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PRODUCT	SPECIFICATION
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Premium Abamectin TC	95%-98%
Regular Abamectin TC	95%-98%
Abamectin EC	1.8% 3.6% 5% 6%

Gujian Emamectin Benzoate

The Patent Leadership Brand in China

· Stable and Non-degradable · Pure white Rapid Solubility 5 Invention Patents

PRODUCT	SPECIFICATIO	
Supreme Emamectin Benzoate TC	99.99%	
Patented Emamectin Benzoate TC	70%-80%/95%-98%	
Premium Emamectin Benzoate TC	70%-80%/95%-98%	
Emamectin Benzoate WG	5%、5.7%、10% 20%、30%	
Emamectin Benzoate SG	5%	
Emamectin Benzoate EC	1.92% 5%	

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Paraquat		Nicosulfron	
Glufosinate, Glu	fosinate-p	Imazethapry	
Atrazine		Imazamox	
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For Agrochemical business (Qilu Crop Science), currently there are over 6000 employees, with a sales revenue of USD1 billion in 2023. It divided into three branches based in Qilu Inner Mongolia, Qilu Synva and Anhui Huaxing.

Qilu Inner Mongolia and Qilu Synva are mainly engaged in the production of Technical products such as Abamectin Emamectin Benzoate Spinosad Spinetoram Gibberellic acid and others. Anhui Huaxing, founded in 1984, is a national high-tech enterprise that integrates the research and development, production, sales, and trade of pesticide chemical products. Products cover three major series of Technical and formulations: insecticides, herbicides and fungicides.

Technical

Abamectin Emamectin benzoate Spinosad Spinetoram Gibberellic acid Imidacloprid Monosultap Cartap Fipronil Glyphosate Nicosulfuron MCPA

Formulations

Insecticide Abamectin 18g/L EC, 36g/L EC, 50g/L EC, 72g/L EC Emamectin benzoate 5% WG, 5.7% WG, 20% WG, 5% SG, 19.2g/L EC Spinosad 120g/L SC, 240g/L SC, 480g/L SC Spinetoram 60g/L SC, 120g/L SC Imidacloprid 200g/L SL, 350g/L SC, 600g/L FS, 10% WP, 25% WP, 70% WG Fipronil 100g/L SC, 200g/L SC, 80% WG Cartap 50% SP, 98% SP Thiamethoxam 25% WG Chlorantraniliprole 200g/L SC Emamectin benzoate + Chlorantraniliprole 32g/L + 95g/L SC

Herbicide

Glyphosate 480g/L SL, 75.7% SG, 88.8% SG Glufosinate ammonium 150g/L SL, 200g/L SL Nicosulfuron 40g/L OD, 75% WG Clethodim 240g/L EC Atrazine 500g/L SC

Fungicide

Carbendazim 500g/L SC, 50% WP Tebuconazole 430g/L SC, 250g/L EW, 250g/L EC Azoxystrobin 250g/L SC

Plant Growth Regulator Gibberellic acid 32g/L SL, 40% SG

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Ф.

Shanghai Heben-Eastsun Medicaments Co., Ltd. was established in March 2002, located in Jinshan especially for insectices and fungicides.

Industrial Park of Shanghai. We are mainly engaged in the R&D, production and sales of pesticides, In 2010, we became the first company in China to get ICAMA for Azoxystrobin, as well as Pyraclostrobin. In Oct. 2020, our new technical factory in Jiangxi with 10 hectares began operation and production. It is going to expand the production capacity of Azoxystrobin from 1500MT/year to 3000MT/ year within 2023.

Shanghai Heben's formulation production capacity is at 5000MT/year for WDG and WP and 3000MT/year for SC.

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AZOXYSTROBIN 10% + TEBUCONAZOLE 35%WDG

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丁醚脲	Diafenthiuron	噻虫嗪	Thiamethoxam	噻虫胺	Clothianidin
呋虫胺	Dinotefuran	唑虫酰胺	Tolfenpyrad	溴虫腈	Chlorfenapyr
氟氯虫双酰胺	Fluchlordiniliprole	氯虫苯甲酰胺	Chlorantraniliprole	三氟甲吡酸	Pyridalyl
杀菌剂	FUNGICIDE				
丙硫菌唑	Prothioconazole	吡唑醚菌酯	Pyraclostrobin	苯醚甲环唑	Difenoconazole
丙环唑	Propiconazole	嘧菌酯	Azoxystrobin	戊唑醇	Tebuconazole
肟菌酯	Trifloxystrobin	氟环唑	Epoxiconazole	氰霜唑	Cyazofamid
除草剂	HERBIGIDE				
五氟磺草胺	Penoxsulam	草铵膦	Glufosinate ammonium	唑啉草酯	Pinoxaden
精草铵膦	Glufosinate-P	硝磺草酮	Mesotrione	环磺酮	Tembotrione
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China's pesticide industry: 40 years of transformation and prospects from global perspective

This article examines China's pesticide industry over 40 years. Driven by reform policies, the industry expanded but now faces overcapacity and environmental challenges. Solutions include innovation, focusing on niche markets, and adopting user-centric strategies to enhance sustainability and global competitiveness.

LIBEN CROP SCIENCE: From Intermediates to Technicals and Formulations, Liben Agro Leading

Lianyungang Liben Crop Science Co., Ltd. is a leading pesticide manufacturer with four production bases, an annual capacity of 500,000+ metric tons. Specializing in herbicides, insecticides, and fungicides, its products, including triazine herbicides and Glufosinate-ammonium, are exported globally. The company holds 174 product registrations and leads in innovation and market share.

Industry Watch

2024 Chinese Agrochemical Market Overview: Accelerated industry upgrading, regulation and innovation across multiple domains

In 2024, China's agrochemical market faces regulatory tightening and industry restructuring. Amid price declines, the government is restricting pesticide facilities to promote sustainability. Companies are focusing on innovations including new compound and formulations, while exports remain robust.

Major pesticide technical capacity expansion continues; emerging popular product investments gradually becoming rationalize: Observations on pesticide and intermediate capacity investments in China 2024

In 2024, China's pesticide industry saw cautious capacity expansion. Investments in popular products remained active, but overall capacity planning became more conservative.

Chinese pesticide companies going global: From breaking through to leading, a microcosm of manufacturing globalization

China's pesticide companies are expanding globally with high-value formulations and overseas investments. Despite trade and environmental challenges, exports drive industry growth. Diverse strategies highlight a shift toward sustainable, valueadded operations.

Feature

Tracking China's Off-Patent Pesticide Industry Trends

China's agrochemical industry has made significant progress in off-patent pesticide R&D and production, establishing a strong industrial chain. In 2024, despite generally low pesticide prices, the industry showed resilience.

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- Abamectin and emamectin benzoate demonstrate strong market performance in 2024, fueled by multiple factors for continued growth potential p56
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Feature

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China's biochemical pesticide industry is rapidly advancing with innovations like "Beyond Limits Manufacturing". The future of China's biochemical pesticide industry will witness breakthrough development propelled by such new technologies.

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6 China-U.S. pesticide trade relations: Navigating complexity in search of new opportunities

Based on interviews with Chinese production and export companies as well as U.S. importers, the article examines how China-U.S. trade tensions have impacted the agrochemical industry since 2018.

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PRODUCT LIST

业 除草剂 HERBICIDE 莠去津 ATRAZINE

莠灭净 AMETRYN 特丁津 TERBUTHYLAZINE 西玛津 SIMAZINE 草铵膦GLUFOSINATE 硝磺草酮 MESOTRIONE 烟嘧磺降 NICOSULFURION 草甘膦 GLYPHOSATE 百草枯 PARAQUAT

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AAN INSECTION 烯啶虫胺 NITENPYRAM 氯虫苯甲酰胺 CHLORANTRANILIPROLE 辛硫磷 PHOXIM

立本-废粮草

企业介绍Company Introduction

连云港立本作物科技有限公司,始建于1965年,为国家定点生产农药现代化企 业,公司拥有四大生产基地,总占地面积超8000亩(约533公顷),年产能突破50 万吨。公司2000年9月通过ISO9001国际质量管理体系认证,"立本"商标获"江 苏省著名商标"称号。

目前公司涵盖产品有除草剂,杀虫剂,杀菌剂三大系列。其中三嗪类除草剂作为全 国领先的生产商,年产能12万吨,草铵膦原药年产能达到7.5万吨,并且配有专用 的20万吨制剂的生产线。丙硫菌唑、肟菌酯、啶氧菌酯、氯虫苯甲酰胺等新产品都 已开始生产。公司有174个登记已完成,还有超过1000项登记正在推进,在行业内 处于领先地位。

Lianyungang Liben Crop Science Co., Ltd., established in 1965, it is a state-designated modern pesticide manufacturing enterprise. The company operates four production bases spanning a total area of over 8,000 mu (approximately 533 hectares), with an annual production capacity exceeding 500,000 metric tons. In September 2000, it passed ISO 9001 International Quality Management System Certification, and the "Liben" trademark won the title of "Jiangsu Province Famous Trademark." Its product portfolio encompasses herbicides, insecticides, and fungicides. Notably, as the nation's leading producer of triazine herbicides, its boasts an annual capacity of 120,000 metric tons and for Glufosinate-ammonium technical annual capacity stands at 75,000 metric tons, complemented by a dedicated 200,000-metric-ton formulation production facility. As for new products, including Prothioconazole, Trifloxystrobin, Picoxystrobin, and Chlorantraniliprole, have now commenced production. With 174 product registrations completed and over 1,000 registrations currently in progress, Lianyungang Liben Crop Science Co., Ltd. maintains a pioneering position in the agrochemical industry.

LIANYUNGANG LIBEN CROP SCIENCE CO., LTD

- Azoxystrobin:Annual capacity is 5,000mt with self-produced raw materials.
- Glufosinate:Annual capacity is 75,000mt with self-produced raw materials.
- The leading manufacturer of Trazines in China with annual capacity 120,000mt.

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China's pesticide industry:

40 years of transformation and prospects from global perspective

esticides are crucial for agricultural production, vitally affecting crop growth and ensuring the global food supply. China has identified over 2,300 types of pests, diseases, weeds, and rodents, and without pesticide protection, crops would face significant damage, leading to a drastic reduction in grain production and posing a threat to food security. As one of the earliest countries to use pesticides, China's history of pesticide application dates back to the 5th to 7th centuries B.C. However, the modernization of the industry began relatively late. Prior to the establishment of New China, the sector was marked by weak infrastructure, outdated technology, and a limited range of products that did not meet agricultural needs.

Following the founding of New China, the government actively promoted the development of the pesticide industry. Through continuous efforts, China has become the world's largest producer and exporter of pesticides, making significant contributions to global food security. The industry has evolved from providing highly toxic pesticides to offering new, efficient alternatives characterized by low toxicity and low residues. This transformation reflects remarkable advancements in research and development, production processes, quality control, and more, all while consistently adapting to the demands of agricultural modernization.

Review of Development History

A Difficult Start (1949 -1978)

In the early years of New China, the country implemented a planned economy, which made it challenging for the pesticide industry to get off the ground. As a strategic material, pesticides were mainly produced and sold by state-owned enterprises. During this time, agricultural disasters were common, and pest and disease issues were particularly severe. The range of available pesticides was limited, predominantly consisting of highly toxic substances like organic mercury, organic quinones, and organochlorines.

Highly toxic pesticides such as HCH and DDT were prevalent in the market, and outdated production technologies combined with low output meant that the industry was far from meeting agricultural needs. Annually, crop losses due to pests and diseases exceeded 30%. Farmers, lacking scientific knowledge, often relied excessively on pesticides, viewing compounds like 1605 (parathion) and 1059 (demeton) as "miracle solutions," which frequently resulted in poisoning incidents among both humans and livestock. During this period, pesticide companies primarily focused on overcoming technical challenges, increasing production capacity, and addressing the pesticide shortage.

Growth in Era of Reform and Opening Up (1978 -1997)

The reform and opening-up policy initiated in 1978 revitalized the pesticide industry in China. The market was opened to private and foreign enterprises, which marked a significant shift. At that time, China's pesticide industry was still underdeveloped, with an annual output of around 500,000 tons and a limited range of products. Highly toxic and high-residue pesticides accounted for 70% of the market, and the industry was heavily reliant on imports. The implementation of the household responsibility system in 1983 sparked farmers' enthusiasm for agricultural production, leading to a surge in pesticide demand and the emergence of numerous new enterprises.

In the early 1980s, organochlorine pesticides dominated the market with

a 70% share. However, by the 1990s, organophosphate insecticides such as methamidophos and parathion took over, capturing 70% of the market. New products like carbamates and pyrethroids were also introduced during this period. International chemical giants like DuPont, Dow, and Bayer entered the Chinese market, establishing offices and introducing high-quality products. Domestic companies began exporting pesticides, and in 1994, exports surpassed imports for the first time. Despite this growth, the industry faced challenges.

The publication of "Silent Spring" raised awareness about the negative impacts of pesticides, leading to the rejection and destruction of agricultural products due to excessive pesticide residues. In 1983, China halted the production of HCH and DDT, marking the end of the organochlorine era. Additionally, the proliferation of counterfeit and

substandard products, highlighted by the Jintan counterfeit pesticide incident, shocked the nation and prompted the government to accelerate the establishment of pesticide regulations. Since 1978, a series of rules have been enacted, culminating in the first "Pesticide Management Regulations" issued by the State Council in 1997, which marked the industry's transition to a legal framework.

Adjustment and Upgrading (1997 - 2017)

The introduction of the first "Pesticide Management Regulations" in 1997 significantly strengthened safety management and legal governance within the pesticide industry, marking a crucial period of adjustment and upgrade. At that time, pesticide shortages were alleviated, and the safety of agricultural products gained increased importance. Underpinned by policy, the development of efficient, lowtoxicity and low-residue pesticide varieties accelerated. In April 2001, the Ministry of Agriculture launched the "Action Plan for Pollution-Free Food," which expedited the phaseout of highly toxic pesticides. This initiative prohibited the sale and use of methamidophos and fenamiphos while restricting 23 other types of pesticides. As a result, new pesticide varieties emerged, leading to a significant shift in product structure and a decline in the dominance of insecticides.

By 2010, insecticides accounted for only 31.4% of the market share, while herbicides rose to 41%, surpassing insecticides, and fungicides held a 7% share. There was also rapid growth in neonicotinoids, insect growth regulators, and biopesticides. China's accession to the WTO in 2001 opened the international market to the pesticide industry, further accelerating its development. By 2005, China had become the world's largest producer and exporter of pesticides. The influx of high-quality international products put pressure on domestic firms to innovate, prompting improvements

and the replication of off-patented products while expanding exports.

In 2017, the 19th National Congress of the Communist Party of China elevated ecological civilization construction to a strategic level, transforming environmental protection requirements from "soft constraints" to "hard indicators." Companies that failed to meet pollution standards faced production suspensions or shutdowns, propelling the industry toward a greener and more environmentally friendly transformation.

Innovation-driven Development (2017 present)

Since 2017, environmental protection and safety have become crucial for the green and highquality development of the pesticide industry, and the industry ushered in a new phase driven by innovation. The legal management of pesticides has been strengthened, and the concept of complete lifecycle management has gained widespread acceptance. The "13th Five-Year Plan" for the pesticide industry has outlined the developmental direction. Through supply-side reforms and lessons learned from multinational

corporations, the industry aimed to create a comprehensive industry chain that enables pesticide enterprises to compete on an international scale. Consolidation within the industry and resource integration have emerged as prevailing trends.

In recent years, the Chinese pesticide industry has experienced both prosperity and challenges, witnessing significant growth from 2021 to 2022, followed by a downturn in 2023 marked by overcapacity and fierce internal competition, influenced by industry cycles and broader socioeconomic factors. In response to this challenging environment, companies are seeking breakthroughs by increasing their R&D investments, shifting from traditional chemical synthesis to innovative technologies, such as biological fermentation, to reduce costs and enhance efficiency, and developing green and efficient pesticide products. Additionally, they actively establish comprehensive industry chains by integrating upstream and downstream resources through acquisitions and collaborations to expand production bases, extend the industrial chain, achieve integrated layouts, improve overall competitiveness, and mitigate market risks.

Market Trend **Insights - Challenges** and **Opportunities**

Challenges of Supplydemand Imbalance

In recent years, global demand for pesticides has shown a steady growth trend, increasing by approximately 3% to 5% annually, which supports industry development. However, the supply side is facing significant oversupply issues with traditional pesticide varieties. The widespread adoption of technology has led many enterprises to enter the market, resulting in capacity expansions that far exceed the growth in demand and intensifying competition. Over the past two years, geopolitical factors have reshaped the international pesticide market. Countries like India

are aggressively expanding their production capacity and capturing market share through competitive pricing, further heightening domestic market competition.

Amid this fierce competition, prices for pesticide products have continued to decline, with some companies embroiled in damaging price wars. For instance, the cost of chlorantraniliprole has plummeted from RMB 2,400,000 per ton to RMB 220,000 per ton, while glufosinate has dropped from over RMB 200,000 per ton at its peak in 2022 to below RMB 50,000 per ton currently. Additionally, India has implemented anti-dumping measures against certain pesticide products from China, creating significant challenges for supply and demand in the pesticide industry.

Opportunities in Niche Markets

Crops are confronted with a wide range of pests and diseases, with over 2,300 types identified in China alone. Additionally, the diverse planting structures and growing environments across different regions lead to significant variations in pesticide demand, contributing to the highly segmented nature of the pesticide industry and giving rise to numerous niche markets. While these markets may be relatively small, they present substantial opportunities for businesses.

Companies that focus on specific niches, gain deep insights into

the patterns of pest and disease occurrence in those areas, meet crop growth needs, and accurately develop targeted pesticide products while continuously optimizing their production processes are more likely to achieve a balance between supply and demand and create growth opportunities. For example, making specialized pesticides designed for the unique pests and diseases affecting economically important crops can effectively address farmers' challenges, resulting in substantial market recognition and economic benefits.

High Entry Barriers and User Loyalty

Due to its capital-intensive nature, the pesticide industry is marked by significant entry barriers. Establishing a modern pesticide production facility requires a substantial investment, which can range from land acquisition and factory construction to the purchase of production and environmental protection equipment, often amounting to hundreds of millions or even billions of yuan. As environmental regulations become more stringent, companies must continuously invest in upgrading automation and continuous production and reaction equipment to meet compliance standards. Additionally, developing pesticide products necessitates a considerable accumulation of technical knowledge

across various disciplines, including

INDUSTRY WATCH

chemistry, biology, and agronomy, resulting in high technical barriers. The industry is also subject to strict administrative regulations, with every aspect—from product development and registration to production and sales—requiring adherence to rigorous standards and complex procedural requirements, further increasing the entry barriers. The high costs associated with trial and error compel companies to make cautious decisions.

When it comes to user loyalty, pesticides are functional products that often show significant similarities among offerings from various manufacturers. End users tend to prioritize cost-effectiveness in their product selection. Although established brands can charge premium prices, price remains a critical factor. However, because of the specialized nature of pesticide application, farmers have a strong demand for after-sales services, such as usage guidance and pest control consultation. This creates a competitive advantage for companies that can provide high-quality aftersales service, helping them build user loyalty in the market.

40 Future Development Outlook

Deepening niche markets and collaborative win-win strategies

In today's fiercely competitive and complex industry landscape, pesticide companies must accurately identify their niche markets and sharpen their focus. By leveraging their strengths, they should precisely target specific segments, conducting thorough investigations into pest and disease patterns, crop characteristics, and farmer needs to develop highly targeted and distinctly differentiated pesticide products. For example, early investment in the development of efficient, low-toxicity, lowresidue, and environmentally friendly specialized pesticides for specific economic crops can help secure a leading position while establishing

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technological barriers and brand advantages.

At the same time, collaboration among enterprises is essential for achieving win-win outcomes. Companies should enhance communication and forge strategic partnerships that facilitate resource sharing and complement each other's strengths. Upstream and downstream enterprises can work closely together in areas such as raw material supply, production processing, and product sales. Meanwhile, firms within the same industry can engage in joint technology research and market expansion to mitigate risks, overcome challenges, and explore markets for mutual benefit.

Innovation as the Driving Force

Innovation is the key driving force behind the pesticide industry's ongoing advancement. Companies should boost their investment in research and development, integrating innovative concepts into product development, production process optimization, and the expansion of application technologies.

On the one hand, it's essential to continually enhance existing pesticide production processes by incorporating automation, intelligent systems, and continuous production technologies. This approach can improve efficiency, reduce costs, and minimize energy consumption and pollutant emissions. Furthermore, exploring cuttingedge biotechnologies like biological fermentation and gene editing in pesticide synthesis can lead to the development of green, effective, and safe pesticide products.

On the other hand, creating new pesticides is vital for China's pesticide industry to penetrate the high-end international market. Enterprises should strengthen collaborations with research institutions and specialized R&D organizations, focusing on the development of novel insecticides, fungicides, herbicides, and plant growth regulators. They should aim to create innovative pesticide varieties with independent intellectual property rights, unique mechanisms of action, and environmentally friendly attributes, thereby enhancing China's influence and competitiveness in the global pesticide market.

User-centric Transformation

Pesticide companies need to shift their business philosophy from a production-focused approach to a user-centric model. The needs and satisfaction of end users determine the market potential of their products. Companies should adopt a serviceoriented mindset throughout the entire industry chain. During the development phase, thorough field research is essential to understanding farmers' needs and creating practical, user-friendly, and effective pesticide products. Additionally, reinforcing collaboration with distributors and retailers during the sales phase is crucial for establishing a broad, responsive, and attentive sales network.

Moreover, enhancing after-sales service by providing professional usage guidance, pest and disease management training, and field management advice adds significant value for farmers. This support helps them use pesticides scientifically and achieve precise pest control, ultimately improving crop yield and quality. By centering operations around end users, companies can build trust and enhance their reputation, securing a competitive advantage in the market while promoting sustainable, healthy, and stable industry development.

Conclusion

Looking back on the 40-year journey of development in China's pesticide industry, it has reached remarkable milestones, transforming from a struggling sector to the world's largest producer and exporter. Today, in the face of challenges such as international competition, environmental regulations, and technological advancements, companies must prioritize innovation, explore niche markets, adopt a usercentric approach, and strengthen international collaboration to solidify their position in the global market. With its solid foundation and innovative spirit, it is believed that China's pesticide industry will continue to play a vital role in global food security and sustainable agricultural development, reaching new heights.

 This article is based on the report delivered by Cao Xufang, Deputy General Manager of Shandong Huimeng Biotech Co., Ltd., at the 2024 China Pesticide Export Workshop (CPEW) held in July 2024, China.

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Editor: Mickey Shan

FUNGICIDE

MANCOZEB FOSETYL-AL CHLOROTHALONIL AZOXYSTROBIN DIFENOCONAZOLE PROPICONAZOLE CYMOXANIL PROPINEB PYRIMETHANIL **PYRACLOSTROBIN** METIRAM ZINEB CAPTAN TRIFLOXYSTROBIN FOLPET CYPRODINIL FAMOXADONE

INSECTICIDE

EMAMECTIN BENZOATE ABAMECTIN IMIDACLOPRID THIACLOPRID SULFUR PYMETROZINE DINOTEFURAN SPIROTETRAMAT CLOTHIANIDIN ISOCARBOPHOS HEXAFLUMURON ACEPHATE DIFLUBENZURON SPINOSAD ACETAMIPRID

the biggest mancozeb manufacturer in China
 equivalence of Fosetyl-al and Mesotrione technical in EU
 a OECD GLP lab and a CNAS lab
 National Center for Enterprise Technology

Limin Group Co., Ltd.

Limin Chemical Co., Ltd. Hebei Shuangji Chemical Co., Ltd. Hebei Veyong Bio-Chemical Co., Ltd.

NZOA

HERBICIDE

L-GLUFOSINATE(GLUFOSINATE-P) GLUFOSINATE-AMMONIUM TEMBOTRIONE MESOTRIONE SULCOTRIONE

NEMATICIDE

FOSTHIAZATE METAM-SODIUM

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2024 Chinese Agrochemical Market Overview

Accelerated industry upgrading, regulation and innovation across multiple domains

By Mickey Shan

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fter experiencing significant volatility in recent years, the international pesticide market is gradually stabilizing in 2024, demonstrating a rational and normal development trend marked by a relatively balanced supply and demand.

In contrast, the Chinese pesticide market continues to grapple with declining product prices, leading to increased production cost pressures for companies and presenting unprecedented challenges for the entire industry.

At the same time, the government is strengthening regulatory measures and promoting high-quality development. Relevant agencies, including the National Development and Reform Commission and the Ministry of Agriculture and Rural Affairs, have implemented regulations to restrict certain pesticide production facilities, phase out outdated production capacities, and steer the industry towards green, efficient, safe, and environmentally friendly practices.

In terms of products, pesticide companies are ramping up their research and development investments to drive technological innovation and enhance product competitiveness. New chemical pesticide varieties innovated by

Chinese companies are being widely adopted in the domestic market and gaining international recognition, showcasing their strong innovative capabilities. The proportion of highly toxic and high-residue pesticides has significantly decreased, while efficient and eco-friendly pesticide products are becoming the norm. Currently, the Ministry of Agriculture and Rural Affairs has registered more than 2,000 biopesticide products. In 2024, China registered eight new pesticides (including ten new active ingredients and 17 products), with new biopesticides accounting for 62.5% of these new offerings.

In the realm of international

expansion and market development, China's pesticide exports have continued to grow year-on-year despite a persistent decline in pesticide prices in 2024 that has significantly impacted profits. Exports account for approximately 85% of total pesticide production (source: ICAMA), highlighting the strong competitiveness of Chinese pesticide products in the global market. Additionally, obtaining overseas registrations has become a crucial strategy for Chinese companies looking to expand internationally, with leading firms establishing a wide global presence to provide customers with more timely and flexible products and services.

As supply-side structural reforms progress in 2025, concentration within China's pesticide industry is expected to increase further. Industry resources and market shares will gradually consolidate among leading enterprises. These key players will capitalize on their strengths in technology, capital, and branding to enhance their competitive position in the market, thereby unlocking greater development opportunities and profit margins.

However, the pesticide industry is also experiencing differentiation and increasing involution. The competition among companies is intensifying. More substantial enterprises are actively expanding both upstream and downstream within the industry chain to establish a comprehensive business model that enables them to control pricing and achieve higher profits. In contrast, smaller and weaker firms are grappling with mounting survival pressures, particularly those weighed down by financial struggles stemming from reckless investments, putting them at risk of bankruptcy. In this market environment, mergers, acquisitions, and restructuring are anticipated to continue evolving, optimizing the industry structure and concentrating resources among leading companies, thereby steering the entire sector toward high-quality and sustainable development.

