	NA	5.88%	8.64%
Willowood Chemicals Limited	NA	0.26%	2.12%

Source: Annual Reports and MCA (Ministry of Corporate Affairs), Crisil Intelligence

Note: All listed companies are reported on a consolidated basis, wherever applicable, while single business entities are reported on a standalone basis.

Table-40: Revenue by geography (₹ million) and its share

Financials	Revenue from operations from India (%)			Revenue from operations from outside India (%)		
Companies	FY25	FY24	FY23	FY25	FY24	FY23
Parijat Industries (India) Limited	7,453.51 (71.30%)	6,767.76 (71.26%)	6,271.46 (60.98%)	2,961.86 (28.33%)	2,699.21 (28.42%)	3,926.68 (38.18%)
Bayer Cropsciences Limited	52119.00 (95.22%)	48214.00 (94.42%)	48521.00 (94.40%)	2,615.00 (4.78%)	2,848.00 (5.58%)	2,876.00 (5.60%)
Dhanuka Agritech Limited	20,097.14 (98.75%)	17,328.90 (98.54%)	16,824.38 (98.95%)	254.38 (1.25%)	256.54 (1.44%)	177.82 (1.05%)
Rallis India Limited	21,413.50 (80.41%)	20,291.40 (76.62%)	20,813.20 (70.15%)	5,215.90 (19.59%)	6,192.40 (23.38%)	8,856.50 (29.85%)
Sumitomo Chemicals India Limited	21,761.39 (69.77%)	20,083.34 (71.28%)	23,863.82 (68.71%)	9,428.48 (30.23%)	8,093.64 (28.72%)	10,868.75 (31.29%)
Crystal Crop Protection Limited	NA	22,196.50 (99.56%)	25,037.23 (99.76%)	NA	98.87 (0.44%)	61.37 (0.24%)
GSP Crop Science Private Limited	NA	10,280.13 (89.22%)	10,315.17 (85.72%)	NA	1,241.49 (10.78%)	1,717.92 (14.28%)
Indofil Industries Limited	NA	16,617.00 (54.15%)	17,297.70 (56.78%)	NA	14,070.60 (45.85%)	13,168.60 (43.22%)
Safex Chemicals (India) Limited	11,168.18 (70.77%)	8,916.61 (63.70%)	7,994.02 (68.94%)	4,612.74 (29.23%)	5,080.91 (36.30%)	3,601.46 (31.06%)
Tropical Agrosystem (India) Private Limited	NA	14,146.68 (99.79%)	12,473.11 (99.77%)	NA	30.32 (0.21%)	28.51 (0.23%)
Willowood Chemicals Limited	NA	17,849.66 (99.93%)	17,968.65 (99.67%)	NA	12.05 (0.07%)	59.72 (0.33%)

Source: Annual reports and MCA (Ministry of Corporate Affairs), Crisil Intelligence

Note: All listed companies are reported on a consolidated basis, wherever applicable, while single business entities are reported on a standalone basis.

Operational benchmarking

Manufacturing plants

The crop protection sector is highly competitive, with new and improved chemistries emerging every year, making R&D and manufacturing crucial for success. MNCs and Indian companies are actively engaged in R&D and manufacturing of technicals and formulations.

Table 42: Manufacturing plants (FY23-25)

Financials	Number of plants		
Companies	**FY25**	**FY24**	**FY23**
Parijat Industries (India) Limited	5	5	4
Bayer Cropsciences Limited	4	4	4
Dhanuka Agritech Limited	3	4	4
Rallis India Limited	7	7	8
Sumitomo Chemicals India Limited	5	5	5
Crystal Crop Protection Limited	NA	7	6
GSP Crop Science Private Limited	NA	4	4
Indofil Industries Limited	NA	3	4
Safex Chemicals (India) Limited	8	7	7
Tropical Agrosystem (India) Private Limited	7	7	7
Willowood Chemicals Limited	NA	5	NA

Source: Annual reports of major companies | Company Presentation | Company Profile, Crisil Intelligence

Revenue from top 10 customers

The revenue generated by the top 10 customers provides insight into the concentration of the business. A lower value indicates a more balanced customers, suggesting that no single customer dominates the business, while a higher value suggests a more concentrated business with a few key customers driving most of the revenue.