The domestic pesticide market is fiercely competitive, with many

companies and fragmented market shares; the top ten firms together hold just 36.5% of the total sales of the top 100 companies (source: China Crop Protection Industry Association). On the international stage, Chinese pesticide companies are contending with challenges from countries like India, where products are being offered at lower prices. There is a pressing need to bolster brand development in order to increase the global presence and influence of Chinese pesticides.

In the following sections, we will summarize and highlight the most trend-setting and influential events shaping the development of the Chinese pesticide industry in 2024, as observed by industry observers. This overview will cover changes in policies and regulations, trends in product variety and pricing, and company activities, with the aim of providing industry players, investors, and readers interested in the Chinese market with a deeper understanding of industry dynamics and insights into future development directions.

Solution of the set of

At the end of 2023, the National Development and Reform Commission (NDRC) released the "Guidance Catalogue for Industrial Structure Adjustment (2024 Edition)," which came into effect on February 1, 2024. This Catalogue identified 28 pesticide production facilities as restricted items, including glyphosate, chlorpyrifos, triazophos, chlorothalonil, abamectin, imidacloprid, acetochlor, chloropicrin, alachlor, 2,4-D, acetamiprid, thiamethoxam, atrazine, butachlor, 2-methyl-4chlorophenoxyacetic acid, ametryn, dicamba, diquat, glufosinate, clethodim, mancozeb, trichlorfon, triadimenol, propiconazole, iprodione, paclobutrazol, and calcium polysulfide.

The new regulations prohibit the establishment of new production

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facilities for these pesticides and require existing capacities to be upgraded within a specified timeframe. Additionally, 43 highly toxic pesticide products, such as aqueous solution containing glyphosate at levels below 30%, nitrofen, and chlordimeform, have been added to the list of items slated for phase-out. Investments in these products are prohibited, and they must be eliminated within the designated timeframe.

The updated catalog significantly increases the number of restricted items in the pesticide industry compared to the previous version. This expansion primarily targets highly toxic and high-residue pesticide technical materials (TCs) that pose risks to environmental and agricultural product safety. It includes production facilities for compounds such as omethoate, tetrachlorvinphos, methidathion, glyphosate, chlorpyrifos, triazophos, paraquat, chlorothalonil, and abamectin. The goal is to address the persistent issue of overcapacity in these products.

The catalog clearly states that "new constructions of restricted items are prohibited, while existing production capacities may be upgraded within a designated timeframe." This approach allows companies producing restricted pesticides to enhance their competitiveness through upgrades, ensuring their continued viability. The adjustment aims to steer the industry toward greener, more efficient, and sustainable development, promoting resource conservation and environmental protection while also supporting the objectives of carbon peaking and carbon neutrality.

In recent years, China's pesticide industry has struggled with overcapacity issues. This problem has primarily arisen from stricter safety and environmental regulations in developed coastal provinces, prompting smaller chemical enterprises to relocate hastily. Additionally, uninformed investments driven by the rapid securitization of private agrochemical companies have contributed to this situation. As a result, the utilization rate of existing

production capacities remains below 50%, leading to reckless investments in sub-new products.

To address the issue of overcapacity, it is essential to raise technical barriers, avoid reckless expansion, and establish selfregulatory mechanisms within the industry. Currently, the pesticide sector faces several challenges, including a prevalence of small, fragmented production enterprises, which complicates efforts to phase out high-pollution and energyintensive capacities. Additionally, there is an urgent need to modernize the aging product variety structure, which suffers from significant homogeneity. As regulations on dual control of energy consumption-both in terms of quantity and intensity as well as safety and environmental protection become increasingly stringent, China's pesticide sector is still developing its original innovation capabilities. This situation places considerable pressure on companies to undergo transformation and upgrade their operations.

Pesticide industry poised for significant restructuring with introduction of 'One **Certificate for One Product'** policy

To further enhance and refine the pesticide management system, the Ministry of Agriculture and Rural Affairs of China released the "Decision on Revising the 'Measures on the Management of Pesticide Registrations' and Four Other Regulations (Draft for Public Comment)" on November 4, 2024. Article 31, Paragraph 1 specifies that the label of a pesticide product associated with the same registration certificate can only feature one trademark rather than being restricted to the trademark of the manufacturer. This policy mandates that each pesticide product be linked to a unique certificate, making the "One certificate for one product" policy a reality in the domestic pesticide market.

The practice of certificate leasing and swapping is currently widespread in the domestic agri-inputs market, with manufacturers launching multiple brands for the same product, resulting in considerable homogeneity. As the "One Certificate for One Product" policy gradually comes into effect, 2025 is expected to be a crucial "year of elimination" for pesticide products. Current statistics indicate that there are approximately 40,000 pesticide registration certificates in China, while the actual number of pesticide brands stands at around 200,000. With the implementation of this policy, it is anticipated that up to 80% of products in the industry may be pushed out of the market. This significant restructuring will realign the industry with core principles of quality and innovation in pesticide products.

The "One Certificate for One Product" policy is essential for the standardized development of the pesticide industry, promoting healthy competition among manufacturers while ensuring the quality and safety of pesticides for farmers. Certificate resources are a key competitive advantage for pesticide companies. Enterprises that possess original factory certificates are likely to succeed, while those that depend on "borrowed" or "substitute" certificates may face elimination. In the short term, smaller companies may experience a period of upheaval lasting two to three years; however, in the long run, this will significantly

enhance the overall health and development of the industry.

In response to the new policy, pesticide companies are proactively adjusting their strategies. They are streamlining their product lines by reducing the variety and specifications, concentrating on core offerings. Simultaneously, they are actively seeking certifications for highdemand products. From a marketing standpoint, they are consolidating distributor resources to safeguard their channels and adapting their product launch strategies to align with the "One certificate for one product" policy.

Moreover, this policy is encouraging pesticide manufacturers to invest in research and development. However, the implementation of the new policy brings various uncertainties in distribution; distributors may conduct initial assessments of their warehouse inventory, while manufacturers will focus on preserving certificate reserves to enhance their market competitiveness.

New pesticide compound developed by Chinese Companies successively obtain registration certificates

In 2024, China recorded a notable total of 167 registrations for pesticide TCs (TKs), which includes the 13th batch of pesticides to be

approved for the year. As illustrated in Figure 1, the overall number of new pesticide TC (TK) registrations has shown a consistent upward trend over the past five years. Remarkably, the registration figures for 2024 are nearly equal to the combined total of registrations from 2020 to 2023.

Being the first registered new pesticide is vital for market sales. In China, new pesticide registration refers to pesticides with active ingredients that have not yet been approved for registration, which includes both new pesticide TCs (TKs) and new formulations. For the industry and companies, ongoing product innovation and iterative upgrades are essential trends and necessary pathways for the growth and strengthening of the Chinese pesticide sector.

In 2024, eight new pesticides were registered in China, which included ten new active ingredients and 17 products. This comprised two insecticides (with four active ingredients and two products), three fungicides (three active ingredients and six products), and three herbicides (three active ingredients and nine products). Additionally, six TCs, TKs, and formulations were registered simultaneously, making up 75% of the newly registered pesticides. Domestic companies like Cynda, KingAgroot, and CAC Group are actively seeking approval and first registration for new pesticides.

Key features of new pesticide registrations are as follows: all registered new pesticide varieties are from domestic enterprises, with most being patented products developed independently or through collaboration. Notably, the three chemical herbicides-flufenoximacil, flusulfinam, and pyraquinate—have each received ISO common names for pesticides. Table 1 lists the newly registered innovative pesticide products in 2024.

New biopesticides make up 62.5% of the recently registered pesticide varieties, representing a 44% decrease compared to 2023. One biochemical pesticide, the corn borer pheromone, is an insect pheromone; the remainder consists of microbial

180

160

Products	Certificate Holders
Pyraquinate 95% TC	Liaoning Cynda Agricultural
Pyraquinate 95% TC	Science Co., Ltd.
Flufenoximacil 95% TC	
Flufenoximacil 40g/L EC	
Glufosinate 18.79%·Flufenoximacil M	1E
Flufenoximacil 10.01%·	Shandong Qingdao KingAgroot
Glufosinate-P ME	CropScience Co., Ltd.
Flusulfinam 95% TC	
Flusulfinam 60 g/L SL	
Propanil 23.2%· Flusulfinam ME	
pesticides. Out of the 17 new pesticide	concentrate (SC), oil-miscible flowable concentrate (OF), and dispensers.

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Figure 1. The overall number of new pesticide TC (TK) registrations from 2020 to 2024

products, 70.6% are classified as low toxicity, while the others are categorized as moderate toxicity. Most of the formulations are environmentally friendly, including options such as aqueous suspension

Several products have been approved for export only in China's recent pesticide registrations. KingAgroot's new pesticides, Fluorochloram 98% and Fluorochloropyridine 95% have

Table 1. The newly registered innovative pesticide products by Chinese companies in 2024

both received their first registrations for export only to Cambodia. Additionally, Nantong CAC International Chemical Co., Ltd.'s Cypermethrin 98% has also been registered domestically for export only to Cambodia.

The registration of pesticide products developed independently by Chinese companies plays a crucial role in encouraging these firms to increase their R&D investments, promote technological innovation, and drive industrial upgrades. This shift enhances the competitiveness of China's pesticide industry in the global market, transforming the country from a major pesticide producer into a leading powerhouse. Moreover, the introduction of innovative products from Chinese companies helps diversify pesticide offerings, catering to the diverse needs of global agriculture and providing safer, more efficient, and environmentally friendly solutions for agricultural production. This ultimately supports the green and high-quality development of the farm sector.

Pesticide prices remain generally low, but some products are starting to see a recovery

The pesticide market in 2024 is gradually stabilizing after the significant fluctuations experienced over the past two to three years. In terms of pricing, the downward trend observed throughout 2023 has started to show differences within the market. Demand-driven procurement has become the primary strategy for both domestic and international markets; however, temporary imbalances between supply and demand have occasionally led to substantial price fluctuations in specific products, such as pyraclostrobin, prothioconazole, and tebuconazole, creating both opportunities and challenges for market participants. Meanwhile, several key herbicide varieties have been operating at low levels for an extended period, which has somewhat limited industry

development.

According to the technical material price index from Sino-Agri Leading Biosciences Co., Ltd., of the hundreds of varieties monitored, 64% continued to decline, 14% remained stable compared to the same period in 2023, and 22% experienced price increases. Among the three main categories, insecticides saw the most significant average drop at -10.21%, followed by herbicides with an average decrease of -9.73%, while fungicides had the smallest decline at -6.95%.

In 2024, only three herbicide products saw price increases: clethodim, sethoxydim, and 2,4-D, while other varieties remained stable or declined to varying degrees. Among the ten insecticides that

experienced price hikes, the top five

were cartap at 61.54%, molosultap at

52%, pyridaben at 30%, abamectin

at 24.27%. The four fungicides that

at 27.03%, and emamectin benzoate

increased in price were chlorothalonil

at 47.22%, dimethomorph at 18.18%,

prochloraz at 6.25%, and azoxystrobin

at 5.26%. Except for chlorothalonil

significant increases, other varieties

suggesting that the fungicide market

upward momentum. Figure 2 shows

categories that saw growth in 2024:

most significant price drops all saw

with some herbicide and insecticide

reductions of over 10% (figure 3),

The top five products with the

only experienced modest growth,

and dimethomorph, which saw

still faces challenges in gaining

the top five varieties from three

Figure 2. Top five varieties of herbicide, insecticide, and fungicide that saw growth in 2024

Figure 3. Top five varieties of herbicide, insecticide, and fungicide that saw a decline in 2024

varieties experiencing declines of more than 30%. The market is still volatile and undergoing consolidation, reflecting an overall trend of divergence.

Looking ahead to 2025, the entire industry is expected to remain in a phase of bottom consolidation. While the agrochemical sector's fundamental demand characteristics remain stable, the market must patiently wait for potential opportunities that may arise from a recovery in demand. This will test companies' resilience and endurance. At the same time, the ongoing expansion of domestic production capacity will lead to more significant product differentiation.

Frequent anti-dumping cases are prompting companies to shift away from price competition

In 2024, the global pesticide market faces dual challenges: increased trade protectionism and intensified market competition. The pesticide trade has seen a rise in anti-dumping investigations and rulings as countries implement these measures to safeguard their domestic industries. This trend underscores the escalating tensions in international trade and highlights significant shifts in the supply chain and trade patterns within the pesticide industry amid globalization.

Over the past year, Chinese export companies have encountered numerous anti-dumping investigations and rulings, with high tariffs significantly undermining the price competitiveness of Chinese products in international markets. Simultaneously, China has effectively managed international trade frictions through anti-dumping policies, safeguarding its domestic industries. By reducing the impact of lowpriced imported goods, the Chinese pesticide industry is accelerating its consolidation and increasing industry concentration. Additionally, these anti-dumping measures are encouraging companies to enhance technological innovation and refine

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their global supply chain strategies (Table 2).

Trade frictions can cause fluctuations in the supply and prices of certain agrochemicals, which may indirectly impact agricultural production. For instance, the U.S. has launched anti-dumping and countervailing duty investigations into 2,4-D herbicides from China and India, with Chinese companies facing tax rates as high as 127.21%. This could increase planting costs for American farmers, affecting agricultural productivity and the stability of the farm product supply. However, in the long run, it may also motivate farmers to adopt more scientific and rational approaches to pesticide use, promoting greener development.

Anti-dumping policies are also compelling Chinese agrochemical companies to increase their R&D investments, improve product value and technological sophistication, optimize industry structure, and move towards higher-end and differentiated products to enhance their core

Table 2. Chronological list of the significant anti-dumping cases for 2024

Initiating Country	Products	Downstream Products and Uses	Anti-Dumping Cases
India	Atrazine TC	Pesticide formulations	Initiated a sunset review investigation for countervailing duties on Chinese products, with a previous countervailing duty of 9.52% (2018-2023)
India	Meta phenylene diamine (MPDA)	Chemical intermediates, dyes, etc.	Continued to impose a five-year anti-dumping duty on MPDA originating in or imported from China, with rates of \$1.50-\$1.71 per ton
China	Ortho-dichlorobenzene (ODCB)	Intermediate for pharmaceuticals and pesticides such as diuron	Continued to impose anti-dumping duties on imports from Japan (70.4%) and India (31.9%)
China	Ortho chloro para nitro aniline	Pharmaceutical intermediate, dye intermediate	Continued to impose anti-dumping duties on imports from India, with rates of 31.4% to 49.9%, for five years
China	Methyl isobutyl ketone (MIBK)	Solvent for coatings, pharmaceuticals, and pesticides, etc.	Continued to impose anti-dumping duties on imports from South Korea (18.5%- 32.3%), Japan (45.0%-190.4%), and South Africa (15.9%-34.1%), for five years
India	Pretilachlor and intermediate PEDA	Pesticide formulations	Initiated an anti-dumping investigation against products from China, and the final determination of duty rates is still pending
China	Propionic acid	Preservatives, herbicides, pharmaceutical intermediates	Preliminary determination of dumping found in U.S. products, imposing a deposit of 43.5%
China	Cypermethrin	Pesticide formulations, public health insecticides	Initiated an anti-dumping investigation against products from India, and the final determination of duty rates is still pending
China	Meta phenoxy benzaldehyde	Pyrethroid insecticides (e.g., cypermethrin)	Continued to impose anti-dumping duties on imported meta phenoxy benzaldehyde originating in India, with rates of 36.4% to 56.9%, for five years
China	Styrene	Polystyrene, ABS resins, unsaturated polyester resins	Continued to impose anti-dumping duties on imported styrene originating in South Korea (6.2%-7.5%), Taiwan region (3.8%-4.2%), and the U.S. (13.7%-55.7%) for five years
India	Sodium cyanide	Glyphosate, triazine herbicides, sulfonylurea herbicides	Imposed anti-dumping duties on sodium cyanide originating in or imported from China, the EU, Japan, and South Korea for five years, with rates: China \$286-\$554/ton; the EU \$13-\$230/ton; Japan \$447/ton; South Korea \$413/ton

Initiating Country	Products	Downstream Products and Uses	Anti-Dumping Cases
China	Phenol	Widely used in pharmaceuticals, pesticides, etc.	Continued to impose anti-dumping duties on imports originating in the U.S. (244.3%-287.2%), the EU (30.4%), South Korea (12.5%-23.7%), Japan (19.3%- 27.0%), and Thailand (10.6%-28.6%), for five years
United States	2,4-D	Herbicides	Imposed anti-dumping duties on 2,4-D originating in China and India, with rates: China 17.07%-127.21%; Indian companies 3.91%-13.23%
China	Ethanolamines	Surfactants, pesticide intermediates, daily chemical products, etc.	Continued to impose anti-dumping duties on imported ethanolamines originating in the U.S., Saudi Arabia, Malaysia, and Thailand for 5 years, with rates: U.S. companies 76.0%-97.1%, Saudi Arabian companies 10.1%-27.9%, Malaysian companies 18.3%-20.3%, Thai companies 37.6%
China	Cypermethrin	Insecticides	Implemented temporary anti-dumping measures in the form of deposits on imported cypermethrin originating in India

Note:

1. Compiled by AgroPages, not exhaustive.

2. In the "Anti-Dumping Cases" section, some cases have not yet reached a final ruling; thus, only the current status of the investigations or any known provisional measures are included. 3. Some cases involve multiple downstream products, so only the main application areas are highlighted.

competitiveness in the international market and reduce the negative impacts of price competition.

Modulation of nano-pesticides advancing rapidly, with notable products and brands emerging in international market

China has made remarkable progress in the field of nanopesticides, with rapid advancements in industrialization. Since 2015, nano-pesticides have been extensively used in various sectors,

including formulation products and drone-assisted plant protection, demonstrating significant application potential. After years of ongoing development, China has not only developed a variety of new nanopesticide formulations but has also emerged as a global leader in technology transformation and industrialization.

China has made significant progress in establishing standards. In 2021, it introduced the world's first officially approved standard for nano pesticides: the "Rules for Drafting Specifications for Nanopesticide Products," which came into effect on May 1, 2024. This standard not only establishes clear regulations

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for the development of nanopesticides in China but also serves as an essential reference for the global standardization of nano-pesticides.

In 2024, Chinese pesticide companies collectively introduced several new nano-pesticide brands, showcasing their strong capabilities in technological innovation and market expansion. By exporting highend nano-pesticide formulations and promoting branded products, these companies are significantly enhancing China's influence in the global pesticide industry.

Pilarquim is a leader in China's formulation industry, having made significant breakthroughs in the application of nanotechnology across

various domains, including pesticide adjuvants, formulations, production processes, engineering, quality control, and equipment utilization. In 2024, Pilarquim officially launched its upgraded Pilarnano® nano-pesticide brand globally. The enhanced Pilarnano® series features particle sizes as small as 300nm and includes innovative "nano-microsphere" adjuvants along with cosmetic-grade moisturizing agents, significantly improving product stability and absorption efficiency.

In terms of market performance, Pilarquim's nano products, such as "Nano PILARTEP," have established a premium brand image on the global stage. For the Pilarnano® series, the company introduced 10 new products in 2024, with over 20 more expected in 2025. By 2026, Pilarquim aims to empower most of its formulation products with nanotechnology and increase its annual submissions for overseas product registrations to 300. This strategic move will enable the company to gradually enter highbarrier markets like the EU, North America, and Australia, thereby advancing global agriculture.

Jiangsu Aijin Agrochemical Co., Ltd. is an innovative leader in China's pesticide formulation industry. It spearheads the development and application of next-generation nano-loading technology, known as "Nano 2.0 Technology," and drives technological advancements across the sector.

Aijin's "Nano 2.0 Technology" utilizes the self-assembly of surfactant molecules to create templates, followed by a sol-gel reaction that forms a mesoporous structure around organic silicon precursors. This groundbreaking approach opens up new possibilities for the development of nano-pesticides. Aijin's "Nano 2.0 Technology" has already yielded significant results in several key areas and has been widely applied in seed treatment, control of boring pests, and management of pine wood nematodes, among others.

Shanghai Yuelian, a pesticide formulation company, has established a distinct position in the nano sector through its innovative nano-

microemulsion technology. In 2024 the company successfully launched a series of high-concentration microemulsion nano-pesticides under its "Yuelian Mijia" brand. These nano microemulsions have particle sizes ranging from 10 to 100 nanometers, offering substantial advantages such as enhanced efficacy and utilization, reduced pesticide consumption, improved stability and compatibility, and increased safety and environmental sustainability.

Industry platforms promote collaborative efforts, fostering mutually beneficial partnerships among enterprises

In recent years, the shifting global political and economic landscape has led to increased uncertainties in the supply chain, prompting a transformation of the agrochemical value chain. Domestic agrochemical companies are actively adjusting their strategies to adapt to market changes. Looking back at 2024, these companies are undertaking various initiatives – whether to strengthen their competitive advantages or to explore new sectors – in order to stand out in a highly competitive market. This year, AgroPages has observed a notable rise in collaboration among domestic agrochemical companies, with partnerships becoming both broader and more profound. They are forming strategic alliances, integrating resources, and optimizing industry structures to enhance their market competitiveness.

Large leading enterprises with resource advantages are increasingly adopting a platform approach. In 2024, Sino-Agri Leading Biosciences Co., Ltd. (SAL), China's largest agrochemical distribution platform, launched the "non-selective herbicide value platform," aiming to serve core upstream and downstream clients by providing comprehensive strategies and foster strategic complementarities.

By harnessing significant financial resources, professional information

services, and a robust supply chain, SAL collaborates with high-quality domestic suppliers to ensure a stable supply of top-notch products. To mitigate procurement risks, the company integrates both internal and external resources to establish a "one-stop" pesticide supply platform. This platform offers a wide range of product options and minimizes reliance on individual suppliers. Additionally, by updating the technical material price index, SAL provides channel partners with market trend insights to support informed procurement decisions. The company also delivers support and value-added services to downstream distributors, thereby enhancing the efficiency and resilience of the supply chain.

SAL has made significant strides in optimizing inventory management and improving operational efficiency. By closely collaborating with both upstream and downstream partners, the company has streamlined its supply chain processes, enabling its channel partners to reduce operational costs. Leveraging its status as a centrally administered state-owned enterprise (SOE) and its strong resource integration capabilities, SAL provides effective logistics and warehousing support to its partners, which significantly decreases inventory backlogs and capital tied up in stock. The "nonselective herbicide value platform" developed by SAL is designed to empower the entire supply chain, promoting a win-win philosophy across the industry to collectively navigate market fluctuations.

Another noteworthy trend in corporate development is the swift entry of companies primarily focused on chemical pesticides into the agricultural biotechnology sector through strategic partnerships. In 2024, Liming Group Co., Ltd. entered into strategic cooperation agreements with three high-tech firms in the agricultural biotechnology space: Lvxinno Biotech, Shanghai Plant Science Biotechnology Co., Ltd., and CANCO. These companies are dedicated to the research and promotion of new peptide

biopesticides, RNA biopesticides, and bacteriophage biopesticides, respectively. These collaborations aim to develop green, efficient, and environmentally friendly biopesticides, expand product offerings, and enhance technical capabilities.

At the end of 2024, Qingdao Kangqiao Pharmaceutical Group teamed up with the Hubei **Biopesticide Engineering Research** Center to launch an industrialization platform named Wuhan Kanghoufeng Biotechnology Co., Ltd. They also held a ceremony to mark the transformation of achievements related to a new strain of Bacillus thuringiensis. Looking ahead, both parties plan to collaborate on commercializing several innovations, including the country's first microbial acaricide, NBIF-001, as well as Bacillus thuringiensis strains designed to target the diamondback moth and the corn borer. Through these initiatives, they aim to establish a strong foothold in the global

biopesticide market.

Collaboration among agrochemical companies is increasingly focused on expanding the industrial chain. For instance, Nantong Jiangshan Agrochemical & Chemicals Limited Liability Co., Ltd. has partnered with Wengfu Group to invest RMB22 billion in developing a circular integrated industrial chain for phosphate chemicals. This initiative includes multiple sub-projects that create a comprehensive framework from phosphate resource extraction to final products, enhancing resource utilization efficiency and increasing product value. Huilong Co., Ltd. has strengthened its partnership with Xingfa Group in areas such as phosphate ore, ammonium phosphate, and potassium fertilizers, further integrating upstream and downstream resources. In terms of technological

innovation, Hailir Pesticides and Chemicals Group Co., Ltd. has collaborated with Qingdao Agricultural University to tackle

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Cyproconazole	Fungicide	96%TC 97%TC
Azoxystrobin	Fungicide	98%TC
Triadimenol	Fungicide	97%TC
Triadimeton	Fungicide	97%TC
Bitertanol	Fungicide	97%TC
Diniconazole	Fungicide	95%TC
Propineb	Fungicide	85%TK
Prothioconazole	Fungicide	98%TC
Paclobutrazol	Plant growth regulator	95%TC
Uniconazole	Plant growth regulator	95%TC

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key technologies related to prothioconazole, with a target annual production of 10,000 tons, aiming to elevate China's position in the international market. Nanjing Red Sun Co., Ltd. and Zhejiang Avilive Chemical Co., Ltd. have leveraged synthetic biology and digital technology to transform the traditional pyridine industry, creating a more competitive industrial chain. Additionally, Rainbow Agro and Sichuan Hebang Biotechnology Co., Ltd. have expanded their global presence in the glyphosate market through resource integration, enhancing their competitiveness.

These collaborations not only enable companies to reduce operational costs and boost market competitiveness through the expansion of the industrial chain and resource integration but also accelerate industry upgrades. This elevates China's agrochemical sector in the global market while promoting sustainable development.

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Major pesticide technical capacity expansion continues; emerging popular product investments gradually rationalize

Observations on pesticide and intermediate capacity investments in China 2024

By Nino Wang

Editor at AgroPages apnino@agropages.com WeChat: Nino_wong n 2024, affected by the continued pesticide price declination, the Chinese pesticide capacity investments appeared cautious and gradually became rational. In the interim, the production layout of popular products and intermediates reflected the market demand and future trends of popular pesticide technical and intermediates.

- According to incomplete statistics from AgroPages, the proposed production capacity of pesticidal active ingredients in China showed a slight decline in 2024. However, it still reached an annual 2.2 million tons, including more than 10,000 tons of new capacity of 22 pesticide technical varieties.
- Investments in popular product varieties such as glufosinate and prothioconazole were active, but significant pesticide investments decreased. Capacity planning of some pesticides remained restrained, and investments appeared conservative.
- The proposed new capacity of sub-new pesticides continued to grow while manufacturers proactively planned the production capacity of part of advantageous Chinese pesticides.
- More than 40 pesticidal intermediates have been planned, reaching a capacity of more than 10,000 tons, leading to the status of a sufficient supply of primary intermediates for PMIDA, glufosinate-P, and prothioconazole.

The report only shows product and capacity information. For the full report including information on the investing and constructing enterprises, please contact agropages@vip.163. com/ apno@agropages.com, or scan wechat to consult.

✓ In 2024, the proposed new capacity of 22 pesticidal active ingredients reached more than 10,000 tons, whilst the total planned capacity experienced a slight decrease

According to incomplete statistics from AgroPages, nearly 200 pesticide projects were being placed under construction, with the addition of a new capacity of more than 2.2 million tons, which is a slight decrease over 2.4 million tons of new capacity in 2023. The newbuild with the production capacity involves 379 pesticide technical products and intermediate products, including 1.05 million tons of pesticidal active ingredients under construction (1.28 million tons in 2023), across 16 provinces, 75 chemical industry parks, 226 technical products and 128 investors. Among the 226 technical

Table 1 Investments in Pesticide Technical in China in 2024 (Incomplete statistics of pesticide technical \geq 10,000 tons of active ingredients)

Product	Export volume & Global usage	New capacity (Ton)
Atrazine	China's 2019 export exceeding US\$100 million; Global top 20 herbicide usage in 2021	107840
Glufosinate-P		85500
Glufosinate	China's 2019 export exceeding US\$100 million; Global top 20 herbicide usage in 2021	60000
Chloroacetic acid		60000
Diquat dibromide		50000
Diquat		32000
Glyphosate	China's 2019 export exceeding US\$100 million; Global top 20 herbicide usage in 2021	30000
Glufosinate-P		28000
Terbuthylazine		23030
Atrazine		19750
S-metolachlor	China's 2019 exports ranged between US\$50 million-100 million.	15000
Clethodim	China's 2019 export exceeding US\$100 million; Global top 20 herbicide usage in 2021	13000
Pyroxasulfone		11700
Pyroxasulfone		11130
Simazine		10090
Chlorantraniliprole	China's 2019 export exceeding US\$100 million; Global top 20 insecticide usage in 2021	32600
Dimethyl disulfide		26000
Thiamethoxam	Global top 20 insecticide usage in 2021	24000
Clothianidin		11500
Prothioconazole	Top 20 fungicide usage 2021	43500
Tebuconazole	China's 2019 export exceeding US\$100 million; Global top 20 fungicide usage in 2021	15600
Captan		10000

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products, there are 91 herbicides/ herbicidal safeners (40.27%), 62 insecticides/acaricides/nematicides/ molluscicides (27.43%), and 61 fungicides (27.01%).

Table 1 shows the planned new capacity of 22 technical products over 10,000 tons in 2024, including 15 herbicides, four insecticides, and three fungicides.

Among the 22 pesticide technical products with a planned capacity of more than 10,000 tons in 2024, there are six major product varieties

with export value of above US\$100 million in 2019 (marked in red in Table 1), namely atrazine, glyphosate, glufosinate, clethodim, tebuconazole and chlorantraniliprole as well as one herbicide with export value of US\$50-100 million which is s-metolachlor. Among the 22 technical products, eight were ranked among the global top 20 among herbicides/ insecticides/fungicides in 2021, e.g., atrazine, glyphosate, clethodim, glufosinate chlorantraniliprole, thiamethoxam, prothioconazole, and tebuconazole.

V Refrained planning of capacity of primary and high-value active ingredients

According to incomplete statistics of AgroPages, in 2024, some of the significant pesticide technical such as glufosinate-P, pyroxasulfone, and prothioconazole not only continued to rank ahead in capacity newbuild but also showed a higher number of newbuild of these projects than projects for other products, reflecting the full recognition of the value of these products by industry players, who were actively participating in or continuing to launch newbuilds of capacity of these products.

Other products such as

tembotrions, flonicamid, indoxacarb, cyantraniliprole, boscalid,

trifloxystrobin, and fluopyram may not be particularly significant in respect of capacity increase, but the number of new projects built by manufacturers is significantly higher. The fact that many enterprises joined these new investments reflected, to a certain extent, their increased favor for these products (Table 2).

Since 2024, a number of global front-rank and high-value pesticide technical, such as fluopyram and cyantraniliprole, have been successfully registered and localized by Chinese companies, followed by planned launch of newbuild of capacity by interested companies. However, it is worth noting that compared to the launch of a new build with a capacity of more than 10,000 tons in chlorantraniliprole at that time, the present pesticide manufacturers appeared much more restrained in their capacity planning for a newly off-patented highvalue pesticide technical. Taking fluopyram as an example, after the expiration of the patent of the key compound of the product in 2023, seven companies announced plans to invest in such projects in 2024 to join the investment in the building of the capacity of the product. Still, the total proposed production capacity is only 2,790 tons, of which only

one company planned a production capacity of 1,000 tons annually, whilst the proposed production capacity of other companies is 500 tons or below. There may be two reasons behind this phenomenon. The first, although the patent of the key compound of fluopyram in China has expired, its use as a nematicide is still protected by patent, which undoubtedly brings potential legal risks to the launch of new production capacity; the second, in the face of the overall adverse market situation, pesticide manufacturers are becoming more and more cautious about the production layout of sub-new pesticide products. As a result, manufacturers would prefer a refrained move and strive to find the best balance between market competition and risk control.

In addition, this compares with the announcement of billions (RMB yuan) of large investment plans by a lot of leading Chinese enterprises in 2023, where investment in a single project could even exceed 10 billion yuan. However, in 2024, significant pesticide investments were significantly reduced. There was rarely an investment in any single project exceeding RMB1 billion yuan, as most of the pesticide investment amount stayed within 500 million yuan. This change reveals the start of rational and refrained industry

(Incomplete statistics of pesticide technical products \geq 3 investors)

Product	Number of investors	Invested capacity (Ton)
Pyroxasulfone	9	11700
Glufosinate-P	6	85500
Tembotrions	7	4850
Flumioxazin	3	5500
Fluroxypyr-methyl	3	5500
Ethofumesate	3	4500
Bentazone	3	4000
Pinoxaden	3	3500
Saflufenacil	3	1700
Indaziflam	3	1300
Imazamox	3	1250
Chlorantraniliprole	5	33610
Flonicamid	5	4400
Indoxacarb	5	4200
Cyantraniliprole	4	8000
Ethiprole	4	4600
Pyriproxyfen	4	3950
Bifenazate	4	2450
Dimethyl disulfide	3	26000
Thiamethoxam	3	24000
Clothianidin	3	11500
Chlorfenapyr	3	6000
Lythidathion	3	3800
Teflubenzuron	3	900
Prothioconazole	14	43500
Boscalid	8	6900
Trifloxystrobin	8	9800
Fluopyram	7	2790
Tebuconazole	5	15600
Fluxapyroxad	5	4040
Azoxystrobin	4	1730
Propiconazole	3	9100
Difenoconazole	3	7800
Triazolone	3	5000
Picoxystrobin	3	5000
Metconazole	3	1800
Thifluzamide	3	1750

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Table 2 Popular Pesticide Technical Investments 2024

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development after the rapid and aggressive expansion in the previous years. Hence, enterprises are paying more attention to risk assessment and long-range planning for investment decisions.

Sub-new off-patent pesticide technical capacity newbuild

In 2024, the proposed production capacity of sub-new pesticides continued to grow remarkably. According to incomplete statistics from AgroPages, plans were announced to build nine new pesticide technical products coming off patents in 2019 - 2022, six of which are herbicides.

As a hot herbicide that has continued to be popular in the past two years, the proposed production capacity of pyroxasulfone increased significantly again in 2024. Besides pyroxasulfone, tembotrions is a herbicide variety with a frequent capacity to launch newbuilds in the past two years. In 2024, eight enterprises announced new builds for 4,850 tons of proposed production capacity of tembotrions. In addition, the launch of a new build with a capacity of subnew compounds pinoxaden, aminopyralid, saflufenacil, and metamifop, which came off patents between 2019 and 2022, was also planned in 2024.

Chlorantraniliprole has been the most appealing insecticide for increasing capacity. Its proposed capacity increase in 2024 was 32,600 tons, of which 30,000 tons were announced to be built by one company. In June 2024, this company made public its plans to launch eight new projects at one time, of which four involved pesticide technical and intermediates, at a total investment of RMB1.1 billion yuan. The proposed projects cover a series of pyridine derivatives, such as K acid and 2,3-dichloropyridine, with an estimated annual output of more than 100,000 tons. From a planning perspective, the company is committed to building a complete

Table 3 Proposed Capacity of 2019-2022 Off-patent Pesticide Technical (Incomplete statistics)

Product	Proposed capacity (Ton)
Chlorantraniliprole	32600
Pyroxasulfone	11700
Tembotrions	4850
Pinoxaden	3500
Aminopyralid	2800
Saflufenacil	1700
Metamifop	1100
Fluopicolide	500
Dimefluthrin	500

Table 4 Proposed Capacity of Off-patent Active Ingredient since 2023 (Incomplete statistics)

Product	Proposed capacity (Ton)
Fluopyram	2790
Bixafen	500
Indaziflam	1300
Cyantraniliprole	8000
Fluxapyroxad	4040
Tetraniliprole	1000
Pydiflumetofen	600
Fluxametamide	500
Fluazaindolizine	500
Halauxifen-methyl	500
Flusulfinam	400
Broclozone	400
Meperfluthrin	300
Heptafluthrin	200
Feproxydim	200
Fluchloraminopyr	100
Bisulflufen	100
Flufenoximacil	30

industry chain covering pyridine intermediates, up to downstream major pyridine pesticide technical.

By 2025, despite the off-patent pesticides in 2023-2024, some products cannot be quickly localized because of the patentee's patentassociated restrictions or other factors. In addition, for a different product, differences exist between its patent expiration date and proposed newbuild of production capacity; even for products of similar expiration date, the proposed capacity may be different. For example, cyantraniliprole, fluopyram, indaziflam, and bixafen are all pesticidal active ingredients that will be coming off patent in 2023-2024. According to incomplete statistics from AgroPages, there was a proposed capacity newbuild of cyantraniliprole of 8,000 tons in 2024, while the proposed production capacity of fluopyram was 2,790 tons involving as many as seven investors, which reveals the manufacturer's high attention to the product.

Fluxapyroxad is BASF's SDHI strategic fungicide, which has been remarkably successful in major pesticide markets around the world, such as Latin America, with global sales of nearly US\$500 million, whose compound patent will expire in February 2026. According to incomplete statistics, in 2024 Chinese companies already planned the launch of a newbuild of the product.

In addition to the abovementioned novel pesticides, in 2014, there were 13 products within a valid period of the patent already planned proactively by Chinese companies for the launch of production. The compound patent of these 13 products will expire between 2026-2041 (marked in a dark shade in Table 4); it should be noted that among the 13 products which are already planned for production, eight are created by local Chinese enterprises, including flusulfinam, broclozone, fluchloraminopyr and flufenoximacil created by KingAgroot, feproxydim created by Cynda, and bisulflufen, meperfluthrin, and heptafluthrin created by Yangnong Chemical, which reflects the growing

capability of Chinese manufacturers in the creation of new pesticides.

More than 40 pesticide intermediates are being planned to add new capacity of more than 10,000 tons, and key intermediates such as PMIDA, glufosinate-P, and prothioconazole are scheduled with ample capacity to ensure sufficient market supply

In 2024, 84 enterprises in China invested in the production of 153 pesticide intermediates, covering a total capacity of 1.146 million tons, slightly larger than the production capacity of pesticide technical. Out of the pesticide intermediates production, 40-plus products are proposed to have a production capacity of more than 10,000 tons.

intermediates, the new production capacity of methyldiethoxyphosphine, the key intermediate of glufosinate, shows a significant increase of 110,000 tons. Also, glycine and PMIDA are both key intermediates for the synthesis of glyphosate. For these

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Among the proposed pesticide

two intermediates, the proposed/ completed production capacity in 2024 was 100,000 tons and 25,000 tons, respectively.

Besides pesticide intermediates involving PMIDA and glufosinate-P series, α -acetyl- γ -butyrolactone, as a key intermediate for the synthesis of the major fungicide prothioconazole, saw an increased capacity of 59,000 tons following the continued increase of production of prothioconazole. N-(1-ethylpropyl)-3,4-dimethylaniline is an intermediate of the major herbicide pendimethalin, for which the leading manufacturer BSM invested in the launch of an annual 40,000-ton new capacity to improve its product industry chain. 3-BroMo-1-(3-chloropyridin-2-yl)-1H-pyrazole-5-carboxylic acid, 2-Amino-5-chloro-3-methylbenzoic acid and 2,3-Dichloropyridine are essential intermediates for synthesis of the broad-spectrum insecticide chlorantraniliprole, etc. In 2024, the proposed production capacity of the three intermediates reached 20,000 tons, 10,000 tons, and 14,700 tons, respectively. Ethyl 3-(difluoromethyl)-1-methyl-1h-pyrazole-4-carboxylate plays a key role in production of SDHI fungicides including fluxapyroxad, for which the planned capacity in 2013 reached 12,000 tons.

Other pesticide intermediates such

Table 5Pesticide Intermediate Investments in China in 2024(Incomplete statistics of more significant capacity/popular intermediates)

Product	Downstream key pesticides	Capacity (Ton)
Methyldiethoxyphosphine	Glufosinate	110000
Glycine	Glyphosate	100000
α -acetyl- γ -butyrolactone	Prothioconazole	59000
N-(1-ETHYLPROPYL)-3,4- DIMETHYLANILINE	Pendimethalin	40000
PMIDA	Glyphosate	25000
3-BroMo-1-(3-chloropyridin-2-yl)-1H- pyrazole-5-carboxylic acid	Chlorantraniliprole, cyantraniliprole, cyclaniliprole, tiorantraniliprole, fluchlordiniliprole.	20000
L- Homoserine	Glufosinate-P	20000
Methomyl oxime	Methomyl, thiodicarb, alanycarb.	18000
2,3-Dichloropyridine	Cyclaniliprole, tetraniliprole, tiorantraniliprole, fluchlordiniliprole, chlorantraniliprole, cyantraniliprole.	14710
Ethyl 3-(difluoromethyl)-1-methyl-1h- pyrazole-4-carboxylate	Benzovindiflupyr, pydiflumetofen, isoflucypram, fluindapyr, bixafen, sedaxane, fluxapyroxa.	12000
2-Amino-5-chloro-3-methylbenzoic acid	Chlorantraniliprole, pioxaniliprole.	10000
(E)-O-(3-Chloro-2-propenyl) hydroxylamine	Clethodim	8245
2,3-dichloro-5-(trifluoromethyl) pyridine	Fluazaindolizine, fluopimomide, fluopicolide, fluopyram, chlorfluazuron, haloxyfop-P, fluazuron.	6100
2-Chloro-5-(chloromethyl)thiazole	Thiamethoxam, clothianidin, dicloromezotiaz	5000
3-[[5-(difluoromethoxy)-1-methyl- 3-(trifluoromethyl)pyrazol-4-yl] methylsulfanyl]-5,5-dimethyl-4H-1,2- oxazole	Pyroxasulfon	1000

as methomyl oxime, 2,3-dichloro-5-(trifluoromethyl)pyridine, 2-Chloro-5-(chloromethyl)thiazole and (E)-O-(3-Chloro-2-propenyl)hydroxylamine are essential intermediates for pesticide synthesis, for which new capacity investments are included in Table 5.

Actual launch of new production capacity is falling behind the scheduled capacity newbuild

Since 2024, the pesticide active ingredients or intermediates projects invested by several pesticide manufacturers have progressed into important milestones, either with the announcement of the start of production, trial production, or project completion.

According to incomplete statistics from AgroPages, from 2024 to the present, a total of 40 technical products (roughly 85,000 tons) and 23 intermediates (200,000 tons) have been actually brought to production in China, involving 28 investors. The completed and operational projects cover various technical products, including herbicides such as glufosinate-P, S-meolachlor, fluroxypyr, flumioxazin, and sulfentrazone, fungicides such as captan, prothioconazole, tebuconazole and boscalid, insecticides such as dinotefuran and tolfenpyrad.

Nevertheless, the vast majority of pesticide technical projects, which were announced in 2023, are not yet operational in 2024. In particular, there is a big gap between the announced capacity and the actual production capacity in the end. The proposed new production capacity of glufosinate in 2023 is as high as 158,000 tons, plus the new capacity of 39,000 tons of glufosinate-P, thus totaling nearly 200,000 tons, whilst in 2024, only a total of 25,000 tons of glufosinate technical invested by Wynca and Yonon were announced being operational; in 2023, S-metolachlor was planned to add 40,000 tons of capacity while in 2024 only Jiangsu Changqing's annual 5,000-ton capacity was

actually put into operation; in 2023, prothioconazole was planned to add a capacity of 19,000 tons while in 2014 only Anhui Jiuyi's 5000-ton capacity was announced as operational. In addition, the other pesticides technical which were planned in 2013 with a production capacity of more than 10,000 tons in 2023, such as mancozeb, clethodim, diquat, thiamethoxam, 2,4-D isooctyl ester, glyphosate, chlorantraniliprole, pendimethalin, 2-Methyl-4chlorophenoxyacetic acid, pyraclostrobin, and acetamiprid, have had no updates of further

Table 6 Operation and Production of Pesticide and Intermediates in China from 2024 to Present(Incomplete statistics)

Product	Category	Capacity (Ton)
Glufosinate-P	Herbicide	25000
Captan	Fungicide	10000
S-metolachlor	Herbicide	5000
Prothioconazole	Fungicide	5000
Tebuconazole	Fungicide	5000
Fluroxypyr	Herbicide	3000
Flumioxazin	Herbicide	2000
Oxyfluorfen	Herbicide	2000
Sulfentrazone	Herbicide	2000
Tolfenpyrad	Insecticide	2000
Boscalid	Fungicide	2000
Propiconazole	Fungicide	2000
Flutriafol	Fungicide	2000
Triazolone	Fungicide	2000
Niclosamide-Olamine	Molluscicide	1800
Dinotefuran	Insecticide	1500
Isoxaflutole	Herbicide	1000
Clodinafop-propargyl	Herbicide	1000
Bentazone	Herbicide	1000
2,4-D	Herbicide	1000
Cloquitocet-mexyl	Herbicide, Safener	1000
Dimethomorph	Fungicide	1000
Thiophanate-methyl	Fungicide	1000
Benomyl	Fungicide	1000
Lufenuron	Insecticide	600
Oxaziclomefone	Herbicide	512
Diflufenican	Herbicide	500
Isoxadifen-ethyl	Herbicide, safener	500
Fluazaindolizine	Nematicide	500
Picoxystrobin	Fungicide	500
Carfentrazone	Herbicide	300
Hexaflumuron	Insecticide	300
Cinmethylin	Herbicide	200
Saflufenacil	Herbicide	200
Indaziflam	Herbicide	200
Feproxydim	Herbicide	200
Lufenuron	Insecticide	200

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information in 2024, most of which may be still under construction. This indicates that despite the planning in the early stages, the planned construction and scheduled operation of these projects face many challenges and constraints during project implementation.

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Product	Category	Capacity (Ton)
Teflubenzuron	Insecticide	200
Pyroxasulfon	Herbicide	100
PMIDA	Agrochemical intermediates	12000
2-[2-(4-Chlorophenyl)ethyl]-2-(1,1-dimethylethyl)- oxirane	Agrochemical intermediates	5000
Methomyl-Oxime	Agrochemical intermediates	1000
cis-1,2,3,6-Tetrahydrophthalimide	Agrochemical intermediates	3000
Sodium methyl mercaptide	Agrochemical intermediates	15000
2-Chloroacrylonitrile	Agrochemical intermediates	2000
DL-(4-Chlorophenyl)Glycine	Agrochemical intermediates	2000
3-[[5-(difluoromethoxy)-1-methyl-3-(trifluoromethyl) pyrazol-4-yl]methylsulfanyl]-5,5-dimethyl-4H-1,2- oxazole	Agrochemical intermediates	1000
Ethyl 3-(difluoromethyl)-1-methyl-1h-pyrazole-4- carboxylate	Agrochemical intermediates	500
5-Amino-3-cyano-1-(2,6-dichloro-4- trifluoromethylphenyl)pyrazole	Agrochemical intermediates	2000
Phosphorus pentachloride	Agrochemical intermediates	30000
Phosphorus oxychloride	Agrochemical intermediates	50000
1-Chloropinacolone	Agrochemical intermediates	10000
1 2 4-triazole	Agrochemical intermediates	10000
4-Amino-6-(tert-butyl)-3-mercapto-1,2,4-triazin-5(4H)- one	Agrochemical intermediates	6000
1,1-Dichloropinacolin	Agrochemical intermediates	6000
Hydrazine hydrate	Agrochemical intermediates	20000
P-chlorobenzaldehyde	Agrochemical intermediates	8000
Thiocarbohydrazide	Agrochemical intermediates	6000
N-Nitroiminoimidazolidine	Agrochemical intermediates	3000
3,6-Dihydro-3-methyl-N-nitro-2H-1,3,5-oxadiazin-4- amine	Agrochemical intermediates	2000
N-(1,3-dimethyl-2,4-dihydro-1,3,5-triazin-6-yl)nitramide	Agrochemical intermediates	3000
1-Methyl-2-nitroguanidine	Agrochemical intermediates	3000

CHICO CROP SCIENCE CO., LTD. is a national high-tech enterprise that has won many national awards and inventions patents. We focus on developing and providing global growers with comprehensive farming solution with our unique and value-added products.

CHICO is acutely aware of the significant challenges confronting contemporary agriculture, including climate change, soil degradation, and development of resistance in agrochemical products. In response to the growing global demand for green and sustainable agriculture development, we remain steadfastly in our commitment to providing practical and environmentally friendly solutions through technological innovation. Since 2017, CHICO team has concentrated on the research and application of microbial technology, successfully selecting and cultivating a diverse range of functional microbial strains and metabolites which has efficient insecticidal and anti-disease function. Leveraging this technological advantage, we have developed a series of high-efficiency, eco-friendly, and distinctive green bio solution aimed at promoting agricultural sustainability.

Concurrently, CHICO has restructured and enhanced its guality management system by implementing stringent raw material inspections, rigorous production process controls, pre-delivery internal inspection, and third-party laboratory testing. These measures ensure that every batch of products adheres to stringent national and customer standards.

Recently, CHICO's biotechnology products have attracted significant attention from European companies and users owing to their superior performance and environmental advantages. These products have achieved favorable filed trial results and market feedback across several regions and countries. Such achievements not only validate CHICO's innovative capabilities in the field of biotechnology but also establish a robust foundation for our strategic initiative to enter the EU market.

A Chinese patented fungicide distributed exclusively worldwide by CHICO

action

Exclusive bio solution for nematode control with faster action, higher safety and efficacy

Enhancing plant's root health and stress tolerances

CHICO is steadfastly committed to its developmental ethos of "sustainability, eco-friendliness, and high efficiency." We will persist in augmenting research and development expenditures within the biotechnology sector, while fortifying collaborative endeavors with agricultural universities and research entities to cultivate a plethora of innovative and pragmatic agricultural solutions.

Adhering to the principles of integrity, openness, harmony and win-win, CHICO wholeheartedly extends an invitation to global planter and partners to collaborate in promoting the development of green agriculture, thereby contributing to the sustainable and environmentally friendly advancement of global agricultural initiatives.

Offering integrated crop nutrition and controlling red spider mite

Green go Karnes

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Competitive Formulations for You

Established in 2011, Bioseen has set up a complete crop protection portfolio and expanded its business over Asia, Latin America and Africa, etc.

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Formulation Product List

Insecticides and Acaricides

Dinotefuran 30% + Pymetrozine 30% WDG Emamectin Benzoate 10% + Lufenuron 40% WDG Spirotetramate 240g/LSC

Herbicides

Fluroxypyr-meptyl 14% +Florasulam 0.5% + Carfentrazone-ethyl 1.5% SE Glufosinate 22.5% + Fluoroglycofen-ethyl 1.5% OD Penoxsulam 1.5% +Bispyribac-sodium 2% + Cyhalofop-butyl 10.5% OD Pinoxaden 4% + Clodinafop-propargyl 6% EC

Plant Growth Regulators

Choline Chloride 17% + 1-napthyl acetic acid 1% WP 6-benzylamino-purine 1.99% + 24-epibrassinolide 0.01% WDG

Fungicides

Azoxystrobin 20% +Dimethomorph 40% WDG Pyraclostrobin 10% + Boscalid 20% SC Pyraclostrobin 7% + Tebuconazole 28% SC

Seed Treatment

Difenoconazole 1% +Fludioxonil 1% +Thiamethoxam 20% FS Difenoconazole 1% + Fludioxonil 1% + Imidacloprid 50% FS Fipronil 3% + Chlorpyrifos 15% FS Thiamethoxam 20% + Fludioxonil 2% FS

Fungous Proteoglycan 1% SL S-abscisic acid 10% SL

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Chinese pesticide companies going global:

From breaking through to leading, a microcosm of manufacturing globalization

By Mickey Shan Editor at AgroPages mickey@agropages.com WhatsApp: +86 18705817985 midst the profound reshaping of the global economic landscape and the accelerated pace of industrial transformation, China's pesticide industry is confronted with unprecedented opportunities and challenges.

In recent years, the continuous growth of China's pesticide exports has become a key driver for industry development, steadily enhancing its market share and global influence. However, in the face of intensified international trade frictions, frequent market fluctuations, and increasingly stringent environmental requirements, the industry's development trajectory has become more complex. Looking at the "going global" journey of Chinese enterprises, they

have not only made breakthrough progress in product structure optimization, technological innovation, and brand building but also demonstrated strong resilience and adaptability in expanding overseas markets. Faced with the dual pressures of "de-globalization" trends and global market competition, how to achieve a strategic transformation from traditional production models to high value-added and globalized operations has become a crucial issue for Chinese pesticide companies to achieve high-quality development. This article presents the export performance and overseas path of Chinese pesticide companies through data and case studies, exploring their strategies and future development directions in the global market.

Pesticide Formulations Outpace Active Ingredients in Export Volume and Value, Signaling Successful Structural Shift

The export of Chinese pesticides has become a key driver for the industry's development. From 2011 to 2020, China's average annual pesticide production reached 1.48 million tons, reflecting a cumulative growth of 13%. During the same period, the average annual export volume of pesticides reached 950,000 tons, showing an impressive growth rate of 35%. Globally, the robust increase in China's pesticide exports has primarily compensated for the demand decline in the domestic market caused by the "zero growth in pesticide use" policy on pesticides, providing crucial support for capacity expansion. In 2021 and 2022, the proportion of pesticide exports reached a historical high, accounting for 85% of the country's total pesticide production. Although the overall development of the global agrochemical market slowed down in 2023, the export proportion remained high at 84%, underscoring its vital role in supporting the industry (as illustrated in Figure 1).