Table 43: Percentage of sales from top 10 customers

Company (FY24,25)	FY25	FY24	FY23
Parijat Industries (India) Limited	19.04%	18.80%	21.59%
Bayer Cropsciences Limited	7.00%	5.00%	7.00%
Dhanuka Agritech Limited	3.00%	3.20%	3.16%
Rallis India Limited	6.00%	7.00%	NA
Sumitomo Chemicals India Limited	4.00%	5.00%	5.00%
Crystal Crop Protection Limited	NA	NA	NA
GSP Crop Science Private Limited	NA	33.00%	24.00%
Indofil Industries Limited	NA	NA	NA

Company (FY24,25)	FY25	FY24	FY23
Safex Chemicals (India) Limited	36.00%	39.00%	33.00%
Tropical Agrosystem (India) Private Limited	NA	NA	NA
Willowood Chemicals Limited	NA	NA	NA

Source: Annual reports of major companies | Company Presentation | Company Profile, Crisil Intelligence

Formulae used for key peer comparison:

1. **Revenue from operations** is calculated as the aggregate of revenue from contracts with customers for sale of products and other operating revenue
2. **Growth in Revenue from Operations** is calculated as percentage change in revenue from operations over previous fiscal.
3. **Gross Profit** is calculated after subtracting Cost of goods sold from Revenue from operations. Cost of goods sold is calculated as sum of cost of raw material and components consumed, purchase of traded goods and changes in inventories of finished goods, work in progress and traded goods.
4. **Gross Profit Margin** is calculated as Gross Profit divided by revenue from operations.
5. **EBITDA** is calculated as profit for the year, plus total tax expense, finance costs, depreciation and amortization expenses.
6. **EBITDA Margin** is calculated as EBITDA divided by total income for the year.
7. **PAT** means profit after taxes for the year.
8. **PAT Margin** is calculated as PAT divided by total income for the year.
9. **Return on Equity** is calculated as profit for the year attributable to owners of the parent divided by total equity attributable to equity holders of the parent.
10. **Return on Capital Employed** is calculated as earnings before interest and taxes (EBIT) divided by capital employed. EBIT is calculated as profit before tax plus finance cost and Capital Employed is calculated as Total Equity attributable to equity holders of the parent plus total borrowing, total lease liabilities and excluding other intangible assets, intangible assets under development, goodwill, right of use assets and deferred tax assets.
11. **Return on Assets** is calculated as PAT divided by total assets.
12. **Net Debt** is calculated as Total Borrowings excluding lease liabilities less Cash and Cash Equivalents.
13. **Net Debt to EBITDA** is calculated as Net Debt divided by EBITDA.
14. **Net Debt to Equity** is calculated as Net Debt divided by total equity attributable to equity holders of the parent.
15. **Revenue from Operations (India)** includes revenue from domestic sales in India.
16. **Revenue from Operations (India concentration %)** is calculated as Revenue from Operations (India) divided by revenue from operations for the year.
17. **Revenue from Operations (Outside India)** includes revenue from export sales.

18. **Revenue from Operations (Outside India concentration %)** is calculated as Revenue from Operations (Outside India) divided by revenue from operations for the year

19. **Revenue from top 10 customers (%)** is calculated as revenue from top 10 customers of the relevant year divided by revenue from operations for the year.

About Crisil Intelligence (formerly Market Intelligence & Analytics)

Crisil Intelligence is a leading provider of research, consulting, risk solutions and advanced data analytics, serving clients across government, private and public enterprises. We leverage our expertise in data-driven insights and strong benchmarking capabilities to help clients navigate complex external ecosystems, identify opportunities and mitigate risks. By combining cutting-edge analytics, machine learning and AI capabilities with deep industry knowledge, we empower our clients to make informed decisions, drive business growth and build resilient capacities.

For more information, visit Intelligence.Crisil.com

About Crisil

Crisil is a global, insights-driven analytics company. Our extraordinary domain expertise and analytical rigour help clients make mission-critical decisions with confidence.

Large and highly respected firms partner with us for the most reliable opinions on risk in India, and for uncovering powerful insights and turning risks into opportunities globally. We are integral to multiplying their opportunities and success.

Headquartered in India, Crisil is majority owned by S&P Global.

Founded in 1987 as India's first credit rating agency, our expertise today extends across businesses: Crisil Ratings, Crisil Intelligence, Crisil Coalition Greenwich and Crisil Integral IQ.

Our globally diverse workforce operates in the Americas, Asia-Pacific, Europe, Australia and the Middle East, setting the standards by which industries are measured.

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