From January to August 2024, China's pesticide exports continued to maintain a growth momentum. Data reveals that the export volume in terms of 100% active ingredient reached 1.33 million tons, reflecting a year-on-year increase of 34.2%. Meanwhile, the export value climbed to \$10.6 billion, marking a yearon-year rise of 3.4%. Despite this substantial increase in export volume, pesticide prices remain somewhat weak.

When it comes to the export product structure(Figure.2), in 2023, the export volume of pesticide technicals in terms of 100% active ingredient reached 730,000 tons, while for the first time, the export volume of formulations in terms of 100% active ingredient surpassed that of technicals, reaching 820,000 tons. Both categories achieved an export value of \$7.5 billion. This shift

Exports (00

Figure 2. 2021-2024 (1-8) China's Pesticide Export Structure

indicates that the Chinese pesticide industry has made considerable strides in optimizing its product structure, with high-value-added formulation products gradually emerging as a new driving force for export growth.

This trend continued from January to August 2024, with the export volume of technical and formulations in terms of 100% active ingredient reaching 620,000 tons and 710,000 tons, respectively. Notably, the export value of formulations significantly outpaced that of technicals, totaling \$5.7 billion compared to \$4.9 billion for technicals. This not only underscores the Chinese pesticide industry's ongoing commitment to technological innovation and product

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Figure 1. China's Pesticide Production and Export Proportion from 2012 to 2023

enhancement but also highlights the strategic success of its transformation towards high-value-added products.

As environmental regulations tighten and market competition intensifies, China's pesticide industry is gradually shifting from traditional technical production to research, development, and production of high-value-added formulations, continuously enhancing product value and market competitiveness.

Looking ahead, as industry trends evolve, China's pesticide industry is poised to capture a larger share of the global market. To achieve this, Chinese pesticide companies must strengthen their presence in international markets and move beyond current development models.

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Specifically, they need to shift from simply processing and selling raw materials to establishing their brands and prioritizing technological research and development. This strategic shift represents the overall direction for the industry's future growth.

& Global Market Pressures **Highlighted In Corporate** Performance; Overseas **Expansion Remains Steady**

Although China's pesticide export market has generally maintained a growth trend, the ongoing price weakness presents significant challenges for companies in the sector, many of which are seeing their profit margins decline. In 2023, a combination of inventory backlogs in international markets and the concentrated release of global pesticide production capacity caused prices to drop sharply, resulting in a widespread halving of net profits for many companies.

AgroPages conducted a detailed analysis of the revenue performance of 28 listed pesticide companies in China from 2021 to 2023, focusing specifically on their overseas expansion (or going global) and the proportion of domestic and international sales(Figure 3). Overall, pesticide companies experienced a growth trend during this period, peaking in 2022. However, in 2023, 26 of these companies reported a decline in revenue. The primary challenges these companies are facing include fluctuations in exchange rates, changes in international trade policies, weak demand stemming from excessive channel overstocking, and intensified market competition. Exchange rate fluctuations have a direct impact on corporate profits, especially for those heavily reliant on exports. Additionally, changes in international trade policies such as rising protectionism and anti-dumping investigations have created significant obstacles for companies expanding foreign markets. Furthermore, the intensified competition in the global pesticide

1. The data is drawn from publicly available information from listed companies,

2. The sales figures encompass all business activities of individual companies, including pesticides.

3. Sales data for each company is presented from top to bottom for the years 2021 to 2023.

3. Norsyn publically released its sales data from 2022.

market in 2023 has forced companies to continuously improve their technological capabilities and product quality to remain competitive against both domestic and international rivals.

The pressure from the international market is mainly reflected in the overseas sales proportions of various enterprises. Companies like Rainbow Agro, Yangnong Chemical, Nutrichem, Nantong CAC, and Lier Chemical have consistently maintained a high level of overseas business proportion. In contrast, companies that have primarily targeted the domestic market, such as Sino-Agri Leading and Wynca, are gradually intensifying their efforts to expand internationally. However, in 2023, most enterprises experienced fluctuations in their overseas sales proportions, with 26 out of 28 companies reporting varying degrees of decline.

Despite the impact of the external environment, Chinese pesticide companies are steadily advancing their overseas market expansion strategies and actively responding to various challenges. These companies have achieved overall revenue stability by optimizing their product structures and exploring emerging markets.

Several companies have made notable strides in expanding their presence in overseas markets and securing product registrations. For instance, Rainbow Agro, Hailir, and Guangxin Agrochemical have completed multiple product registrations in various countries and regions, and they are rapidly establishing overseas branches to strengthen their footprint in international markets.

Additionally, some companies are increasing their investment in the research and development of new pesticide products. In 2023, Lier Chemical began the registration and market development of glufosinate-P in several countries, actively promoting its core products. NeoAgro has been actively advancing its overseas operations in thiazole zinc formulations, targeting key countries and core crops while forging strong

partnerships with high-quality distribution channels. Red Sun has expedited the overseas registration of products such as diquat dichloride, chlorantraniliprole, and glufosinate-P. Meanwhile, Cynda has conducted efficacy evaluation trials for innovative compounds like pyraquinate and feproxydim across various markets, including Southeast Asia, Central America, and Latin America, and has already initiated independent registration efforts.

In response to market challenges, companies are actively improving their overseas marketing capabilities. Rainbow Agro has launched the "Rainbow Leadership Program" to train its overseas management teams. Meanwhile, senior executives from companies like Limin Group and Changqing Agrochemical have taken the initiative to lead teams abroad for comprehensive market research, providing robust support for market expansion.

When it comes to managing foreign exchange risk, companies often utilize financial instruments such as foreign exchange hedging, forward foreign exchange settlement, and sales to mitigate the effects of exchange rate fluctuations, thereby protecting their profits from volatility.

in the pesticide industry will continue to encounter a range of opportunities and challenges in overseas markets. With the increasing global demand for efficient and environmentally friendly pesticides, companies with innovative products are poised to further their share in the international market through technological

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Looking ahead, listed companies

innovation and market expansion.

From Chaos to Order and Dependence to **Innovation: The Evolution** of Chinese Agrochemical **Companies' Strategies for** "Going Global"

Since China acceded to the World Trade Organization (WTO), pesticide companies have actively participated in internationalization. They have evolved from primarily exporting raw materials to adopting a diversified strategy for going global, becoming deeply integrated into the value chains of overseas end markets. Throughout this process, Chinese pesticide companies have not only secured their positions in the global market but have also achieved significant advancements in technological innovation, product enhancement, and market diversification.

For enterprises, "going global" goes beyond mere product exports; it is a crucial pathway for integrating into the global industrial division and enhancing international competitiveness and influence. From the perspective of the global value chain, "going global" can be divided into three categories: Firstly, trade**based going global**, which includes product exports, the establishment of distribution networks, and OEM production. This is currently the most common form of going global for Chinese agrochemical companies, although it faces challenges such

as price competition, market fluctuations, and brand vulnerabilities. Secondly, investment-based going global involves overseas investments, mergers and acquisitions, and the establishment of production bases and R&D centers. While this type of going global presents significant risks and management challenges, an increasing number of Chinese companies have been pursuing this route in recent years. Thirdly, global operations encompass comprehensive industrial chain layouts, brand management, and the establishment of regional headquarters. This approach demands strong capabilities in strategic planning, organizational management, and cultural development, representing a dynamic capability that is cultivated over the long term.

Agrochemical companies' tradebased going global mainly has

three models: Model A represents traditional export trade without registration; Model B is a registered trade model; and Model C is a localized distribution model. These three models indicate different stages of internationalization for companies, each requiring progressively more significant resources, operational capabilities, and investment commitment, highlighting the enhancement of the corporate value chain. In recent years, Chinese companies have evolved significantly through long-term investments, becoming entities that actively pursue overseas independent registrations and can establish technological barriers using patent strategies.

It is particularly noteworthy that some Chinese companies have successfully implemented the Model C approach overseas by profoundly engaging with end markets and addressing the needs of local farmers.

For instance, Kesai Agrochem has cultivated the African market for many years, establishing a good reputation in markets such as Nigeria and Cameroon through the introduction of differentiated products and direct control over sales channels while continuously expanding into emerging markets like Ghana and Côte d'Ivoire.

ACECHEM, on the other hand, focuses on the pest control needs for resistant diseases and highvalue economic crops in the Vietnamese market, developing and promoting patented green microbial products tailored to local needs. After achieving success, the company replicated this experience in the Indonesian market, creating a business model driven by technology and services that stimulate the end demand. Additionally, Zibo Oasis Agroscience has collaborated with the adjuvant company Sinvochem

to develop formulations resistant to rain-fastness for Philippine farmers, effectively addressing the unique planting challenges in the region.

Investment-based going global enables enterprises to acquire resources and gain control over the industrial chain through mergers and acquisitions, as well as by establishing overseas production bases and R&D centers. In recent years, the overseas investments of Chinese enterprises have primarily fallen into four categories (Table 1): resourcebased investment, breakthrough investment in high-end markets, capacity investment, and supply chain investment. Furthermore, Chinese companies have adopted a "nearshore strategy" by setting up production bases abroad, with formulation production facilities located across Asia, South America, Africa, Europe, and North America. This approach is expected to create regional platforms that will facilitate the entry of more Chinese enterprises into local markets.

Global operations represent an advanced stage for companies going global, necessitating the creation of a comprehensive system that includes research and development, production, and brand management. This model places considerable demands on corporate strategic planning, organizational management, and cross-cultural competencies. While this model requires substantial upfront investment and a lengthy timeline, successful implementation can yield lasting competitive advantages and a broad development space for enterprises. Currently, no domestic agrochemical company in China has fully realized global operations. However, Rainbow Agro is at the forefront of this development trajectory, showcasing its industryleading vision and commitment.

Manufacturing Going Global

Looking ahead, the development trajectory of China's pesticide companies is crucial not only to the rise and fall of the industry but

also to the microcosm of China's manufacturing sector going global. Against the backdrop of a restructured global industrial chain, Chinese manufacturing enterprises must transition from mere product exports to the export of technology, brands, and standards. By engaging in investment-driven overseas expansion and global operations, they can integrate more deeply into international markets. This requires not only sustained investment in technological research and product innovation but also strategic vision and practical capabilities in

INDUSTRY WATCH

Table 1. Four categories of overseas investments of Chinese enterprises

nvestment	Hebang Biotechnology raised its stake in Australian giant AVE
estments in arket	Rainbow Agro acquired Spain's Exclusivas Sarabia
	Rainbow Agro purchased a formulation facility in the US
stment	Xingfa acquired Indonesia's AMCO
vestment	Wynca established an overseas warehouse in Ghana

organizational management, crosscultural integration, and global resource allocation.

Overall, the journey of China's pesticide companies offers valuable lessons for the manufacturing sector's overseas expansion. In the future, as Chinese enterprises continue to break through in technological innovation, brand building, and global layout, China's manufacturing industry is poised to capture a larger share of the worldwide market, achieving a splendid transformation from "Made in China" to "Created in China" and "Branded in China." AP

Feature: Tracking China's Off-Patent Pesticide Industry Trends

Chlorothalonil price surge:

Global market dynamics amid China's capacity control

hina's agrochemical industry has achieved remarkable progress in the research and development as well as production of off-patent pesticides over the years, establishing a complete industrial chain and continuously consolidating this advantage. In 2024, when pesticide prices were generally low, the Chinese agrochemical industry still demonstrated strong resilience. Driven by demand, some pesticide products, such as chlorothalonil, abamectin, and emamectin benzoate, have seen price increases and have performed well in the market.

More encouragingly, China's agrochemical industry is shifting from being a "follower" to a "leader." Take chlorantraniliprole as an

example. With its strong technical production capabilities and cost advantages, China has brought this once high-priced product down from its "pedestal," making it more accessible to farmers. With the changes in market supply and demand, the latest prices of chlorantraniliprole in 2025 have already begun to rise.

This special Fearure selects several off-patent pesticide products with significant industrial and technological advantages that have seen price increases against the trend in the past year for in-depth analysis and observation. We hope that through these case studies, readers can better grasp the product trends and development directions of China's pesticide market, providing references for industry development and decision-making.

0 H 0 H 1 U A U J A S

By Annie Feng Editor at AgroPages AnnieFeng@agropages.com WhatsApp: +86 15653248912

hlorothalonil, a broadglobal agricultural production since its introduction in the 1960s. Its multisite action mechanism effectively mitigates the risk of pathogen resistance, providing it with a distinct advantage in disease management. In recent years, despite restrictions and bans on chlorothalonil in several countries and regions, including the European Union (EU), demand remains robust in key markets such as Brazil and the US, particularly for controlling soybean rust. From a market perspective, the price of chlorothalonil surged from RMB16,500 per ton in 2024 to RMB27,500 per ton at the beginning of 2025, marking a 66% increase and highlighting a growing supplydemand imbalance. This article delves into the current landscape and development trends of chlorothalonil, examining various aspects such as its global development history, market structure, regulatory environment, and innovation trends.

40 Global Development **History and** Characteristics

Chlorothalonil was initially launched in 1963 by the American company Diamond Alkali Co. (now ISK Biosciences Corp.). In 1997, it was acquired by Zeneca

Agrochemicals (now Syngenta Group), becoming a core product for the agricultural chemical giant. Chlorothalonil formulations were first registered in the US in 1966 for use on lawns. In the 1980s, China obtained the first registration for chlorothalonil formulation, a 75% WP. Yunnan Chemical Research Institute began researching and developing chlorothalonil in the early 1980s, achieving the capability to produce its technical material (96%) by the end of that decade.

The chemical structure of chlorothalonil

In the realm of plant disease control, chlorothalonil offers distinct advantages: it not only provides preventive protection before diseases occur, but its multi-site action mechanism also significantly reduces the likelihood of pathogens developing resistance, making it a vital tool in resistance management.

Figure 1. Price Trend of Chlorothalonil (Source: BAIINFO)

However, in recent years, chlorothalonil has encountered bans due to its potential risks to fish and aquatic organisms, as well as concerns regarding the impact of its degradation products on groundwater. Several countries and regions have implemented restrictions or bans, including the EU (comprising 27 countries), New Zealand, Switzerland, Türkiye, the United Kingdom, and Costa Rica. The key timeline of these restrictions and bans is as follows:

In 2017, New Zealand imposed strict regulations on pesticides containing chlorothalonil. The local environmental protection agency revoked the approval of four fungicides used in residential properties and gardens, including Yates Bravo and Yates Greenquard, and ultimately banned their sale throughout the country. The year 2019 marked a significant turning point for the industry, as the EU rejected the re-evaluation application for chlorothalonil, signaling its withdrawal from the EU market. The United Kingdom soon followed suit with its ban. Additionally, in the same year, Switzerland also revoked sales licenses for the product. In 2020, Türkiye added

chlorothalonil to its list of banned pesticides for use, production, and importation. By 2023, the global regulatory landscape tightened even further, with Costa Rica implementing a ban on the use of chlorothalonil.

Despite these regulatory pressures, the chlorothalonil market continues to demonstrate strong growth. According to third-party data, global sales of chlorothalonil reached US\$380 million in 2021 and are projected to rise to \$540 million by 2023, indicating a sustained increase in market demand.

40 Global Market Landscape

Due to fluctuations in the prices of key raw materials for chlorothalonil and significant shifts in the market environment, its price has increased considerably. According to data from BAIINFO (as shown in Figure 1), as of January 16, 2025, the market price of chlorothalonil has reached RMB27,500 per ton, marking a

substantial rise of 66.67% from the annual low of RMB16,500 per ton recorded on May 10, 2024.

The specific factors contributing to the price increase of chlorothalonil are as follows:

- Following the second quarter of 2024, inventories of chlorothalonil declined, resulting in a market recovery driven by strong demand.
- The supply-side market structure is well-defined, with no new production capacity being introduced. As the manufacturing process of chlorothalonil produces cyanide waste, which is highly toxic, the approval for new projects faces certain restrictions. Aside from the expansion of existing facilities, it is relatively complex for new entrants to obtain approvals. Currently, chlorothalonil is included in the National Development _____

and Reform Commission's "high pollution, high environmental risk" product catalog, which prohibits the addition of new production capacity and expansions. This is expected to sustain the current structure of the chlorothalonil industry.

in terms of raw materials, the price of m-xylene has increased and stabilized, while the price of synthetic ammonia has experienced fluctuations. Overall, the cost of chlorothalonil followed an initial increase before stabilizing.

In summary, the supply-demand imbalance for chlorothalonil is likely to become more pronounced, potentially allowing for further price increases. Historically, chlorothalonil has demonstrated significant price elasticity, peaking at RMB55,000 per ton in 2019.

Demand side: Characterized by Regional and Seasonal Variations, Along With an Expanding Range of **Applications**

The market demand for chlorothalonil shows notable regional and seasonal variations.

Geographically, the demand for chlorothalonil is mainly concentrated in South America, especially Brazil. According to Phillip's data (as shown in Figure 2), global sales of chlorothalonil reached 61,000 tons in 2023, with Brazil representing 61% of that total. China and the US account for 17.6% and 6.22% of the market share, respectively. The product is primarily used in soybean, vegetable, and fruit crops. In total, the current global demand for chlorothalonil is around 70,000 tons.

From 2021 to 2024, global imports of chlorothalonil have demonstrated a fluctuating upward trend, as illustrated in Figure 3. While Brazil's share of imports has decreased from

70000

60000

50000

40000

30000

20000

10000

0

around 80% in 2021 to 50% in 2024. its market dominance remains strong. Concurrently, demand from other regions, such as the US, has been increasing steadily, contributing to the overall growth of global imports. It is noteworthy that the decline in Brazil's import volume in 2023 is mainly attributed to the industry's destocking cycle rather than a decrease in actual demand. With the end of the destocking cycle, Brazilian market demand rebounded in 2024, leading the industry into a restocking phase. In the Brazilian market,

chlorothalonil is almost irreplaceable in the control of soybean rust due to local climatic conditions and

Figure 2. Global Sales of Chlorothalonil in 2023

Figure 3 Global Imports of Chlorothalonil (Technical + Formulations) from 2021 to 2024

crop structures. There are two peak application periods each year in this region: from December to February and from July to August. In 2024, Brazil experienced prolonged rainy and humid weather, leading to a large-scale outbreak of soybean rust. Coupled with tight inventory levels, the market demand for chlorothalonil surged. Furthermore, the application range of chlorothalonil in Brazil has expanded from solely controlling soybean rust to managing disease resistance in cotton and corn, further driving the growth of its demand and becoming one of the key factors behind the current increase in market demand.

Supply-side: Highly Concentrated

The supply side of chlorothalonil also exhibits a highly concentrated characteristic. Import and export data from 2021 to 2024 (as shown in Figure 4) indicate that the global import volume of chlorothalonil technical closely aligns with China's export trends, highlighting that the worldwide supply of chlorothalonil is heavily reliant on the Chinese market.

According to industry research by AGROPAGES, the current global annual supply of chlorothalonil is approximately 70,000 tons, with China accounting for around 90% of this total. The primary producers of chlorothalonil in China include Jiangsu Xinhe, Suli Chemical, Shandong Dacheng, and Jiangsu Weunite, creating a market landscape dominated by a few key players. Among these, Jiangsu Xinhe stands out with a production capacity of about 30,000 tons, representing 40% of the global capacity. The company is primarily owned by Nantong CAC, which holds a 51% share, and Limin Chemical, which has a 34% share, positioning it as the leading enterprise in China's chlorothalonil market. The specific capacity information can be found in Table 1.

The production process of chlorothalonil primarily involves the ammoxidation of m-xylene to produce m-phthalodinitrile, which is subsequently converted into chlorothalonil through a chlorination reaction. The final product is obtained through a series of steps, including condensation, separation, and purification, with tail gases being either recovered or treated.

While this process is wellestablished within the industry, variations in technology, equipment, and management practices among different enterprises lead to notable differences in product quality and production efficiency.

Nantong CAC has been actively involved in the chlorothalonil sector for over 20 years, harnessing continuous research, development, and technological innovation to create distinct advantages. The

Figure 4 Export Situation of Chlorothalonil Technical from China

Table 1: Production Capacity of Chlorothalonil in China

Manufacturer	Annual Production Capacity (ton/year)
Jiangsu Xinhe	30000
Suli Chemical	20000
Shandong Dacheng	10000
Jiangsu Weunite	3000

company holds proprietary core catalysts and advanced ammoxidation technology. Its manufacturing facilities are equipped with high-standard automation and an EHS management system, ensuring efficient, safe, and environmentally friendly production. Thanks to these strengths, Nantong CAC has emerged as a key global supplier of chlorothalonil, forming long-term partnerships with several multinational corporations. The company has also contributed to the development of national standards by conducting equivalence assessments of chlorothalonil according to FAO standards, reinforcing its leadership position in the industry and consistently delivering stable, costeffective products to its customers.

Suli Chemical has amassed 30 years of experience in chemical

manufacturing within the chlorothalonil sector, establishing significant competitive advantages through its extensive research and development, production capabilities, and market layout. The commissioning of a new factory in Ningxia further improves its product quality and supply stability. Through process innovation, standardized design, careful equipment selection, and comprehensive automation control, Suli Chemical has achieved intrinsically safe production, environmentally compliant emissions, and consistent product output. By leveraging local resources and optimizing factory product planning, the company has facilitated the mutual use of raw materials and energy, maximizing resource value to maintain cost advantages.

Additionally, Suli Chemical actively engages in the formulation of national standards, and its product quality has garnered widespread recognition within the industry.

Mathematical Second Second and Market Outlook

The following factors primarily drive the ongoing growth of the chlorothalonil market:

Strong demand in the Brazilian market: Chlorothalonil has emerged as the fifth most widely used active ingredient in Brazil, securing the second position in the fungicide category and indicating a strong market presence.

Enhanced value in resistance **management:** Globally, the practice of mixing or rotating chlorothalonil with SDHI fungicides is gaining traction. This resistance management strategy not only prolongs the effectiveness of pesticides but also creates new application opportunities

for chlorothalonil, especially in disease control for cotton and corn crops in Brazil.

Accelerated product innovation: As the efficacy of specific-site active ingredients diminishes, the market share of multi-site protective fungicides has seen a substantial rise. The demand for ternary mixed products is steadily increasing, and the development of quaternary mixed products is also gaining traction. These innovative formulations streamline operational processes for producers, improve formulation stability, and significantly mitigate the risks associated with hazardous tank mixtures. The promotion of these new formulation products will further strengthen chlorothalonil's market position.

Market opportunities: While

certain regions have imposed restrictions or bans on chlorothalonil, its primary competitor, mancozeb, is also encountering challenges, including bans in the EU. The

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absence of comparable multi-site protective fungicide alternatives ensures that the demand for chlorothalonil remains robust in key global markets. Furthermore, the relatively lenient regulatory environment in regions such as Southeast Asia and Australia is anticipated to create growth opportunities for chlorothalonil.

Looking ahead, the demand for disease control is expected to rise in light of worsening global climate change. In major agricultural countries, particularly Brazil, rainy and humid weather conditions may heighten the risk of disease outbreaks, underscoring the critical role of chlorothalonil in disease management systems. With rapid advancements in product innovation, the use of chlorothalonil in resistance management and disease control is set to deepen, offering significant development potential in the development of innovative mixtures and the exploration of emerging markets. AP

Abamectin and emamectin benzoate demonstrate strong market performance in 2024, fueled by multiple factors for continued growth potential

Figure 2. Price trends of abamectin and emamectin benzoate from 2022 to 2024

segments of the pesticide market after a period of decline.

According to observations from AgroPages, the recovery of abamectin and emamectin benzoate was not achieved "overnight." Public data shows that at the beginning of 2024, both products had fallen to record lows, with abamectin dropping to RMB350,000 per ton and emamectin benzoate falling to RMB490,000 per ton, marking historical lowest prices (Figure 2). The market selling prices were even below production costs, forcing many companies to shut down some or all of their production lines, which further affected the market performance of these products. However, as the year progressed, several favorable factors began to emerge. Insufficient operating rates, the onset of the traditional application season, and the ongoing "de-stocking" process helped boost domestic demand. Additionally, international orders continued to rise. These combined factors gradually strengthened market demand for abamectin and emamectin benzoate, leading to a price rebound and the start of a continuous upward trend. As of February 2025, the current price for abamectin is RMB 480,000 per ton, and that for emamectin benzoate is RMB650,000 per ton.

If price adjustments represent a rational mechanism for market recovery, then the ongoing price increases are undoubtedly backed by the products' inherent strengths.

In recent years, the rise in pest resistance has significantly diminished the effectiveness of traditional insecticides. Abamectin and emamectin benzoate, characterized by their low toxicity and minimal residual impact, are considered environmentally safe for nontarget organisms, which aligns with the sustainability goals of modern agriculture. Consequently, there has been a growing market demand for these pesticides. Additionally, since the domestic production of chlorantraniliprole, its market trajectory has become apparent. While its significant price drop has somewhat affected the market, it also has highlighted resistance issues. In comparison to traditional insecticides, both abamectin and emamectin benzoate exhibit

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By Nino Wang

bamectin and emamectin benzoate hold significant positions in the pesticide industry, particularly within the insecticide segment.

As a derivative of abamectin. emamectin benzoate not only retains but also enhances the outstanding properties of its predecessor, resulting in significant advancements in the precision and effectiveness of pest control. Currently, these two compounds are used together to combat a variety of pests affecting crops such as cotton, rice, vegetables, and citrus, leveraging their distinct mechanisms of action for targeted control. With their exceptional attributes of broadspectrum effectiveness, low toxicity, and high efficiency, they have become the preferred choice for pest management.

& Prices Remain Strong with a Continuous Upward Trend

Looking back at 2024, the market experienced a downward trend

throughout the year, characterized by cost inversions for bulk varieties and ongoing price declines. By the end of December 2024, the technical material price index was recorded at 72.92 points, reflecting a yearon-year decrease of 9.07%. Out of more than a hundred varieties, 65% experienced price drops, with some seeing reductions exceeding 30%.

Against the backdrop of overall poor market performance, abamectin

and emamectin benzoate emerged as exceptions, maintaining stable prices that demonstrated a consistent upward trend. Specifically, the cost of abamectin technical powder rose by RMB 115,000 per ton, and that of emamectin benzoate technical by RMB 125,000 per ton (Figure 1). This trend not only underscores the product advantages of abamectin and emamectin benzoate but also indicates a recovery in specific

Figure 1. Price trends of abamectin and emamectin benzoate in 2024

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excellent compatibility, creating a synergistic effect when used in conjunction with chlorantraniliprole. This combination not only enhances performance but also optimizes costs, offering a complementary alternative that influences the overall market landscape to some extent.

20 Product Registration: Notable Growth in Demand for Combinations

According to the China Pesticide Information Network, there are currently a substantial number of valid registration certificates for abamectin and emamectin benzoate in China, totaling around 3,321 and involving numerous companies. It is noteworthy that the number of certificates for technical grades has remained stable since 2018. Recent inquiry reveals that the increase in registration certificates for abamectin and emamectin benzoate in recent years primarily pertains to formulated products, especially combination formulations.

The China Pesticide Information Network reports that there are 1,758 combination formulations containing abamectin or emamectin benzoate. Among these, combinations with chlorantraniliprole and cyantraniliprole have emerged as the leading products for managing rice leaf folders and stem borers in rice cultivation.

Additionally, abamectin is a widely

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utilized acaricide in citrus farming, with 294 insecticide/acaricide products formulated alongside compounds such as etoxazole, spirodiclofen, propargite, pyridaben, spirotetramat, cyflumetofen, and fluazinam for controlling citrus red mites. Moreover, over the past two years, new combinations of abamectin and fluopyram have been registered for nematode control, and abamectin is now being combined with new patented pesticides targeting rootknot nematodes in tomato and cucumber crops.

China is the Sole Producer of Abamectin and Emamectin Benzoate in the World

Currently, China is the sole producer of abamectin and emamectin benzoate in the world, catering to global processing and application needs. Over ten manufacturers of abamectin and emamectin benzoate exist, including Ningxia Taiyicin, Qilu Pharmaceutical, Xingbai, and Limin Group (Table 1). An analysis by AgroPages regarding the global export landscape for abamectin and emamectin benzoate technicals reveals that China maintains a dominant position in the international market for these compounds. In 2024, the total global import volume of both substances experienced significant growth, particularly with a remarkable increase in the import volume of emamectin benzoate technical compared to 2023.

Market feedback indicates that since 2023, there has been a favorable trend in the global destocking of abamectin and emamectin benzoate. Both international orders and export volumes have been steadily rising, reflecting a sustained increase in market demand for these two technicals.

Leading Companies Consistently Investing in Innovation to Achieve Breakthroughs and Maintain Their Leading Position

The production process for abamectin and emamectin benzoate technicals requires exceptionally high standards, especially during the fermentation stage, where precise control of critical parameters is essential. Any mismanagement can result in instability and susceptibility to degradation of the technicals, ultimately compromising product quality. Furthermore, some companies face challenges with purification technology and synthesis methods, which hinder their ability to enhance the overall quality of their products.

In recent years, several companies have achieved significant breakthroughs in the production technology of abamectin and emamectin benzoate.

Ningxia Taiyicin has been a prominent player in the fermentation industry for over 30 years. Through years of research and process innovation, the company has mastered the essential technologies required for the production of non-degradable abamectin and emamectin benzoate. Taiyicin has established itself as a leading enterprise with a comprehensive industrial chain for these products, ensuring consistent quality and remarkable production capacity.

Table 1. Abamectin and emamectin benzoate production capacity in China

Manufacturer	Abamectin (t/a)	Emamectin Benzoate (t/a)
Taiyicin Biotech	2000	1500
Qilu Pharmaceutical	4000	2000
Limin Group Co., Ltd.	1100	1000
Xingbai Agrochem Group	1200	800
Jiangsu Fengyuan	100	-
Zhejiang Biok	150	-
Jinxianda	-	800
Hailir	-	500
Total	8550	6600

In terms of process innovation, Taiyicin has developed a unique 3K technology that focuses on optimizing sugar levels, time, and metabolic processes. This technology effectively addresses the industry's challenge of abamectin and emamectin benzoate's susceptibility to degradation, achieving significant advancements in the sustainable development of these two products.

Qilu Pharmaceutical is a leading domestic producer of abamectin and emamectin benzoate. The company has significantly enhanced production efficiency and product quality through the application of advanced fermentation technology and full-process fermentation control measures. Qilu Pharmaceutical is committed to continuous technological upgrades and is capable of producing high-purity abamectin and emamectin benzoate technicals with superior α -values. For instance, the B1a content in their abamectin products exceeds 90%, which translates to at least a 10% increase in efficacy at the exact dosage. The core emamectin benzoate product, emamectin benzoate 5% ME, utilizes innovative nano-formulation technology, ensuring it remains clear when mixed with water and facilitating faster penetration and significantly enhanced efficacy.

Limin Group Co., Ltd. is one of the pioneering companies in China dedicated to the industrial development of abamectin and the first domestic enterprise to achieve

large-scale production of emamectin benzoate. Its subsidiary, Veyong, employs advanced breeding and mutation techniques to optimize and select high-yield, stable strains. Additionally, it utilizes a full-process fermentation control technology to produce high-activity, visually appealing technical-grade abamectin, which is subsequently used to manufacture high-quality emamectin benzoate characterized by excellent purity and stability, making it suitable for a variety of formulations. Limin Group Co., Ltd. also plays a significant role in drafting national standards for abamectin and emamectin benzoate and is recognized by the Ministry of Agriculture and Rural Affairs as an authorized manufacturer of reference standards. The company benefits from extensive ICAMA resources and a global registration network.

40 Future Outlook

Abamectin and emamectin benzoate, as bulk products in the pesticide industry, have undergone a transformative shift in China from a fragmented market with numerous players to an oligopoly. This transition has significantly increased the industry concentration and facilitated industrial upgrading, further strengthening the market position of leading companies. By consistently investing in technological innovation, these top enterprises have enhanced

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both the quality and stability of abamectin and emamectin benzoate while also lowering production costs. Furthermore, they have proactively expanded into new application areas and market space, steering the industry towards more advanced and environmentally friendly development.

In 2024, despite facing challenges like certain products failing quality inspections in the abamectin and emamectin benzoate sector, companies such as Taiyicin, driven by strong market demand, continued to produce high-quality products by leveraging core production advantages such as non-degradable product technology and maintain a significant share of the market. Product prices have been steadily increasing, and the market outlook remains optimistic. Overall, due to their outstanding properties and the ongoing growth in market demand, the prices of abamectin and emamectin benzoate are anticipated to keep rising.

Looking ahead, with continuous technological advancements and gradual improvements in industry regulations, abamectin, and emamectin benzoate are poised to play an increasingly vital role in enhancing agricultural production and fostering the sustainable development of the pesticide industry. The sector is anticipated to evolve more healthily and stably, offering strong support for the green and efficient development of global agriculture.

Jiangsu Repont Agrochemical Co., Ltd. REPONT

Jiangsu Report Agrochemical Co., Ltd. established in 2000, with the registered capital of CNY 129.8 million. It has 800 employees, of which R&D and technicians is about 30%. We have two production bases: 1) Rudong Base : covers an area of 13.33 hectares and building area of 56,000 m². 2) Gansu Base(Gansu Kombass Biotechnology Co., Ltd.) covers an area of 31.7 hectares and building area of 70,000 m².

We are ISO9001, ISO14001 and ISO45001 approved company, with our own intermediate, technical synthesis, formulation and package production line. The company has listed in top 100 Agrochemical sales enterprises in China for several consecutive years. We sincerely hope to cooperate with well-known enterprises at home and abroad to provide more and better agrochemical products.

Product Catalog:

*ICAMA registration in progress

Product name	Formulation type	GLP
Amidosulfuron	97% TC, 50% WG	5B (2025), P&C (2025), 6 Pack (2025), Ames (2025), Micronucleus test (2025)
Bensulfuron-methyl	97% TC, 60% WG	5B (Agrifor), P&C (Agrifor&Intox), 6 Pack (Intox), Ames (Intox)
Bensulfuron-methyl 4% + Pretilachor 36%	40% WP	
Bensulfuron-methyl 3% + Quinclorac 33%	36% WP	
Bispyribac-sodium	95% TC, 10% SC, 40% SC, 20% WP	N/A
Bentazone	97% TC, 480g/L SL, 560g/L AS	5B (Agrifor), P&C (Agrifor), 6 Pack (plan), Ames (plan), Micronucleus test (plan)
Chlorimuron-ethyl	98% TC, 25% WP, 50% WP, 25% WG, 75% WG	5B (SwRI), P&C (SwRI)
Carfentrazone-ethyl	92% TC, 95.5%TC, 10% WP, 240g/L EC	5B (Achiever), P&C (Achiever), 6 Pack (Intox), Ames (Intox), Micronucleus test (Intox)
2-methyl-4-chlorophenoxy acetic acid 66.5% + Carfentrazone-ethyl 4%	70.5% WP	
Ethoxysulfuron	97% TC, 15% WG	5B (2025), P&C (2025), 6 Pack (Intox), Ames (2025), Micronucleus test (2025)
Flazasulfuron	97% TC, 25% WG	5B (Rotam), P&C (Rotam), 6 Pack (VBS), Ames (VBS), Micronucleus test (VBS)
Florasulam	98% TC, 50g/L SC	5B (2025), P&C (2025), 6 Pack (2025), Ames (2025), Micronucleus test (2025)
Flucarbazone-sodium	95% TC, 70% WG	5B (Rotam), P&C (Rotam), 6 Pack (VBS), Ames (VBS), Micronucleus test (VBS)
Flumetsulam	98% TC, 80% WG	5B (2025), P&C (2025), 6 Pack (2025), Ames (2025), Micronucleus test (2025)
Halosulfuron-methyl	98% TC*, 75% WG*	5B (Achiever), P&C (Achiever), 6 Pack (Intox), Ames (Intox), Micronucleus test (Intox)
lodosulfuron-methyl sodium	91% TC, 5% WG	5B (Rotam), P&C (Rotam), 6 Pack (VBS), Ames (VBS)
Metsulfuron-methyl	98%TC*, 95% TC*, 20%WG, 60%WP,60%WG	5B (SYRICI), P&C (SYRICI), 6 Pack (SYRICI), Ames (SYRICI), Micronucleus test (SYRICI)
Mesosulfuron-methyl	95% TC, 30g/L OD	5B (2025), P&C (2025), 6 Pack (2025), Ames (2025), Micronucleus test (2025)
Metribuzin	97% TC, 70% WP, 70% WG, 75% WG, 480g/L SC	5B (Chemservice), P&C (Chemservice), 6 Pack (Intox), Ames (Intox), Micronucleus test (Intox)
Nicosulfuron	95% TC, 40g/L OD, 75% WG	5B (Rotam), P&C (Rotam), 6 Pack (VBS), Ames (Rotam), Micronucleus test (Rotam)
Nicosulfuron 2% + Propisochlor 20% + Atrazine 20%	42%OD	
Oxadiazon	95% TC, 250g/L EC	5B (Agrifor), P&C (Agrifor), 6 Pack (2025), Ames (2025), Micronucleus test (2025)
Oxadiazon 10% + Butachlor 50% EC	EC	
Pyrazosulfuron-ethyl	98% TC, 10%W, 60%WG*	N/A
Quizalofop-P-ethyl	98% TC, 5% EC, 10% EC	5B (Rotam), P&C (Rotam), 6 Pack (2025), Ames (Rotam), Micronucleus test (Rotam)
Rimsulfuron	99% TC,25% WG	5B (Rotam), P&C (Rotam), 6 Pack (VBS), Ames (Rotam), Micronucleus test (VBS)
Rimsulfuron 17% + Thifensulfuron 17%	34% WG	
Sulfometuron-methyl	95% TC*, 75% WP, 75% WG	5B (2025), P&C (2025), 6 Pack (2025), Ames (2025), Micronucleus test (2025)
Sulfentrazone	95% TC, 50% SC	5B (2025), P&C (2025), 6 Pack (2025), Ames (2025), Micronucleus test (2025)
Tribenuron-methyl	95% TC, 10% WP, 75% WG	5B (Achiever), P&C (Achiever&Intox), 6 Pack (Intox), Ames (Intox)
Thifensulfuron-methyl	97% TC, 15% WP, 75% WG	5B (Rotam), P&C (Intox), 6 Pack (Intox), Ames (Rotam)
Thidiazuron	98% TC , 50% WP, 80% WP, 80% WG, 0.1% SL	5B (Rotam), P&C (Rotam), 6 Pack (Intox), Ames (Intox), Micronucleus test (Intox)
Thidiazuron 360g/L + Diuron 180g/L	360g/L SC	
Thidiazuron 75% + Diuron 6%	81% WP	
Cloransulam-methyl	98% TC, 84% WG	5B (Achiever), P&C (Achiever), 6 Pack (Intox), Ames (Intox), Micronucleus test (Intox)
Diclosulam	95% TC*, 84% WG*	5B (2025), P&C (2025), 6 Pack (2025), Ames (2025), Micronucleus test (2025)
Triflusulfuron-methyl	95% TC*, 50% WG*	5B (2025), P&C (2025), 6 Pack (2025), Ames (2025), Micronucleus test (2025)
Thiencarbazone-methyl	98% TC*	5B (2025), P&C (2025), 6 Pack (2025), Ames (2025), Micronucleus test (2025)

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Formulation Products

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Introduction

Shandong Binnong Technology Co., Ltd, founded in 2003, is a national high-tech enterprise inChina, integrating R&D, Production, Sales and Plant Protection Services. Three production bases have been built in Binzhou Binbei Industrial Park and Zhanhua Binhai Industrial Park in ShandonoProvince, Lanzhou industrial park in Gansu Province.

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Navigating patent expiration and market transformation:

Chlorantraniliprole as a case study in technological advancements by Chinese agrochemical companies

By Annie Feng Editor at AgroPages AnnieFeng@agropages.com WhatsApp: +86 15653248912

hlorantraniliprole is a revolutionary product in the global insecticide market. Since its introduction in 2008, it has maintained a leading position due to its exceptional systemic properties and broad-spectrum insecticidal effectiveness. However, with the expiration of its core patent in China in August 2022, the market experienced significant changes. Chinese agrochemical companies, capitalizing on their accumulated technical expertise and industrial chain advantages, swiftly evolved from "followers" to "leaders." This article explores the trajectory of chlorantraniliprole in the Chinese market, moving from a patentprotected monopoly to market liberation, and examines how Chinese firms addressed technological barriers through independent innovation, ultimately reshaping the global chlorantraniliprole industry ecosystem. Furthermore, it discusses the implications of this case for the advancement of China's agrochemical industry and provides insights into future prospects.

V Patent protection and market monopoly period

Chlorantraniliprole is a novel anthranilic diamide insecticide discovered by DuPont in 2000. Since its introduction to the market in 2008, it quickly became a star product due to its high insecticidal effectiveness. Its core technical innovation lies in its distinct chemical structure and mechanism of action, which effectively inhibits insect ryanodine receptors, providing rapid and longlasting control of lepidopteran pests. This breakthrough fueled its swift ascent in the global pesticide market,

Chlorantraniliprole

especially in the pest management of key crops such as rice, corn, and vegetables.

DuPont increased its market share through strategic partnerships with companies such as Bayer and Syngenta. In 2017, FMC acquired DuPont's chlorantraniliprole business, along with its associated intellectual property rights. FMC made significant investments in the research, development, and commercialization of the product, launching several brands in addition to Coragen. Public data shows that global sales of chlorantraniliprole rose from \$1.402 billion in 2017 to \$1.93 billion in 2022, reinforcing its status as the leading insecticide worldwide and highlighting its vital role in the global crop protection market.

Chlorantraniliprole is currently registered in numerous countries, including the U.S., Canada, Brazil, India, China, Türkiye, and Japan. It is mainly used on fruit crops such as grapes, pome fruits, and walnuts; vegetable crops like lettuce, tomatoes, and peppers; as well as field crops including

cotton, soybeans, and rice. Chlorantraniliprole entered the Chinese market around 2008 and was first registered by FMC in China in 2010. Its exceptional pest control effectiveness quickly made it popular in regions that grow rice, corn, and vegetables. According to third-party data, global sales of chlorantraniliprole in 2023 reached approximately 2,600 tons, with major markets including Brazil (36%), India (20%), the U.S. (12%), China (10%), and Argentina (4.6%).

Before August 13, 2022, the chlorantraniliprole was protected by a patent for technical material compound. During this period, DuPont and FMC held a dominant position in the market due to their patent advantages. For this breakthrough patented technology, FMC has issued several intellectual property statements regarding chlorantraniliprole. It's important to note that the expiration date of August 13, 2022 applied solely to the compound patent for chlorantraniliprole. Other manufacturers are still prohibited from producing chlorantraniliprole technical materials using FMC's patented intermediates and synthesis processes without authorization, as this would constitute patent infringement. This strategy of comprehensive patent protection is common in the pesticide industry, where comprehensive patent coverage of compounds, intermediates, and processes maximizes the market exclusivity.

During the patent protection period, the high price of chlorantraniliprole hindered its widespread adoption in the Chinese market. However, its outstanding pest control effectiveness ensured its strong presence in the highend market. Due to a technological monopoly and consistent quality, the product was priced at a premium, reaching RMB 3 million per ton when it first entered the Chinese market. During this period, the Chinese chlorantraniliprole market was primarily dominated by a few foreign companies, with limited opportunities for domestic firms to enter, resulting

in a relatively stable market structure. Simultaneously, patent protection

spurred domestic companies to boost their R&D investments, setting the stage for future technological breakthroughs and market entry. During the patent protection period, several domestic firms began their preparations by conducting early efficacy trials and establishing supply chains for chlorantraniliprole technical materials and intermediates, thereby positioning themselves for competition in the market after the patent expires.

Market changes after the patent expired

On August 13, 2022, the compound patent for chlorantraniliprole in China (CN100391338C) expired, triggering profound changes in the market landscape. Chinese companies rapidly scaled up their production capacity, utilizing years of technological advancements and cost advantages. This sparked a transformation across the entire industrial chain, from the production of technical materials to the sale of end products. Manufacturers of technical materials competed to boost their capacity, while downstream formulation companies eagerly registered new products. End-market sales also adopted differentiated marketing strategies, injecting unprecedented vitality into the industry. In early October 2022, Youdao Chemical became the first chlorantraniliprole manufacturer in China with complete certificates, fully independent intellectual property rights and complete industrial chain, marking a significant milestone in China's technological independence in this sector. As market demand surged, the number of product registrations in China continued to rise each year, establishing chlorantraniliprole as a key player in

crop protection.

According to data from the China Pesticide Information Network, as of February 24, 2025, a total of 510 chlorantraniliprole products have been registered in China. This

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includes 44 technical materials, 116 single formulations, and 350 combined formulations. The registered formulation types comprise aqueous suspension concentrate (SC), oil dispersion (OD), water-dispersible granule (WG), and aqueous capsule suspension-aqueous suspension concentrate (SC-CS). The growth in technical material registrations has been impressive: with 8 in 2022, 9 in 2023, and 24 in 2024. Key registrants of technical materials include Youdao Chemical, Lier Chemical, Flagchem, Nanjing Red Sun, and Synwill Co., Ltd. and other leading agrochemical companies, highlighting the rapid ascent of Chinese companies in this field.

Capacity expansion and technological breakthroughs

As of February 2025, based on incomplete data from government environmental assessment websites and company announcements, China's declared production capacity for chlorantraniliprole technical materials has surpassed 130,000 tons (Table 1). Major participating companies include Youdao Chemical (11,000 tons/year), Hubei Yilihong Chemical (30,000 tons/year), Zhejiang Zhongshan Chemical (20,000 tons/ year), Inner Mongolia Miraculous Crop Science (20,000 tons/year), Anhui Guangxin Agrochemical (7,000 tons/ year), FMC (Shanghai) (6,000 tons/ year), and Nanjing Red Sun (2,000 tons/year). This indicates the pesticide industry holds a generally optimistic outlook regarding the market potential for chlorantraniliprole.

Currently, the industrial production of chlorantraniliprole primarily starts with pyrazole acid, which is coupled with an aromatic ring to form benzoxazinone, followed by hydrolysis with methylamine. Key intermediates involved in this synthesis process include 2,3-dichloropyridine (2402-77-09), 3-methyl-2-nitrobenzoic acid (5437-38-7), methylamine (74-89-5), and diethyl maleate (141-05-9). A stable supply of these intermediates is essential for lowering production

Table 1: Major Participating Companies and Their Production Capacities

No.	Company	Capacity (tons/year)
1	Hebei Di An Nong Biotechnology Co., Ltd.	2000
2	Inner Mongolia Yongtai Chemical Co., Ltd. Parent company: Zhejiang Yongtai Technology Co., Ltd	500
3	Inner Mongolia Zhonggao Chemical Co., Ltd. Parent company: Zhejiang Zhongshan Chemical Industry Group Co., Ltd.	20000
4	Inner Mongolia Miraculous Crop Science Co., Ltd Parent company: Lianyungang Liben Crop Science Co., Ltd	20000
5	Liaoning Longtian Chemical Technology Co., Ltd	1000
6	Liaoning Jinhui Biochemistry Co., Ltd	1500
7	FMC (Shanghai) Agricultural Sciences Co., Ltd.	6000
8	ABA Chemicals (Nantong) Limited Parent company: Lianyungang Liben Crop Science Co., Ltd	2000
9	Huaian Guorui Chemical Co., Ltd. Parent company: Jiangsu Flag Chemical Industry Co., Ltd.	1500
10	Zhejiang Avilive Chemical Co., Ltd.	500
11	Anhui Guangxin Agrochemical Co., Ltd.	7000
12	Anhui Huilong RMF Biotechnology Co., Ltd Parent company: Anhui Huilong Group RMF Agrochemical Co., Ltd.	2000
13	Jiangxi Huihe Chemical Co., Ltd. Parent company: Jiangxi Zhengbang Crop Protection Co., Ltd.	2000
14	Rainbow Agro	1000
15	Shandong Eshung Industrial Co., Ltd.	5000
16	Shandong Youdao Chemical Co., Ltd. Parent company: Himile Chemical Technology (Shandong) Co., Ltd.	11000
17	Dezhou New Power Fine Chemical Co., Ltd. Parent company: Shandong New Power Chemical Group	1000
18	Changqing (Hubei) Biotechnology Co., Ltd. Parent company: Jiangsu Changqing Agrochemical Co., Ltd.	1000
19	Synwill Yichang Chemical Co., Ltd. Parent company: Synwill Co., Ltd.	1000
20	Hubei Zhongxun Thinkgreen Technology Co., Ltd. Parent company: Guangdong Zhongxun Agri-science Corporation	2000
21	Jingzhou Sancaitang Chemical Technology Co., Ltd. Parent company: Lier Chemical Co., Ltd.	5000
22	Hubei Yilihong Chemical Co., Ltd.	30000
23	Chongqing Huage Biochemical Co., Ltd. Parent company: Nanjing Red Sun Co., Ltd.	2000
24	Shaanxi Nuozheng Biotechnology Co., Ltd. Parent company: Shaanxi Meibang Pharmaceutical Group Co., Ltd.	2000
25	Hailir	3000
26	Gansu Zhongmaotou Chemical Co., Ltd.	1000
27	Jingmen Jinxianda Biotechnology Co., Ltd.	1000

Data source: Public environmental assessment announcements from companies, subject to actual data

costs and improving market competitiveness.

Youdao Chemical has become the first Chinese company to possess fully independent intellectual property rights and a complete industrial chain for chlorantraniliprole through technological innovation and capacity expansion. The company implemented a fully continuous flow process and equipment developed independently by Himile Group, which reduced the project construction period from 18 months to just 7 months, significantly enhancing the construction efficiency. This fully automated system ensures stable operations, achieving a product active ingredient content of \geq 98% with consistent quality. Currently, Youdao Chemical's production capacity for the chlorantraniliprole technical material has reached 11,000 tons, making it the largest global producer with the most comprehensive industrial chain. Moreover, its reliable supply of the key intermediate 2-nitro-3-methylbenzoic acid further lowers production costs and boosts the market competitiveness of products. In March 2024, Youdao Chemical's chlorantraniliprole technical material received registration approvals in Australia and the EU, establishing a

solid foundation for its expansion into international markets.

Nanjing Red Sun has successfully established a complete industrial chain for chlorantraniliprole through years of research and development, achieving a significant breakthrough in the production of the key intermediate 2,3-dichloropyridine. This advancement has given Red Sun a unique global competitive advantage. Currently, the company boasts an annual production capacity of 9,000 tons of 2,3-dichloropyridine, with projected revenues exceeding RMB 6.5 billion and profits surpassing RMB 1.5 billion by 2027. After a decade of research, Red Sun's technical team has developed a fully independent synthesis process that offers several advantages, including a complete industrial chain, cost efficiency, and environmental sustainability. This process not only enhances production efficiency but also allows for the full-cycle recycling of by-products, aligning with sustainable development principles. With its comprehensive industrial chain and technological advantages, Red Sun has secured a strong competitive edge in the chlorantraniliprole market, laying a solid foundation for its long-term

Figure 1. Chlorantraniliprole Price Trends (Data source: Sino-Agri Leading)

global growth.

Zhejiang Zhongshan Chemical began investing in chlorantraniliprolerelated projects in 2022 and has since developed a complete network of upstream and downstream industrial resources. Since 2024, the company has introduced a variety of chlorantraniliprole formulation products for different applications, expanding into both domestic and international markets. This comprehensive industrial chain strategy has become increasingly prevalent in the post-patent market competition for chlorantraniliprole, serving as a key method for companies to gain a competitive advantage.

Declining prices and intensified market competition

When chlorantraniliprole was first introduced to the Chinese market in 2008, its technical material price reached as high as RMB 3 million per ton. However, following the expiration of the core patent and due to intensified market competition, prices have seen a significant decline. By the end of 2024, the price of

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chlorantraniliprole technical material had fallen from RMB 310,000 per ton at the beginning of the year to RMB 200,000 per ton, a decrease of RMB 110,000 per ton, or a cumulative annual decline of 35.48% (Figure 1). This sharp drop in price was largely driven by, after the patent expired, the influx of new companies into the market, rapid capacity expansion, and a surge in product registrations, all of which contributed to intensified competition.

As of late February 2025, the price of chlorantraniliprole technical material rose to RMB 210,000 per ton due to a tight supply resulting from shortages of intermediates and low operating rates. Meanwhile, competition in the formulation market continues to be intense.

Global supply landscape

China has emerged as a leading exporter of chlorantraniliprole on the global stage. As shown in Figure 2, from 2021 to 2024, China's exports of technical materials consistently made up a substantial share of global exports, with a notable increase following 2022. By 2024, China accounted for 58% of global technical material exports. The U.S. also plays a key role in the technical material export market, with major international companies such as FMC and Albaugh developing the product domestically.

In India, the import volume of chlorantraniliprole technical materials has been declining year by year since it exceeded 1,100 tons in 2021 (as shown in Figure 3). Following the expiration of the patent in 2022, Indian companies began launching locally produced generic chlorantraniliprole, which has facilitated import substitution. By 2023, India had virtually halted its imports of technical materials, indicating the establishment of local production capabilities. Currently, in addition to FMC, several companies such as Syngenta, Corteva, Adama, NATCO, BAL, Dharmaj Crop Guard, and GSP Crop Science are actively developing the Indian market for

Figure 2. Global Chlorantraniliprole Exports from 2021 to 2024

chlorantraniliprole. However, India continues to import intermediates like K acid (3-bromo-1-(3-chloro-2pyridyl)-1H-pyrazole-5-carboxylic acid), with major importers including GSP Crop Science Private Limited, Best Crop Science Private Limited, and Willowood Industries Private Limited.

Resistance issues and technological innovation

As chlorantraniliprole is used globally, the issue of pest resistance has become more pronounced. This challenge has prompted the industry to seek innovative solutions, such as new formulation type, the creation of combination products, and the

exploration of new crop applications.

To tackle resistance challenges, the industry began exploring new formulation types, such as nano-formulations and granules. Nano-formulations can enhance the absorption efficiency and effectiveness of pesticides, while granules hold significant promise for underground pest management and drone applications. These innovations not only boost product efficacy but also help delay the development of resistance and extend the lifecycle of products. Currently, the registered formulation types of chlorantraniliprole have expanded beyond aqueous suspension concentrate (SC), granule (GR), water dispersible granule (WG), oil dispersion (OD), and flowable

concentrate for seed treatment (FS) to include ultra-low volume concentrate (UL), micro-emulsion (ME), and aqueous capsule suspension-aqueous suspension concentrate (SC-CS).

As a low-toxicity, high-efficacy insecticide, chlorantraniliprole combination products have become a mainstream choice for registration in the market. Chlorantraniliprole can be combined with various classes of insecticides, including organophosphates, carbamates, and insect growth regulators. Common combination partners include lambdacyhalothrin, chlorfenapyr, abamectin, emamectin benzoate, thiamethoxam, clothianidin, pymetrozine, indoxacarb, monosultap, lufenuron, cyfluthrin, deltamethrin, methoxyfenozide, dinotefuran, imidacloprid, triflumezopyrim, spinosad, and diflubenzuron.

In terms of agricultural applications, chlorantraniliprole has made significant strides over the past two years. In December 2022, it was registered for the first time for use on spinach. In May 2023, it received its initial registration for use on pitaya, flowering Chinese cabbage, and sorghum. In July, 2023, it was approved for the first time to combat fall webworms. August 2023 saw its first registration for carrots to control cutworms. Moving into March 2024, it was registered for the first time on zucchini to manage Diaphania indica, and in the same month, it also received its first approval for tea plants to address Ectropis obliqua. Most recently, in January 2025, it was authorized for the first time to control grassland grasshoppers. These "firsttime" registrations primarily pertain to economically significant fruit and vegetable crops, suggesting that the next growth phase for chlorantraniliprole may concentrate on the economic crop market.

V Future prospects and industry insights

The development trajectory of chlorantraniliprole exemplifies the typical progression of a blockbuster insecticide as it transitions from patent-protected monopoly to market liberalization. This case demonstrates how originator companies established market barriers through robust patent strategies and how Chinese companies rapidly captured market share by leveraging technological innovation and cost advantages following patent expiration. The transition from patent protection to market liberalization has

brought about significant changes within the industry:

Patent-protected monopoly **period:** The originator company FMC (formerly DuPont) established comprehensive protections through the core compound patent and auxiliary process patents, with technical material prices as high as RMB 3 million per ton and the market dominated by a few foreign companies.

Technological preparation **period:** Domestic companies proactively positioned themselves ahead of patent expirations, with companies like Youdao Chemical and Red Sun making early technological breakthroughs and establishing complete industrial chains to prepare for competition once the patent expired.

Market liberalization period:

After the core patent expired on August 13, 2022, Chinese companies quickly achieved technical material registrations and expanded their production capacities. This resulted in a dramatic price drop to RMB 200,000 per ton, with domestic technical materials capturing over half

of the global market share.

This transformation offers several insights: Technological innovation is the core of longterm competitiveness; market opportunities derived from patent expiration require early preparation; industrial chain integration is a key competitive strategy in the post-patent era; and formulation innovation and differentiated marketing are effective ways to address homogeneous competition.

Despite ongoing challenges such as overcapacity, declining prices, and regulatory risks, the chlorantraniliprole industry continues to offer substantial potential. Innovative formulation technologies, a broader array of crop registrations, and the emergence of domestic companies in international markets are paving new pathways for this blockbuster insecticide. This trajectory from patent-protected monopoly to market liberalization not only reshapes China's competitive position in the global agrochemical sector but also provides valuable experience for other pesticide varieties approaching patent expiration.

The chlorantraniliprole case clearly delineates the market lifecycle of a blockbuster insecticide product and illustrates how Chinese agrochemical companies shift from a follower role to a leadership position in the post-patent era, offering important references for innovative development within the agricultural chemical industry. AP

Biochemical pesticides:

The frontier development in China's industry and Beyond Limits Manufacturing

By Joyce Wang Editor at AgroPages

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he threat of pests to crop production is enormous. According to FAO, if pesticides are not used, the yield reduction rate caused by insect pests and diseases can be up to 53.4%, and the yield reduction rate caused by weeds can be up to 21.3%.

In China, if pesticides and other plant protection approaches are not applied, the annual yield loss is more than 15% of the total yield. Biochemical pesticides, as a sustainable and efficient type of pesticides, have gradually become a research hotspot, and their development in China has also attracted much attention.

Definition and **Classification of Biochemical** Pesticides

China has no unified definition of biopesticides, and China's current regulations on pesticide registration do not have a clear definition of biopesticides either. However, in 2017, China defined biochemical pesticides as: biochemical pesticides should be natural compounds; if

they are artificially synthesized, their structure should be the same as natural compounds. For example, the molecular structure of the main component of the synthetic compound is the same as the molecular structure of the naturally occurring analog. Since 2019, biochemical pesticides have been added to the classification of biopesticides in the Chinese regulation (previously, there were only microbial pesticides and botanical pesticides in the biopesticides, and agricultural antibiotics are still not included in the scope of biopesticides

since the regulation adjustment in

biochemical pesticides in China

Although the development of

started late, it has excellent potential.

As of July 31, 2024, there were 152

Agriculture and Rural Affairs (MARA),

active ingredients of biopesticides

registered by the Ministry of

of which biochemical pesticides

account for about 36%, microbial

pesticides account for about 45%,

and botanical pesticides account

for about 20% (Figure 1). Although

the number of active ingredients in

biochemical pesticides is relatively

2019.).

small, their registered products account for the highest proportion in biopesticides.

The biochemical pesticides registered in China include five categories: insect growth regulators, semiochemicals, plant growth regulators, plant elicitors, and others, with a total of 54 active ingredients (as of July 31, 2024). Among them, there are only two insect growth regulators registered as biochemical pesticides: muscalure and S-methoprene; there are 15 active ingredients of semiochemicals, which are all insect sex pheromones, to control Spodoptera frugiperda, Chilo supperssalis (Walker), Spodoptera litura, Ceratitis capitata, Apolygus lucorum, Grapholitha molesta Busck etc.; plant growth regulators include 26 active ingredients, such as gibberellic acid and indolebutyric acid; plant elicitors include 10 active ingredients, such as harpin protein and lentinan; in addition, there is cholecal ciferol. The proportion of the active ingredients in the five categories of biochemical pesticides is shown in Figure 2.

Current Status of Biochemical Pesticide Industry

The top five biochemical pesticide active ingredients on China's production are gibberellic acid, oligosaccharins, brassinolide,

Others

Figure 2. Proportion of active ingredients in biochemical pesticides registered in China (as of July 31, 2024)

Table 1. Number of products registered in China (Source: ICAMA)

erellic acid	290
saccharins	135
ssinolide	272
contanol	39
ed brassinosteroid	63

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triacontanol, and 14-hydroxylated brassinosteroid, accounting for 71% of biochemical pesticides.² Table 1 shows the number of registered biochemical pesticide products containing these ingredients in China (as of February 18, 2025).

The biochemical pesticide market is highly competitive, but some companies with innovations have strengthened their market position.

Pherobio Technology Co., Ltd. supplies the country's first registered Chilo supperssalis (Walker) pheromone products in China. This product slowly releases high concentrations of the sex pheromones in the field to cover up the location of female insects, making it difficult for the males to find the females to mate, which can significantly reduce the oviposition and the pest population. The current products include slow-release packets, dispensers, and others. The packet is the only slow-release packet independently developed in China which has a lasting efficacy of more than 4 months. It is very easy to apply the products, reducing the use of pesticides and saving labor costs. Its integrated control solution for rice with this Chilo supperssalis (Walker)

pheromone as its core technology was listed in the key promotional technologies by MARA in 2024.

Indolebutyric acid produced by Zhengzhou Zhengshi Chemical Co., Ltd. is characterized by being environmentally friendly, high purity, and high efficiency. The company uses enzyme-catalyzed directional synthesis technology and continuous flow microchannel reactors to achieve the purity of indolebutyric acid \geq 98.5% (the industry generally has a purity of 95%). It has been certified by HPLC and GC-MS. The gel filtration chromatography technology they use can reduce isomeric impurities and increase yield by 12%. It also can reduce 30% energy consumption compared to traditional processes. The enzyme-catalyzed directional synthesis technology significantly improves the efficacy and stability of the technical product. Zhengshi Chemical has replaced benzene solvents with bio-based solvents and built a recycling production system, achieving 98.7% solvent recycled, reduced industrial emission by 75%, and has been certified by REACH authentication and OECD ecotoxicity testing. The entire process, from raw material to end users' application, is

traceable and in line with FAO/WHO standards. Their indolebutyric acid has been exported to more than 12 countries in Southeast Asia, South America, and other regions.

Beyond Limits Manufacturing Changes Biochemical Pesticide Production

Biochemical pesticides have the advantages of high safety (no/low toxicity), low dosage (high efficacy), ecological safety (low residue), and precise biological regulation. However, they also face some challenges in their mass production, complex ingredients, inconsistent quality, and solubility. These problems need to be solved through molecular design, formulation technology, manufacturing processes, and application methods.

In September 2018, China created the concept of "Beyond Limits Manufacturing." This process uses femtosecond lasers to manufacture new chemical or biological components, making component discovery and production more efficient. ³ East China Normal

University has built an ultrafast laser system and created a microfluidic chip. East China University of Science and Technology evaluated the design.

In traditional chemical production, the molecules involved in the reaction are in a disordered state in large pipes or other large reactors, and it isn't easy to improve their efficiency of momentum transfer, heat transfer, mass transfer, and chemical reaction (three transferences & one reaction). However, the principle of Beyond Limits Manufacturing is that when the diameter of the pipe that transports the reactant becomes thinner at the micron level, especially as thin as about 200 nanometers, the molecules can only move forward in the same posture due to the narrow space (Figure 3). By changing the pipe environment, different chemical molecules can meet in the micro/ nano space in the posture that is most suitable for the "three transference & one reaction." In this way, the reaction condition is milder, the reaction rate is greatly improved, and the product purity is higher, making the manufacturing more energysaving and eco-friendly.

Beyond Limits Manufacturing is of great significance to the biochemical pesticide industry and even to the entire process industry. It will subversively change the macroscopic form of traditional industries through large-scale miniaturization and integration at the micro/nanoscale. It is similar to the computers that have evolved from behemoths covering an area of 170 m² and weighing 30 tons to current wearable ones with performance increased by hundreds of millions of times. Chemical synthesis will also evolve from industrial parks to continuous flow microreactors and even micro/ nanodevices. ⁵ This will not only bring about a significant improvement in productivity but also lead to a more sustainable and low-carbon footprint production.

Beyond Limits Manufacturing is the key to promoting the industry to enter the quantum era. With the emergence of the second quantum revolution and artificial intelligence

Figure. 3. Schematics for the evolution of the flow reaction in distinct flow environment. The color distribution in the flow environment represents the concentration distribution. (a) On a flat plane. (b) In a macro-scale tube (>2000 μ m). (c) In a micro-scale channel (0.2–2000 μ m). (d) In a nano-scale channel (<0.2 μ m).

(AI), the electronics industry has approached this era, and the process industry is also looking for opportunities to enter. Beyond Limits Manufacturing enables humans to manipulate different particles at the micro/nanoscale and improve reaction efficiency and product quality, promoting the process industry to enter the quantum era with micro/nano effects and giving the industry a head start in global competition.

Cases of Beyond Limits Manufacturing Applied in Biochemical Pesticides

Beyond Limits Manufacturing's micro/nano fluidics technology has achieved remarkable results in the development and application of

biochemical pesticides. Traditional spinosad suspensions and RNAi pesticides have some problems. After being improved by this technology, they have excellent performance, opening up a new path for the development of biochemical pesticides. ³

Nano spinosad suspensions based on Beyond Limits Manufacturing micro/nano fluidics technology have shown excellent performance. With traditional production approaches, spinosad suspensions are not ideal in terms of storage stability, uniformity, and dispersibility, which affect their insecticidal efficacy. The nano spinosad suspension by Beyond Limits Manufacturing shows good storage stability under low temperature, room temperature, and high temperature. Even after repeated freezing and thawing 5 times (-20°C - 45°C),

it still has good uniformity and dispersibility (97 nm, PDI<0.1), and its insecticidal efficacy is also better than the spinosad suspension available in the market. (Spinosad is an agricultural antibiotic that should be classified as a biochemical pesticide.)

RNAi pesticides, as a new type of biochemical pesticide (currently, no such product has been registered in China), have broad application prospects, but they have the problems of low stability of dsRNA and difficulties in efficient delivery and low-cost, large-scale synthesis. Nano RNAi pesticides based on the Beyond Limits Manufacturing micro/nano fluidics technology use lipid nanoparticles to encapsulate and deliver dsRNA (dsRNA@LNP). Through the continuous process, the lipid flow on the liquid surface is greatly improved so that the

uniformity and dispersion of the dsRNA@LNP particles are good.

In addition, with the new RNAi pesticide chassis technology, the ingredients can be folded into nanostructures with specific shapes and sizes by base-specific recognition. It can be assembled based on any sequence or coding RNA and has good compatibility; compared to ordinary RNA, it has more substantial stability, good biocompatibility, and is easy to apply. This technology has changed the manufacturing method of traditional dsRNA pesticides. The coding sequence is firstly synthesized into ssRNA, and then self-assembled to form a specific nano structure of dsRNA. Its targets can be expanded. It enters cells through pinocytosis to silence target genes. There is no need to introduce nanocarriers. It can be directly sprayed and used and is safe and eco-friendly.

Prospects of the **Biochemical Pesticide** Industry in China

The future of China's biochemical pesticide industry will usher in breakthrough development driven by innovations and transformation toward sustainable agriculture. Biochemical pesticides, as an essential link between efficient farming and sustainability, will further enhance their strategic position.

The application of Beyond Limits Manufacturing has injected new vitality into the development of China's biochemical pesticide industry. This technology will continue to promote the R&D and production of novel biochemical pesticides and improve product performance. With the advent of micro/nano factories, relevant policies will be gradually enhanced to adapt to the industry's rapid development.

In the global competition, China is expected to take the lead with the dual advantages of technologies and policies. Technology export under the initiative "Belt and Road" can transform mature solutions, such as insect pheromones and plant elicitors, into international standards. In addition, the EU's initiative "Farm to Fork" restricts the use of chemical pesticides, which also brings historical opportunities for the business expansion of Chinese biochemical pesticide companies. Through partnerships in R&D and production, the industry will continue to promote the transformation of global agriculture toward sustainability. AP

[1] Journal Pesticides, Volume 1, 2025.

[2] Chinese Journal of Biological Control, Volume 5, 2019.

[3] Fellow Qian Xuhong's report "Biochemical Pesticides and Beyond Limits Manufacturing" at the 4th Conference organized by China Association of Pesticide Development and Application.

[4] Liu P, Zhao F, Zhang J, et al. Micro/nano flow chemistry by Beyond Limits Manufacturing[J]. Chinese Chemical Letters, 2024, 35(05): 29-38.

[5] Beyond Limits Manufacturing originated in Shanghai and is becoming a reality: In the future, an industrial park may only need one floor. Source: WENHUI DAILY.

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HALOXYFOP-R-METHYL

MESOSULFURON-METHYL

FLUMIOXAZIN

GLYPHOSATE

ISOXAFLUTOLE

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Chlorfenapyr	Clomazone	Difenoconazole	Brassinolide	
Chlorantraniliprole	Fenoxaprop-P-Ethyl	Dimethomorph	Ethephone	
Dinotefuran	Glufosinate	Fludioxonil	GA3	
Emamectin Benzoate	Glufosinate-P	Fluopyram	IBA	
Etoxazole	Glyphosate	Prothioconazole	Mepiquat Chloride	
Flonicamid	Imazamox	Picoxystrobin	Naphthoxyacetic acid	
Imidacloprid	Metsulfuron-methyl	Pyraclostrobin	Paclobutrazole	
Lambda-cyhalothrin	Mesotrione	Tebuconazole	Coference	
Methoxyfenozide	Penoxsulam	Thifluzamide	Satener:	
Pymetrozine	Pyroxasulfone	Trifloxystrobin	Cloquintocet mexyl	
Pyriproxyfen	Quinclorac	Spiroxamine	Isoxadifen-ethyl	
Spinosad	Tembotrione	Myclobutanil	Mefenpyr-diethyl	
Spirotetramat	Topramezone			
Thiamethoxam	Tribenuron-methyl			
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Interview | China-U.S. pesticide trade relations:

Navigating complexity in search of new opportunities

By Mickey Shan Editor at AgroPages mickey@agropages.com WhatsApp: +86 18705817985

ince the start of the China-U. S. trade war in 2018, this prolonged dispute has significantly impacted the global economy and trade landscape.

Chemicals and agrochemicals, as key components of trade between China and the U.S., are now facing challenges related to adjustments in their industry chains amid this competition.

In early February this year, the Trump administration in the United States announced a plan to impose an additional 10% tariff on all goods imported from China, on top of the existing tariffs. This policy has now been implemented, and all Chinese goods arriving in the United States after March 7, 2025, are subject to the additional 10% tariff. On March 3, the U.S. announced that it would impose an additional 10% tariff on certain Chinese products, on top of the existing 10% tariff. The aggressive policy has drawn widespread attention and concern from global

markets.

At the time of the announcement of the new tariff policy in February, AgroPages conducted interviews with several Chinese companies that play a key role in pesticide exports to the U.S., as well as American importers. The goal was to gain insights into how the national-level trade war has impacted their business operations and industry development since 2018, as well as their strategies for adaptation. Overall, Chinese pesticide companies have demonstrated remarkable resilience and sustained growth despite considerable pressures, while American importers have adopted various strategies to manage rising costs. Looking ahead, the agrochemical industry is set to navigate a complex international trade landscape filled with both opportunities and challenges. Both sides are closely monitoring policy changes and are flexibly adjusting their business strategies to adapt to the evolving situation.

The Background and Key Developments of the China-U.S. Trade Tariff War

The China-U.S. trade tariff war started in 2018 when President Trump initiated a "Section 301 investigation," citing unfair competitive practices by China concerning intellectual property protection and market access. This led to the imposition of high tariffs on a wide range of Chinese imports, including chemicals and agrochemical products. In response, China swiftly implemented countermeasures by imposing additional tariffs on U.S.origin goods, also covering chemicals and agrochemical products. This tariff war significantly increased trade costs for chemicals and agrochemical products between the two countries, squeezing profit margins for companies and disrupting industrial and supply chains.

2018:

- In March, Trump announced the imposition of additional tariffs on Chinese imports, officially kicking off the trade war.
- On July 6, the U.S. imposed an additional 25% tariff on US\$34 billion worth of Chinese products, which led to immediate retaliatory actions from China.

○ In August, the U.S. added tariffs on another \$16 billion worth of Chinese products. On September 24, the U.S. rolled out an additional 10% tariff on \$200 billion worth of Chinese products, with intentions to raise the rate to 25% in 2019.

2019:

- In May, the U.S. raised the tariff on \$200 billion worth of Chinese products from 10% to 25%.
- In August, Trump announced an additional 10% tariff on \$300 billion worth of Chinese products.

 In December, China and the U.S. reached a Phase One trade agreement, leading to the cancellation of some tariffs.

2020:

 On January 15, China and the U.S. signed the Phase One trade agreement. In August, the U.S. imposed sanctions on Chinese companies over issues related to the South China Sea.

2021:

 The Biden administration largely maintained the tariff policies from the Trump era and intensified technology restrictions on China with a strategy dubbed "small yard, high fence."

2024:

 During his campaign, Trump proposed "Tariffs 2.0," which included plans to impose tariffs of 60% or more on all products from China.

2025:

On February 1, President Trump signed an executive order establishing an additional 10% tariff on imports from China.

> Figure 1 Trends in US Pesticide Imports and Exports from China and India to the US from 2015 to 2024 (ton)

Source: Customs data; pesticide products are categorized under HS codes 380891, 380892, and 380893.

GROUP INTERVIEW

• On March 3, the United States announced an additional 10% tariff on certain Chinese products, on top of the existing 10% tariff.

Accelerating the **Restructuring of the** Agrochemical Industry Chain

The agrochemical industry has encountered considerable challenges in the context of the China-U.S. trade war. Since 2018, the U.S. has implemented an additional 25% tariff on 113 types of pesticide technicals imported from China and a further 7.5% tariff on 18 other technicals.

In the short term, additional U.S. tariffs on Chinese chemicals have led to a decrease in the market share of related products in the U.S. China's retaliatory measures, including additional tariffs on chemicals and agricultural products originating from the U.S., have impacted the supply of certain high-end chemicals that rely on imports. Consequently, trade costs for chemicals and agrochemicals between China and the U.S. have increased significantly, placing pressure on businesses' profit margins.

Analysis of customs data from 2015 to 2024 (see Figure 1) reveals that China's pesticide exports to the

Figure 2. Number of Listed Chinese Enterprises Establishing Overseas Factories and Established Factories from 2010 to 2023.

Source: Public information of listed companies

U.S. peaked in 2019, driven by U.S. importers stockpiling in anticipation of tariff changes. Although export volumes have declined since 2019, they have remained relatively stable compared to the period before 2019. Meanwhile, India's pesticide exports to the U.S. have experienced significant growth in recent years, partially filling the void in the U.S. market.

This suggests that the impact of the China-U.S. trade war on the agrochemical industry is complex and multifaceted. It has not only influenced trade flows between the two countries. Still, it has also prompted relevant businesses to seek new market opportunities and supply chain strategies to navigate the continuously changing international trade environment.

From a mid-to-long-term perspective, the China-U.S. trade war has catalyzed the restructuring of the global agrochemical industry and reshaped the competitive landscape. The U.S. government is actively promoting the relocation of the chemical industry chain, urging domestic companies to move production to other countries to reduce dependence on the

Chinese market. Concurrently, Chinese enterprises are hastening their transformation towards highend products and globalization to navigate this new global trade environment.

In terms of market expansion, Chinese companies are actively pursuing opportunities in emerging markets across Europe, Southeast Asia, and the Middle East to lessen their reliance on the U.S. market. Additionally, these companies are boosting their investments in independent research and development, making continuous progress in key technologies to enhance their innovation capabilities.

Notably, amid the dual pressures of trade policies and industrial upgrading, several capable Chinese agrochemical companies have begun relocating their production lines to regions such as Southeast Asia, the Middle East, and South America. This strategy goes beyond mere capacity transfer; it involves deeper strategic considerations, including technology transfer, brand localization, and supply chain restructuring. By shifting production or establishing overseas facilities, these companies can not only reduce their dependence on

a single market but also take full advantage of local tax incentives and financial resources. For example, by leveraging the low tax rates and abundant financial opportunities in locations like Singapore, companies can optimize their global cash flow. Furthermore, by setting up production bases in Southeast Asia, they can better meet local infrastructure development needs and effectively mitigate trade risks through re-export activities.

Figure 2 clearly illustrates the activities of listed Chinese enterprises in establishing overseas factories over the past decade, highlighting development trends and vividly reflecting the dynamic changes in the global landscape for these companies. After a brief disruption due to the COVID-19 pandemic in 2021, the number of enterprises investing in overseas factories surged to a new peak in 2023, signaling a more determined commitment by Chinese companies to globalization.

From a regional perspective, multiple Chinese chemical giants and niche leaders have targeted Southeast Asia for expansion. In 2024, direct investments from Chinese chemical enterprises in

Southeast Asia increased by 18% compared to the previous year, making up 35% of their total overseas investments. Additionally, emerging markets such as Morocco, India, and Vietnam are attracting greater multinational investment in the chemical sector, gradually enhancing their production capacities. This shift has the potential to reshape global chemical trade dynamics as these countries transition from being mere importers of chemical products to becoming exporters or achieving selfsufficiency within the region. Such a transformation is likely to influence the flow and direction of global chemical trade, significantly altering the overall landscape of the industry.

Key overseas factory establishment or acquisition projects by Key overseas factory establishment and acquisition projects by Chinese agrochemical companies

- 😑 In 2023, Xingfa Group acquired a production facility for paraguat and glyphosatesoluble concentrates in Indonesia.
- In 2023, Lianhetech established a factory in Malaysia.
- O In 2024, Rainbow purchased a formulation plant in the U.S. In 2024, Hebang Biotechnology began the construction of a 300,000ton/year glyphosate project in Indonesia.
- In 2025, Rainbow Agro established a formulation production center in Illinois, US.

From the Perspective of **Enterprises**

-Chinese Pesticide Manufacturers Demonstrate Resilience under Pressure

To thoroughly analyze the specific impacts of the China-U.S. trade tariff tensions on the pesticide industries in both countries, we

interviewed a range of industry experts, representatives from Chinese pesticide export companies, and U.S. pesticide importers.

In the earlier interviews, some Chinese companies had believed that the likelihood of the U.S. actually implementing the proposed 10% tariff increase is relatively low. Nevertheless, as a precaution, many have proactively shipped at least six months' worth of products to the U.S. to mitigate potential tariff risks. Throughout the interview process, representatives from these companies shared insights into the specific impacts that recent China-U. S. trade frictions have had on their operations, as well as the strategies they have adopted to adapt. They also provided their perspectives and forecasts regarding potential future trends in the industry.

Jingma Chemicals Co., Ltd. is a large, modern pesticide manufacturer that integrates scientific research, production, and both domestic and international trade. The company primarily produces glyphosate technical material (TC) using the IDA process, in addition to isopropylammonium (IPA) salt and soluble concentrate (SL). According to the company, the U.S. market is significant, accounting for over 20% of its total sales, with glyphosate

> Figure 3. Volume (kg) of Major Glyphosate Exports from China to the U.S. from 2018 to 2024

GROUP INTERVIEW

TC and formulations being its main export products. Since the onset of the trade war, however, the company's market share in the U.S. has declined. In terms of profits, the impact of China-U.S. trade tensions on costs is minimal, as all raw materials used in production are sourced domestically. However, higher tariffs on formulations have led U.S. customers to prioritize purchasing TC and glyphosate IPA salt 62% SL. This shift reduces the number of deep processing steps and ultimately decreases corporate profits. Additionally, increased costs for customers have resulted in stricter price demands, further squeezing the profitability of the company.

Figure 3 illustrates the export trends of the three main glyphosate products from China to the U.S. from 2018 to 2024. Historically, glyphosate IPA salt 62% SL has represented over 90% of all glyphosate formulation exports, establishing itself as a cornerstone of these exports. Its export volume has shown steady growth since 2018, peaking in 2024 and indicating a robust upward trend. In contrast, the export of technical materials has experienced fluctuations, notably suffering a sharp decline in 2023, followed by a gradual recovery in 2024. The U.S. is one of the largest

Source: Customs data compiled by AgroPages

pesticide importers globally, and companies are constantly looking for ways to enhance their competitiveness in this market. Recently, Jingma Chemicals announced the construction of a production line for PMIDA with an annual capacity of 20,000 tons. The product of this facility will be dedicated exclusively to producing 15,000 tons per year of glyphosate technical concentrate (TC) by the company. This initiative aims to streamline the production chain for glyphosate products and strengthen the competitiveness of its core offering, glyphosate TC. Xingfa **Group**, a leading player in the glyphosate sector, has taken the initiative to explore the U.S. market. In recent years, Xingfa Group has aggressively promoted its own end brand, Xsate, in the U.S. By shifting the product value chain downstream, the company has gained greater control and reinforced its dominance in the market.

Maxunitech ranks among the top 20 pesticide exporters in China and has achieved significant success in independently developing compounds and innovating products. The company has established a solid presence in the U.S. market. A representative from Maxunitech noted that the proposed "reciprocal tariffs" policy in the U.S. has not yet been fully implemented, making it challenging to thoroughly assess its impact on China's pesticide industry. Nonetheless, U.S. tariff policies will undoubtedly have far-reaching effects on the global market and supply chain restructuring. In this context, Chinese enterprises are well-positioned to overcome challenges by adopting strategies such as "technological innovation" and "going global." Maxunitech plans to maintain its focus on research and development, including the potential establishment of overseas factories when suitable locations are identified, to enhance its competitiveness. The company firmly believes that strengthening its own capabilities is essential for mitigating risks and achieving sustainable development.

A senior industry expert from

China emphasized that the Chinese pesticide industry has not been crippled by additional tariffs imposed over the past five years, underscoring the industry's resilience. He pointed out that while the volume and value of Chinese exports to the U.S. have not seen drastic declines, the composition of exported product categories has shifted. For instance, pyrethroid products from India have increasingly entered the U.S. market in recent years, resulting in a decrease in Indian exports to other regional markets. This change has opened the door for Chinese companies to leverage China's production capacity.

The additional 10% tariff on all products exported from China to the U.S. will undoubtedly affect Chinese enterprises. However, the U.S. market continues to rely heavily on pesticides sourced from China. If the U.S. government does not create special exemption channels for pesticides, it could result in another shift in the types of products exported from China to the U.S. In this context, changes in supply dynamics between China and India could have significant implications for China-U.S. trade relations. It remains uncertain whether India can seize this opportunity to emerge as a key player in the competitive landscape between China and the U.S. Such a transformation could not only reshape India's share in the global market but also have profound long-term effects on its domestic economic development.

U.S. importers: **Costs Passed Down to** Farmers, Agriculture Affected Negatively

U.S. importers have expressed skepticism about the government's trade policies. Several companies we spoke with highlighted the need for the government to prioritize the interests of domestic importers when formulating trade policies. They emphasized the importance of considering various factors, particularly the availability of mature and cost-effective alternatives within

the supply chain. Additionally, the U.S. government should be mindful of the safeguards that other countries provide to their exporters and assess whether any barriers have been put in place to restrict U.S. imports.

As for the impact of increased tariffs, the importers we interviewed indicated that these policies have directly affected their operations, resulting in higher costs, disruptions in the supply chain, and declining sales, which could potentially contribute to inflation.

Nearly all respondents indicated that any increase in the cost of goods sold (COGS) due to trade tariffs must be passed on to customers, who then transfer these costs to farmers. This chain reaction ultimately undermines farmers' interests. Some interviewees noted that U.S. farmers are already grappling with significant challenges as their global competitive position continues to decline.

This issue is reflected in a report from the U.S. Department of Agriculture (USDA) released in October 2024, which highlighted that U.S. farmers faced widespread losses in 2024 due to persistently low agricultural prices coupled with rising production costs. Data from the Farm Business Farm Management (FBFM) of Illinois, a key agricultural state, indicates that the average non-land cost of producing corn in Illinois from 2014 to 2019 was \$587 per acre. By 2024, this cost is projected to rise to \$772 per acre, representing a 31.5% increase. Similarly, during the same period, the non-land cost for soybeans is expected to climb from an average of \$363 per acre to \$512 per acre by 2024, reflecting a 41.0% increase.

Some importers have already implemented or are planning to implement a range of measures to address the challenges they face. For example, they are stockpiling essential raw materials. To avoid tariffs, importers are compelled to accumulate these materials before higher tariffs come into effect, highlighting the distinctive position that Chinese suppliers have maintained regarding their product delivery capabilities and

their role in the global supply chain. Additionally, some importers have indicated that they have informed their customers about the potential necessity for price increases. In the case of bulk pesticide products like glyphosate, importers are actively taking steps to protect their interests. For instance, one company has announced its intention to participate in an upcoming hearing in Washington to seek tariff exemptions for glyphosate TC. Furthermore, some importers noted that unless China is the sole supplier of a specific product, or if the product remains cost-effective even after tariffs are imposed, they may consider sourcing from other countries.

In discussing the future trajectory of China-U.S. trade relations, some respondents drew a striking analogy, comparing the competition to the notorious incident involving Tonya Harding and Nancy Kerrigan in sports history. Tonya Harding was once a promising figure skating

star in the U.S., aiming for glory at the World Championships and the 1994 Winter Olympics. However, her husband, Jeff Gillooly, and others conspired to attack her main rival, Nancy Kerrigan, resulting in Kerrigan suffering a knee injury. This scandal abruptly ended Harding's skating career, while Kerrigan ultimately went on to win an Olympic medal. Following the incident, Harding faced public disgrace and condemnation. Essentially, this competition undermined fairness and dignity. As an emerging power, China seeks fairness and peace in this competitive landscape, but other major powers may not share the same viewpoint.

Nevertheless, importers remain hopeful that commercial rationality will prevail over political sentiment in government policymaking. While they are taking various measures to navigate these challenges, they also expect the government to safeguard their interests and foster fair competition.

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Regionalization of Industrial Chains Will Intensify

As of 2024, average U.S. tariffs on Chinese goods stand at around 21%. If Trump Tariffs 2.0 is implemented, it will significantly impact bilateral trade between China and the U.S. Moving forward, the restructuring of the global industrial chain under the strong influence of trade policies will continue to affect the chemical and agrochemical sectors, making the trend toward regionalization even more pronounced. Companies will increasingly prioritize localized production and supply chain security. At the same time, emerging technologies such as green chemistry and biotechnology will drive the industry towards a more sustainable future. In the realms of chemicals and agrochemicals, China and the U.S. will navigate a landscape of both competition and cooperation, ultimately striving for winwin partnerships amid the competitive dynamics. AP

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INSECTICIDES

insecticides

Emamectin 4% + Indoxcarb 6% SC Thiamethoxam 12.6% + lambda Cyhalothrin 9.4% CS Dinotefuran 20% + Pymetrozine 50% WG Emamectin benzoate 5% + Lufenuron 40% WG Methoxyfenozide 8% + Chlorfenapyr 16% SC Spirodiclofen 24% + Abamectin 4% SC Emamectin benzoate 0.5% + Acetamiprid 2.5% ME

HERBICIDES

Glyphosate IPA 41% SL Glyphosate ammonium 88.8% SG Hexazinone 13.2% + Diuron 46.8% WG S-metolachlor 350g/L + Atrazine 320g/L SC Pyrazosulfuron-ethyl 4% + Oxadiargyl 20% OD Mesosulfuron-methyl 30g/L OD Clethodim 240g/L EC Penoxsulam 25g/L OD Fenoxaprop-P-ethyl 69g/L EW Oxyfluorfen 240g/L EC Pendimethalin 450g/L CS Trifluralin 480g/L EC Flumioxazin 50% WP 2,4-D 98%TC, 720g/l, 860/l Amine Salt Paraquat 42%TC, 125g/I SL

PGR

Padobutrazole 15% WP GA3 20% ST Ethephon 40% SL Paclobutrazol 2.5% + Mepiquat chloride 7.5% WP Paclobutrazol 6% + Chlormeguat 24% WP Uniconazole 5% WP Trinexapac-ethyl 25% ME Sodium nitrophenolate 1.4%, 1.8% SL Brassinolide 0.01%SL, 0.01%EC

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Company Showcase:

"Welcome to the Company Showcase section of the 2024 China Pesticide Industry Watch Magazine.

Here, you'll find an extensive directory of leading agrochemical companies, highlighting their innovative products, technical strengths, and global registrations.

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- Thiamethoxam

p117

p117

• S-metolachlor

• Terbuthylazine

- Trifloxystrobin
- 150+Prothiocona

Global Footprint of Leading Chinese Agrochemical Companies: Product Registrations Overview

		Australia	
p118	3	• 2,4-DB TC	p118
p97		ABAMECTIN	p116
, 199		 Acetamiprid 	, p97
e p97		Azoxystrobin	p126.96
p126.9	1	Azoxystrobin 250	p123
LEC/ p118	3	Bentazone	p117
LEC		Bifenthrin	p96
p118	3	Carfentrazone-ethyl	p92
, p118	3	Chlorantraniliprole	, p97.112
TC p118	3	chlorfenapyr	p121
, p97		Clethodim	p126
, p126	5	Clethodim 240	, p123
onium p96		Clethodim TC	, p118
, p96		Clomazone TC	, p118
, p118	3	Clothianidin	, p97
, p118	3	 Diafenthiuron 	, p97
, p118	3	• Dicamba	, p96
, p118	3	Difenoconazole	, p97
, p126	5	 Dimethomoroph TC 	, p118
lorothalonil p120	5	• Dinotefuran	p97
p126,9	7	Emamectin Benzoate	p97
C p118	3	EMAMECTIN BENZOATE	p116
p116	5	 Fluazifop-P-butyl 	p117
p91		Flumioxazin	p117
SC p94		GIBBERELLIC ACID	p116
p97		Glufosinate 200	p123
p94		 Glufosinate ammonium 	p96
zole 175 SC		Glufosinate Ammonium	p111

٠ •

Glyphosate	p101,96	• [
Glyphosate TC	p99	• [
Imazapic TC	p118	• [
İmazapyr TC	p118	• [
Imazethapyr TC	p118	• [
Imidacloprid	p97	• [
Indoxacarb	p119	• [
Lambda-cyhalothrin	p96	• [
Lambda-cyhalothrin 25	0g/L <i>p96</i>	• [
Mesosulfuron-Methyl	p117	• [
Mesotrione	p110	• [
METALAXYL-M	p103	• [
Metalaxyl-M	p126	• [
Metribuzin	p106	• (
Metsulfuron Methyl	p105	• (
Paclobutrazol	p106	• (
Pendimethalin	p117	• (
Picolinafen TC	p118	• (
Pinoxaden	p126	• (
Prothioconazole	092,119,126,97	7
Pyraflufen-ethyl TC	p118	• (
Pyroxasulfone	p92,124	7
PYROXASULFONE	p103	• (
pyroxasulfone 850WG	p116	
Pyroxasulfone85% WG	p92	• (
Quizalotop-p-ethyl	p119	•
S-metolachlor	p11/	•
Spinosad	p111	•
Spirotetramat	p91	•
lebuconazole	p106	•
	p127	• 1
Terbuthylazine	p117	• 1
Thiamethoxam	p97	• [
	p105	• 1
Trifloxystrobin	prio	
		•
		•
Lufenuron 5% EC	p103	•
		•
srazil 📀		•
Acetamiprid	p97	•
Atrazine	n108 110	•
Azoxystrobin	p100,110	- 1
Boscalid	p108	• 1
Chlorfenapyr	p121	•
Chlorpyrifos	p120	• •
Clethodim	p126.91	• -
Clethodim 240a/L EC/	p118	• †
Clethodim 360a/L EC	1	• -
Clethodim TC	p118	• -
Clomazone TC	p118	• -
CLORANSULAM METH	IVI p105	-

- Clothianidin
- Cyproconazole

F

- DICLOSULAM

5101,96	 Difenoconazole
p99	 Diflubenzuron
p118	 Diflufenican TC
p118	• Dimethomoroph TC
p118	 Diquat
, p97	• Diquat 200g/L
, p119	Ethephon TC
p96	Ethiprole 200a/l
p96	Ethiprole 200G/L SC
p117	Fluazinam
p110	Fluazinam TC
p110	 Flumiovazin
p100	 Flutriafol
p120	
p100	Glufosinate
p105	Glufosinate ammonit
p106	Glufosinate-ammonit
p117	Glutosinate-ammoniun
p118	Glyphosate
p126	Glyphosate Ammoni
9,126,97	75.7%
p118	 Glyphosate Ammoni
92,124	79.25%
p103	 Glyphosate Isopropy
p116	Salt 41%
p92	 Glyphosate TC
p119	 Haloxyfop
p117	Hexazinone TC
p111	Imazapic TC
p91	 Imazapyr TC
, p106	 Imazethapyr TC
, p127	Imidacloprid
, p117	 Indoxacarb
, 97	Lufenuron
p105	Malathion
p110	 Malathion 1000g/l
<i>p</i> o	Mancozeb
	Mesotrione
	METALAXYL_M
p103	Metalaxy/_M
'	 Motoloxy/ M + Chlor
	Niecaulfuron 40g/L (
	Nicosulfuron 06% TC
p07	INICOSULTUPON 96% IC
ρ77	INICOSULTUPON IC
108,110	 Prothioconazole
,108,122	
p108	Pyraciostrobin 98% I
p121	Spirodicloten 98%
p120	SULFENTRAZONE
0126,91	Tebuconazole
p118	 tebuthiuron
	 Thiamethoxam
p118	 Thidiazuron
p118	Thifluzamide 96%
105	

٠	Ethephon TC	p127
٠	Ethiprole 200g/L	p126
•	Ethiprole 200G/L SC	p116
•	Fluazinam p10	8,124
•	Fluazinam TC	p127
•	Flumioxazin	p126
•	Flutriafol	p128
•	Glufosinate	p110
•	Glufosinate ammonium	p96
•	Glufosinate-ammonium	p113
•	Glufosinate-ammonium 200g/L	p126
•	Glyphosate	p96
•	Glyphosate Ammonium Salt 75.7%	p99
•	Glyphosate Ammonium Salt 79.25%	p99
•	Glyphosate lsopropylamine Salt 41%	p99
•	Glyphosate TC	p99
•	Haloxyfop	, p120
•	Hexazinone TC	p127
•	Imazapic TC	p118
•	Imazapyr TC	p118
•	Imazethapyr TC	p118
•	Imidacloprid	p97
•	Indoxacarb	p119
•	Lufenuron	p128
•	Malathion	p120
•	Malathion 1000g/L	p113
•	Mancozeb	p124
•	Mesotrione	p111
•	METALAXYL-M	p103
•	Metalaxyl-M	p126
•	Metalaxyl-M + Chlorothalonil	p126
•	Nicosulfuron 40g/L OD	p125
•	Nicosulfuron 96% TC	p125

- 3% TC
- IE
- Thiodicarb
- Triclopyr-butotyl

p97

p106

p105

- Trifloxystrobin
- Trifloxystrobin 50%

 Pyroxasulfone85% WG Nicosulfuron75% WG Pyroxasulfone85% WG Tembotrione80g/L SC 	р92 р92 р92 р92
Canada 🛛 🕈	
 P14-hydroxylated brassinosteroid 0.0075% Azoxystrobin Diquat 240g/L Glufosinate Glufosinate-ammonium 150g/L Glufosinate-ammonium 280g/L Imazamox 98% TC Pinoxaden 97% TC Prothioconazole Pyraclostrobin 250g/L SULFENTRAZONE 	p94 p110 p126 p110 p126 p125 p125 p125 p92,97 p119 p105
China TaiwanDinotefuranFlonicamidImidacloprid	р100 р100 р100
Colombia	

p119

p100 p100

p113

p94

p103

p118

p105

p117

p113

p92

p97

p119,91

p106,110,96

p111

p108

p127

p118

p126

p127

p118

p111

p103

p99

p103

p119

p105

p106

p127

p97

p105

p119

p113

p124

p94

p126

p94,92,111,

126,97,124

p120,101

- Azoxystrobin+Difenoconazole p113 p113
- Chlorantraniliprole
- Kasugamycin • Thiamethoxam 141g/L +
- p113 Lambda-cyhalothrin 106g/L • Thiamethoxam+Lambda-
- p113 cyhalothrin

Ecuador

• Theanine

Egypt

• Lufenuron 20% EC

EU

- 2,4-DB TC
- 98% Chlormequat Chloride TC p99 p97
- Acetamiprid
- Azoxystrobin
- BENTAZONE • Bentazone
- Bixafen • Boscalid
- Carfentrazone-ethyl
- Chlorantraniliprole

Chlorantranilprole 97% TC	p103	Global
Clethodim	0126,91	Boscalid + Cyproc
Clethodim TC	p118	Chlorantraniliprol
Clomazone TC	p118	Emamectin benzo
• Dicamba	p96	Cymoxanil + Dim
 Difenoconazole 	p97	700 a/Ka
Emamectin Benzoate	p97	 Elumioxazin + S-n
 Flonicamid 	p119	350 a/l
 Flonicamid 96% TC 	p103	 Gibberellic acid +
 Florasulam 	p102	vlacetic acid + 1/l-l
FLORASULAM	p105	brassingstoroid 0 1
 Fluazifop-P-butyl 	p117	 Lambda cyhalothi
Fluazinam 98% TC	p103	
• Flumioxazin p	117,126	 Lambda cyhalothi
Flumioxazin 97% TC	p127	
 Fluopyram 	p91	
 Fluroxypyr-ethyl 	p104	Prothioconazala
Foramsulfuron	p102	Purpelectrobin 24
 Fosetyl-al 	p111	C motolochlor J
GIBBERELLIC ACID	p116	 S-metolachior + Tarbuthylazina 42
Imazalil 98% TC	p125	Terbuthylazine 42
 Imazamox 	, p102	
 Imazamox 97% TC 	, p103	1. I
 Imazamox 98% TC 	p125	
• Imazamox TC	, p118	 Acetamiprid
IODOSULFURON SODIUM	, p105	Bifenthrin
Lambda-cyhalothrin	, p96	 Chlorpyriphos
MESOSULEURON-METHYL	p105	Clethodim
Mesosulfuron-Methyl	p117	Clothianidin
Mesotrione D1111	117 110	Glufosinate
Methoxyfenozide 98% TC	125م	 Glyphosate
Metribuzin	p91	 Imidacloprid
Nicosulfuron	92 119	Lufenuron
NICOSULEURON	105م	 Thiamethoxam
Paclobutrazol	p106	
Pendimethalin	p117	
Penoxsulam	p104	Indonasia
Picolinafen TC	p118	muonesia
Pinoxaden	p126	 8% Cymoxanil+10
Pinoxaden 97% TC	p125	Dimethomorph+5
Pollen Polysaccharide	p94	Mancozeb WP
Prothioconazole p119.92.	126.97.	 Chlorfenapyr
11,1	106,113	20%+Chlorantran
Pyraclostrobin	p119	Nicosulfuron
Pyraflufen-ethyl TC	p118	Prothioconazole7
Pyrimethanil	p111	Pymetrozine 60%
Quizalofon-n-ethyl	p119	Nitenpyram 20%
Rimsulfuron	p102	 Pyroxasulfone
	p105	• Spinosad 6% +En
Saflufenacil	p100	benzoate 4% WG
	p116	 Tembotrione
Tebuconazole	p106	• Tembotrione80g/
Tembotriono	p100	
Terbuthylazina	p117	
	p117	
thifonsulfuron method	□ p105	Italy
Tribonuron methyl	p105	Boscalid 26.7%
Triflowetrobin	110 110	+ Pyraclostrobin
	17,110	· · yraciostrobili (

COMPANY SHOWCASE

dinil 285 g/L e + pate 63 g/L ethomorph	р115 р115 р115
netolachlor	p115
Indol-3- hydroxylated 136%	p115
rin +	p115
rin 250 g/L osulfuron	p115
+ 0 a/L	p115
24 g/L	p115
	р98 р98 р98 р98 р98 р98 р98 р98 р98
0% 50%	p102
iliprole 10%	p121
5% WG	р92 р92 р104
namectin	р92 р92
/L SC	р92 р92
6.7 % WG	p116

Kazakhstan 🚺	
• 80g/L Triticonazole + 40g/	p102
LPyraclostrobin FS • 90g/L Fenoxaprop-P- ethyl+45g/L Clodinafop-	p102
propargy1+34.5g/ LCloquintocet-mexyl EC	
Kenya	
• Glufosinate-P 100g/L	p126
Mexico	
• 2,4-D 480SL	p94
Azoxystrobin 250SC	p94
Chlorothalonil 720SC	p123 p94
• Cyprodinil 37.5% + Fludioxonil	, p116
 Dimethomoroph TC 	p118
• Imazethapyr 98% TC	p103
Trifloxystrobin 500SC	p94
Multiple European Countries	
Prothioconazole 250ECProthioconazole 300EC	р94 р94
Myanmar 📩	
Pyrazosulfuron Ethyl	p105
• Quinclorac 34%	p105
+BensulfuronMethyl 6% WP	
Nigeria	
• Glufosinate-P 100g/L	p126
Paraguay	
• Bixafen 125g/L+	p113
Trifloxystrobin 150g/L	
 Chlorantraniliprole+Emamectin benzoate 	p108
Emamectin Benzoate 30% WG	p92
• Fenpropimorph 750g/L	p113
 Flumioxazin+Glutosinate- Ammonium 	p108
Pymetrozine+Dinotefron	p108
PUraciostopin	n 1 / 1

Saflufenacil 70%

- Spinetoram 120G/L SC
- Spinetoram 96 g/L +
- Chlorantraniliprole 96g/L SC
- Teflubenzuron 97.4% TC • Topramezone 336g/L
- Topramezone+Terbuthylazine

Peru

- Abamectin 8.4% SC
- Bacillus subtilis
- Clothianidin+Deltamethrin p113 Cyprodinil+Fludioxonil p113
- Imidacloprid+Spirotetramat p113
- Oregano extract

Philippines 🔊

- chlorfenapyr 240g/L • Spinosad 25G/L SC

Poland

• Clethodim 120 EC

Russia

 2,4-D 2-ethylhexyl ester 452.5G/L + Florasulam 6.25G/L SE

South Africa 💓

- Propamocarb Hydrochloride *p116* 625G/L + Fluopicolide 62.5G/L SC
- Pss Harpin Protein
- 280g/I MCPAisooctyl+Metamifop+ Fluchloraminopyr-tefuryl EC
- 60g/L Flusulfinam SL
- Emamectin Benzoate 2% + p93 Chlorfenapyr 10% SC
- Fluchloraminopyr-tefuryl p109 60g/L + Glyphosate 300g/L
- Fluopicolide 15% + Metalaxyl-M 15% SE
- Flusulfinam + Propanil 250g/L p109 • Glufosinate-p 100g/L + p109 Flufenoximacil 10g/L

90 / 2025 CHINA PESTICIDE INDUSTRY WATCH

Switzerland

• Glyphosate 480

Turkey C

p113

p92

p92

p103

p113

p108

p103

p113

p113

p121

p92

p116

p116

p91

p109

p109

p93

p123

- Esfenvalerate
- Glyphosate
- Hexythiazox • Lufenuron + Emamectin
- benzoate
- Mesosulfuron-methyl
- Pyraclostrobin • Spirodiclofen

UK

- 2.4-DB TC • Acetamiprid
- Chlorantraniliprole
- Clethodim TC
- Dimethomoroph TC
- Imazamox TC
- Mancozeb
- Picolinafen TC
- Prothioconazole • Pyraflufen-ethyl TC
- Spinosad 480 SC

Ukraine

- 2,4-D isooctyl ester 850g/l EC
- Acetochlor 900g/l EC
- Alfa-Cypermethrin 100g/I EC p100 p100
- Azoxystrobin 200g/l +Cyproconazole 80g/l SC
- Dicamba 500g/l SL • Diquat 200q/l SL
- p100 p100
- Flutriafol 250g/l SC • Glyphosate 480g/l SL
- Glyphosate 75.7% WSG
- p100 • Imidacloprid 700g/kg WDG p100
- Nicosulfuron 4% OSC p100
- Quizalofop-p-ethyl 50g/l EC p100
- Tebuconazol 250g/l EC p100 • Thiabendazole 80g/l+ p100
- tebuconazol 60g/l FS • Thifensulfuron-methyl 750g/ p100
- ka WDG
- Tribenuron-methyl 750g/kg p100 WDG

US

- Acequinocyl 150g/L
- Clethodim
- Flumioxazin p126
- Glufosinate ammonium p96
- Glyphosate Isopropylamine p99 Salt 41%

US 💻

p101

p101

p101

p101

p101

p101

p101

p118

p97

p97

p118

p118

p118

p111

p118

p97

p118

p116

p100

p100

p100

p100

p126

p126

- Glyphosate Isopropylamine p99 Salt 53.8%
- Glyphosate lsopropylamine p99 Salt 62% p99

p126

p126

p94

p116

p105

p94

p121

p126

p106

p94

p126,97

- Glyphosate TC
- Metalaxyl-M
- Metalaxyl-M + Chlorothalonil
- Newsun X6
- Prothioconazole SPINOSAD
- SULFENTRAZONE

Uzbekistan

- "104g/L Haloxyfop-P-methyl p102 EC"
- p102 • 200g/L Propiconazole+ 200g/L Tebuconazole EW

Vietnam .

- 14-hydroxylated brassinosteroid 0.0075%
- Astragalus Polysaccharide p94 p100
- Cyhalofop-butyl TC
- Emamectin benzoate 1.8%+chlorfenapyr 19%
- Glufosinate-P 100g/L
- Paclobutrazol • Pollen Polysaccharide

Sponsor

Hebei Lansheng Biotech Co., Ltd.

Established in 2014, Lansheng is a technology-centered,

responsibility and mission. In the era of rapid development of the

industry, it is committed to contributing to China's agrochemical

Content

95%

98%

98%

98%

95%

97%

98%

98%

98%

98%

Pesticide Formulation Product name

Most Valuable Global Registration

Registration Area

EU

EU

EU

EU

Brazil

Argentina

Argentina

Argentina

Argentina

Australia

Pyraclostrobin 13.3% + Boscalid 26.7% WDG

OECD GLP

YES

designated enterprise advocating "clean production, green

pesticides". The company has a strong sense of social

industry and jointly building ecological civilization.

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Pesticide Technical

Product name

Clethodim

Spirotetramat

Boscalid

Isoxadifen-Ethyl

24-epibrassinolide

Metribuzin

Pretilachlor

Topramezone

Fluopyram

Fluxapyroxad

Clethodim 240G/L EC

Clethodim 360G/L EC

Spirotetramat 22.4% SC

Spirotetramat 15% OD

Metribuzin 75% WDG

Topramezone 30% OD

Clethodim 37% TK

24-epibrassinolide 0.01% SL

Product

Clethodim TC

Boscalid TC

Metribuzin TC

Fluopyram TC

Clethodim TC

Clethodim TC

Clethodim

Spirotetramat TC

Boscalid TC

Spirotetramat TC

Boscalid 50% WDG

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COMPANY SHOWCASE

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Pesticide Technical Product name	Content	OECD GLP
Pss Harpin Protein	2%	YES
Bacillus velezensis	1000 亿 CFU/ 克	YES
Chlorantraniliprole	96%	YES
Pyroxasulfone	98%	YES
Flumioxazin	98%	YES
Tembotrione	95%	YES
Topramezone	97%	YES
Prothioconazole	97%	YES
Fluopyram	96%	NO
Metconazole	95%	NO

Pesticide Formulation Product name

Pss Harpin Protein 0.1% SL Pss Harpin Protein 0.1% SP Bacillus velezensis 20 billion CFU/g WG Chlorantraniliprole 20% + Thiamethoxam 20% SC Pyroxasulfone 40% SC Flumioxazin 6% + Glufosinate-ammonium 60% WP Tembotrione 3.5% + Atrazine 20% OD Topramezone 2% + Nicosulfuron 3% + Terbuthylazine 25% OD Prothioconazole 20% + Tebuconazole 20% SC Cvanamide 50% SL

Most Valuable Global Registration		
Product	Registration Area	
Pss Harpin Protein SL	South Africa	

ANHUI HUAXING CHEMICAL INDUSTRY CO., LTD.

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Pesticide Technical Product name	Content	OECD GLP
Cartap		YES
Monosultap	95%	NO
MCPA	96%	YES
Imidacloprid	97%	YES
Fipronil	95%	YES
Nicosulfuron	95%	YES
Kresoxim-methyl	95%	YES
Glyphosate	95%	YES
Carbendazim	98%	YES

Pesticide Formulation Product name

Cartap 50% SP; Cartap + Acetamiprid SP Abamectin1.8% 3.6% 5%EC 7.2%EC "Emamectin1.92%EC 5%WDG Emamectin Benzoate + Chlorantraniliprole SC" Spinosad 120g/I 480g/I SC Spinetoram 60g/I, 120g/I SC, 25%WG Imidacloprid 70%WDG 350G/L SC Fipronil 5%SC 80%WDG Nicosulfuron 4% OD Bisultap 18% 29% 40% SL Glyphosate30% 41% 530% 62%SL 75.7% 88.8%WDG

Most Valuable Global RegistrationProductRegistration AreaSpinosad 25G/L SCPhilippinesSpinetoram 96 g/L +
Chlorantraniliprole 96g/L SCParaguayEmamectin Benzoate 30% WGParaguaySpinetoram 120G/L SCParaguaySpinosad 6% +Emamectin
benzoate 4% WGIndonesia

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Pesticide Technical Product name	Content	OECD GLP
Prothioconazole	98%	YES
Tembotrione	98%	YES
Pyroxasulfone	98%	YES
Nicosulfuron	98%	YES
Carfentrazone-ethyl	95%	NO
Fenoxaprop-P-ethyl	97%	NO
Chlorantraniliprole	96%	NO
Fluxapyroxad	98%	NO
Saflufenacil	98%	YES

Pesticide Formulation Product name

Prothioconazole 210g/I EC Prothioconazole 30% OD Prothioconazole 210g/I +Tebuconazole 210g/I SC Tembotrione 8% OD Tembotrione 420g/I SC Nicosulfuron 40g/I OD Tribenuron-methyl 75% WG Carfentrazone-ethyl 40% WG Nicosulfuron 75% WG

Most Valuable Global Registration		
Product	Registration Area	
Prothioconazole TC	EU、Brazil、Canada、 Australia	
Tembotrione TC	EU、Indonesia	
Nicosulfuron TC	EU、Indonesia	
Pyroxasulfone TC	Australia, Indonesia	
Carfentrazone-ethyl TC	EU、Australia	
Pyroxasulfone85% WG	Australia、Cambodia、 Cameroon	
Tembotrione80g/L SC	Pakistan、Indonesia、 Cameroon	
Prothioconazole75% WG	Indonesia	
Nicosulfuron75% WG	Cameroon	

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Pesticide Technical Product name	OECD GLP	
Chloransulam	NO	
Diclosulam	YES	
Florasulam	YES	
Glufosinate-ammonium	YES	
Flumioxazin	NO	

Most Valuable Global Registration	
Product	Registration Area
Chlorantraniliprole 10% + Chlorfenapyr 20% SC	Africa
Emamectin Benzoate 2% + Chlorfenapyr 10% SC	Southeast Asia
Spinosad 16% + Emamectin Benzoate 4% SC	Africa
Fluopicolide 15% + Metalaxyl-M 15% SE	Southeast Asia
Fluxapyroxad 7.5% + Propiconazol 15% ME	Africa
Fungous proteoglycan 1% SL	Africa
Topramezone 1% + Atrazine 22.5% + Nicosulfuron 1.5% OD	Africa
Topramezone 2% + Terbuthylazine 25% + Nicosulfuron 3% OD	Africa
Difenoconazole 1% + Fludioxonil 1% +Thiamethoxam 20% FS	Africa
Difenoconazole 1% + Fludioxonil 1% + Imidacloprid 50% FS	Africa

Pesticide Formulation Product name

Dinotefuran 30% + Pymetrozine 30% WDG Chlorfenapyr 19% + Lufenuron 5% SC Chlorantraniliprole 5% + lufenuron 5% SC Flonicamid 7.5% + Pyriproxyfen 7.5% SE Azoxystrobin 20% + Dimethomorph 40% WDG Pyraclostrobin 5% + Thiophanate-methyl 25% SC Pyraclostrobin 10% + Boscalid 20% SC Prothioconazole 20% + Trifloxystrobin10% SC Pinoxaden 4% + Clodinafop-propargyl 6% SC Florasulam 0.5% + Fluroxypyr 10% + Carfentrazone-ethyl 1.5% SE

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Pesticide Technical Product name	Content	OECD GLP
Matrine	98%	NO
Abamectin	95%	YES
Emamectin Benzoate	70%	NO
Spinosad	90%	YES
GA3	90%	YES
Rotenone	40%	NO
Matrine	5%	YES
Fungous proteoglycan	10%	NO
(+)-abscisic acid	95%	YES

Pesticide Formulation Product name

Spinosad 480g/L SC Spinosad 7.5% Tablet Spinosad 0.24g/L Spinosad 0.5% SP GA3 3% SP GA3 10% Tablet GA3 40% SP Matrine 0.5% SL Fungous proteoglycan 1% SL Seaweed extract SP

CAC INTERNATIONAL

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Pesticide Technical Product name	Content	OECD GLP
2,4-D	98%	YES
Chlorothalonil	98.5%	YES
Azoxystrobin	98%	YES
Trifloxystrobin	97%	YES
Prothioconazole	98%	YES
Tembotrione	97%	YES
Topramezome	97.5%	YES
MCPA	96%	YES
Pyroxasulfone	98%	YES
Cyproflanilide		NO

Pesticide Formulation Product name

2,4-D DMA (480/600/720/806/840/860)g/L SL 2,4-D EHE 87.5% EC 2,4-D+Picloram 240g/L+64g/L SL Chlorothalonil 500/720g/L SC Glyphosate (792/747) WG Glyphosate (IPA,Potassium,etc) SL Azoxystrobin+Difenoconazole 200g/L+125g/L SC Azoxystrobin 250g/L SC Tebuconazole+Trifloxystrobin 50+25% WG Cyhalofop (10%/20%/30%) EC/EW

Most Valuable Global Registration

	Product	Registration Area
	Trifloxystrobin TC	Brazil
	Prothioconazole TC	Brazil
	Tembotrione 420SC	Argentina
	Trifloxystrobin 150+Prothioconazole 175 SC	Argentina
	Prothioconazole 300EC	Multiple European Countries
	Prothioconazole 250EC	Multiple European Countries
	Chlorothalonil 720SC	Mexico
Azoxystro	Azoxystrobin 250SC	Mexico
	Trifloxystrobin 500SC	Mexico
	2,4-D 480SL	Mexico
	Azoxystrobin 140g/ L+Prothioconazole 100g/L EC	EU Countries

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Pesticide Technical Product name	Content	OECD GLP
14-hydroxylated brassinosteroid	80%	NO
14-hydroxylated brassinosteroid	5%	NO
Coronatine	98%	NO
Carvacrol	10%	NO
Allicin	50%	NO
Physcion	10%	NO
Pollen Polysaccharide	5%	NO
Astragalus Polysaccharide	2%	NO
Theanine	2%	NO
Orange Peel Oligosaccharide	10%	NO

Pesticide Formulation Product name

14-hydroxylated brassinosteroid AS 14-hydroxylated brassinosteroid SP Coronatine SL Veratrum Root Extract SL Allicin ME Physcion SC Carvacrol AS Lentinan AS Biostimulants (Pollen Polysaccharide, Astragalus Polysaccharide, Theanine, Orange Oligosaccharide, Borage Amino Acid) - Broad Spectrum DP Biostimulants (Pollen Polysaccharide, Astragalus Polysaccharide, Theanine, Orange Oligosaccharide, Borage Amino Acid) - Tuber Enlargement DP

Most Valuable Global Registration		
Product	Registration Area	
Pollen Polysaccharide AS	EU	
14-hydroxylated brassinosteroid 0.0075% SL	Canada	
Theanine	Ecuador	
Newsun X6	US	
14-hydroxylated brassinosteroid 0.0075% SL	Vietnam	
Astragalus Polysaccharide	Vietnam	
Pollen Polysaccharide	Vietnam	

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Pesticide Formulation Product name

Thiodiazole Copper 20% SC Emamectin Benzoate 5.1% + Chlorantraniliprole 5.9% SC Chlorantraniliprole 10% + Chlorfenapyr 20% SC Dinotefuran 10% + Tolfenpyrad 15% SC Cyazofamid 10% + Cymoxanil 50% WDG Prothioconazole 30% OD Atrazine 24% + Topramezone 1% OD Quizalofop-P-Ethyl 6% + Fomesafen 16% EC Cyhalofop-butyl 15% + Penoxsulam 3% OD Pinoxaden 5% EC

COMPANY SHOWCASE

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Pesticide Technical Product name	Content	OECD GLP
Acephate	98%	YES
Chlorantraniliprole	95%	YES
Cyantraniliprole	94%	YES
Fluazinam	98%	YES
Fluxapyroxad	98%	YES
Metsulfuron-methyl	95%	YES
Prothioconazole	95%	YES
Pyroxasulfone	95%	YES
Saflufenacil	95%	YES
Trifloxysulfuron	95%	YES

Pesticide Formulation Product name

Chlorantraniliprole 200g/L+ Emamectin Benzoate 50g/L SC Flonicamid 30% + Dinotefuran 30% WDG Topramezone 10g/L + Atrazine 300g/L SC Prothioconazole 125g/L + Tebuconazole 125g/L EC Trifloxystrobin 150g/L + Prothioconazole 175g/L SC Clomazone 120g/L + Propanil 270g/L EC Fluxapyroxad 234g/L + Azoxystrobin 292g/L SC Aminopyralid 40g/L + 2,4-D 320g/L SC Acetamiprid 25% + Bifrenthrin 25% DF Haloxyfop-R-methyl 200g/L + Trifloxysulfuron 20g/L OD

Sichuan Leshan Fuhua Tongda Agro-Chemical Technology Co. Ltd.

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🚺 Kevin Li

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Pesticide Technical Product name	Content	OECD GLP
Glyphosate	95%	YES
Glufosinate-ammonium	95%	YES
Azoxystrobin	98%	YES
Dicamba	98%	YES

Pesticide Formulation Product name

Glyphosate 480g/l SL
Glyphosate 757g/kg SG
Glyphosate 540g/l SL
Glufosinate-ammonium 150g/l SL
Glufosinate-ammonium 200g/l SL
Glyphosate 450g/l SL

Most Valuable Global Registration			
Product Registration Area			
Glyphosate	Argentina、Australia、Brazil		
Glufosinate ammonium	Argentina、Australia、 Brazil、US		
Azoxystrobin	Australia、EU		
Dicamba	Australia、EU		

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Content	OECD GLP
98%	YES
95%	NO
96%	NO
98%	YES
96%	YES
97%	YES
95%	YES
96%	YES
97%	YES
98%	YES
	Content 98% 95% 96% 98% 96% 97% 95% 96% 97% 96% 97% 98%

Pesticide Formulation Product name

Azoxystrobin 6.6%+Fludioxonil 1.1%+Metalaxyl-M 3.3% FS Beta-Cyfluthrin 10% + Imidacloprid 21% SC Beta-Cyfluthrin 12.5% SC Beta-cyfluthrin 5% +Chlorantraniliprole 10% SC Bifenazate 30% + Etoxazole 15% SC Bifenthrin 10% + Pymetrozine 20% SC Chlorantraniliprole 20%+Thiamethoxam 20% SC Fosthiazate 30% CS Lambda-cyhalothrin23% CS Pymetrozine 20% + Spirotetramat 10% SC

Most Valuable Global Registration			
	Product	Registration Area	
	Bifenthrin TC	Australia	
	Azoxystrobin TC	Australia	
	Lambda-cyhalothrin 250g/L CS	Australia	
	Lambda-cyhalothrin TC	Australia	
	Lambda-cyhalothrin TC	EU	

Hailir Pesticides and Chemicals Group CO.,LTD

Pesticide Technical Product name	Content	OECD GLP
Pyridalyl	91%	YES
Tolfenpyrad	98%	YES
Emamectin Benzoate	95%	YES
Prothioconazole	95%	YES
Pyraclostrobin		YES
Diafenthiuron	97%	YES
Difenoconazole	95%	YES
Propiconazole	95%	YES
Clothianidin		YES
Chlorantraniliprole	96%	YES

Pesticide Formulation Product name

Tebuconazole20%+Trifloxystrobin10% SC Diafenthiuron 500g/L SC Chlorantraniliprole 30% SC Prothioconazole 250g/L EC trifloxystrobin 10% +difenoconazole 10% SC Pyraclostrobin20%+Difenoconazole10% WP Tolfenpyrad 10% + Chlorfenapyr 10% SC 9% Pyridalyl+ 15% Methoxyfenozide SC Clothianidin 20% SC fluopicolide62.5g/L+propamocarb hydrochloride625g/L SC

Most Valuable Global Registration			
Product			
Prothioconazole TC	Brazil/Argentina/Australia/US/ Canada/EU/UK		
Imidacloprid TC	Brazil/Australia		
Acetamiprid TC	Brazil/Argentina/Australia/ EU/UK		
Thiamethoxam TC	Brazil/Argentina/Australia		
Dinotefuran TC	Argentina/Australia		
Clothianidin TC	Brazil/Australia		
Difenoconazole TC	EU/Australia		
Emamectin Benzoate TC	EU/Australia		
Chlorantraniliprole TC	EU/UK/Argentina/Australia		
Diafenthiuron TC	Australia		

COMPANY SHOWCASE

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Pesticide Technical Product name	Content	OECD GLP
Abamectin	95%	YES
Emamectin Benzoate	90%	YES
Cyantraniliprole	95%	YES
Fluopyram	95%	YES
Cyazofamid	94%	YES
Prothioconazole	95%	YES
Dithianon	98%	YES
Chlorfenapyr	98%	YES
Bifenazate	97%	YES
Flufenacet	98%	YES

Pesticide Formulation Product name

Abamectin 1.8% EC Emamectin Benzoate 5.0% WG/SG Pyraclostrobin25% + Cyazofamid 10% SC Spirotediclofen 240g/L SC Flonicamid 50% WG Dinotefuran 25% WP Bifenazate 43% SC Trifloxystrobin 100+ Tebuconazole 200 g/L SC Pyraclostrobin 25% SC Thifluzamide 240g/L SC

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Pesticide Technical Product name	Content	OECD GLP
Bifenthrin	90%	YES
lambda-cyhalothrin	95%	NO
Copper hydroxide	88%	NO

Pesticide Formulation Product name

abamectin-aminomethyl2.6%+chlorantraniliprole9% clothianidin1.2%+chlorantraniliprole0.4% GR bifenthrin15%+flonicamid15% clothianidin13%+lambda-cyhalothrin12% 28-epihomobrassinolide0.002%+gibberellic acid A4,A70.398% AS

Hebei Bestar Industry Co.,Ltd

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Pesticide Technical Product name	Content	OECD GLP
Imidacloprid	97%	NO
Acetamiprid	99%	NO
Thiamethoxam	98%	NO
Glufosinate-ammonium	95%	NO
Chlorfenapyr	98%	NO
Clothianidin	95%	NO
Glyphosate	95%	NO

Pesticide Formulation Product name

Thiamethoxam 25% WDG Imidacloprid 70% WDG Acetamiprid 70% WDG Acetamiprid 20%SP Abamectin EC Chlorfenapyr 24% SC "Bifenthrin Acetamiprid 250+250g/L SC&SL" "Bifenthrin Acetamiprd 250+250g/kg WDG" Abamectin 40% WDG

Most Valuable Global Registration		
Product	Registration Area	
Imidacloprid TC	India	
Acetamiprid TC	India	
Thiamethoxam TC	India	
Glufosinate TC	India	
Glyphosate TC	India	
Lufenuron TC	India	
Bifenthrin TC	India	
Clothianidin TC	India	
Clethodim TC	India	
Chlorpyriphos TC	India	

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Pesticide Technical Product name	Content	OECD GL
Chlormequat Chloride	98%	YES
Ethephon	91%	YES
Prohexadione Caclium	95%	YES
Uniconazole	97%	YES
Diflubenzuron	98%	YES
Mepiquat Chloride	98%	NO
DA-6 diethyl aminoethyl hexanoate	98%	NO
NAA 1-Naphthaleneacetic acid	98%	NO
IBA 3-indolebutyric acid	98%	NO
CPPU Forchlorfenuron	98%	NO

Pesticide Formulation Product name

Chlormequat Chloride 750g/l SL Prohexadione Calcium 10% WDG Ethephon 480g/l SL Ethephon5% PA/GEL Chlormequat Chloride+Paclobutrazol 30% SC NAA 1-Naphthaleneacetic acid 5% SL Forchlorfenuron 0.1% SP NAA+IBA5% SL Paclobutrazole 15% SC Mepiquat Chloride 250g/l SL

Most Valuable Global Registration	
Product	Registration Area
98% Chlormequat Chloride TC	EU

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Pesticide Technical Product name	Content	OECD GLP
Glyphosate	95%	YES
2, 4-D	98%	YES
Nicosulfuron	98%	YES
Imazamox	98%	YES
Imazethapyr	98%	YES
2, 4-D EHE	96%	YES

Pesticide Formulation Product name

Glyphosate Isopropylamine Salt 41% SL Glyphosate Isopropylamine Salt 62% SL Glyphosate Ammonium Salt 33% SL Glyphosate Ammonium Salt 88% SG Glyphosate Ammonium Salt 79.25% SG Glyphosate Ammonium Salt 75.7% SG Atrazine 80% SG 2,4-D DMA 720g/L SL Nicosulfuron 75% WG Imazamox 75% WG

Most Valuable Global Registration		
Product	Registration Area	
Glyphosate TC	US	
Glyphosate Isopropylamine Salt 62% SL	US	
Glyphosate Isopropylamine Salt 41% SL	US	
Glyphosate Isopropylamine Salt 53.8% SL	US	
Glyphosate TC	Brazil	
Glyphosate Isopropylamine Salt 41% SL	Brazil	
Glyphosate Ammonium Salt 79.25% SL	Brazil	
Glyphosate Ammonium Salt 75.7% SL	Brazil	
Glyphosate TC	Australia	
Nicosulfuron TC	Brazil	

Hubei Zhongxun Thinkgreen Technology Co., Ltd.

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Pesticide Technical Product name	Content	OECD GLP
Cyhalofop-butyl	98%	YES
Clodinafop-propargyl	97%	YES
Metamifop	98%	NO
Chlorantraniliprole	98%	NO
Penoxsulam	98%	NO
Triflumuron	99%	NO

Most Valuable Global Registration	
Product	Registration Area
Cyhalofop-butyl TC	Vietnam

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sticide Technical Product name	Content	OECD GLP
carbosulfan	92%	YES
carbofuran	97%	YES
methomyl		YES
thiodicarb	95%	YES
rimiphos-methyl	90%	YES
carbaryl	99%	YES
fenobucarb	98%	YES
ophanate-methyl	95%	YES
propoxur	97%	YES
benfuracarb	94%	YES

Pesticide Formulation Product name

Pirimiphos-methyl 55% EC Pirimiphos-methyl 5% DP Deltamethrin 0.2% +pirimiphos-methyl 1.8% DP Thiophanate-methyl 70% WP Carbosulfan 35% DS Carbosulfan 20% EC Fenobucarb 20% EC Methomyl 90% SP Thiodicarb 75% WP Thiodicarb 375g/L SC

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Pesticide Technical Product name	OECD GLP
Flumioxazin	YES
Glufosinate-ammonium	YES
Glufosinate-p	YES
Acephate	YES
Chlorantraniliprole	YES
Dinotefuran	YES
Etoxazole	NO
Emamectin benzoate	NO
Azoxystrobin	YES
Prothioconazole	YES

Pesticide Formulation Product name

Azoxystrobin 25% SC,50% WDG Chlorantraniliprole 200g/l SC,35% WDG Chlorfenapyr 10% + Chlorantraniliprole 15% SC Azoxystrobin 20% + Difenoconazole 12.5% SC Glufosinate ammonium 15% — 50% SL,88% SG Glufosinate-P 200g/l SL Prothioconazole 125g/l + Tebuconazole 125g/l EC Flumioxazin 50% WP/WDG,48% SC Glufosinate ammonium 60% + Flumioxazin 6% WP Acephate 75% SP

Most Valuable Global Registration		
Product	Registration Area	
Imidacloprid	China Taiwan	
Dinotefuran	China Taiwan	
Flonicamid	China Taiwan	
Glyphosate 480g/l SL	Ukraine	
Glyphosate 75.7% WSG	Ukraine	
2,4-D isooctyl ester 850g/l EC	Ukraine	
Dicamba 500g/l SL	Ukraine	
Nicosulfuron 4% OSC	Ukraine	
Acetochlor 900g/I EC	Ukraine	
Quizalofop-p-ethyl 50g/l EC	Ukraine	
Thifensulfuron-methyl 750g/kg WDG	Ukraine	
Tribenuron-methyl 750g/kg WDG	Ukraine	
Diquat 200g/l SL	Ukraine	
Alfa-Cypermethrin 100g/l EC	Ukraine	
Imidacloprid 700g/kg WDG	Ukraine	
Thiabendazole 80g/l+ tebuconazol 60g/l FS	Ukraine	
Flutriafol 250g/l SC	Ukraine	
Tebuconazol 250g/I EC	Ukraine	
Azoxystrobin 200g/l +Cyproconazole 80g/l SC	Ukraine	

COMPANY SHOWCASE

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Pesticide Technical Product name	Content	OECD GLP
Glyphosate	95%	NO
Carbendazim	95%	NO
Buprofezin	90%	NO
Ethephon	85%	NO

Pesticide Formulation Product name

Glyphosate IPA 450g/L / 41% / 62% SL Glyphosate Ammonium 75.7% / 79.25% / 88% SG Glufosinate Ammonium 150g/L / 200g/L SL 2.4 D 480g/L / 720g/L / 860g/L SL Diquat 20% SL Prothioconazole 250g/L EC Chlorantraniliprole 200g/L SC Bacillus Subtilis 20-100 Billion CFU/g Powder Bacillus Velezensis 20-100 Billion CFU/g Powder Paenibacillus Polymyza 20-100 Billion CFU/g Powder

Most Valuable Global Registration		
Product	Registration Area	
Diquat SL	Brazil	
Glyphosate SL	Australia	
Glyphosate SL	Turkey	
Glyphosate SG	Turkey	
Hexythiazox SL	Turkey	
Lufenuron + Emamectin benzoate SC	Turkey	
Mesosulfuron-methyl OD	Turkey	
Pyraclostrobin SC	Turkey	
Esfenvalerate EC	Turkey	
Spirodiclofen SC	Turkey	

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Pesticide Technical Product name	Content	OECD GLP
Halosulfuron		YES
Iodosulfuron	91	YES
mesosulfuron	95	YES
Foramsulfuron	94	YES
Diclosulam	95	YES
Cloransulam	98	YES
Triflusulfuron	95	YES
Florasulam	98	YES
Flucarbazone	98	YES
Propiconazole	95	YES

Pesticide Formulation Product name

Florasulam18.7%+Tribenuron56.3% WDG
Flumetsulam 80% WDG
Bentazone 480g/l SL
Imazamox 4% SL
Isoxaflutole 75% WDG
Oxaziclomefone 30% SC
Metamitrione 70% WDG
Tralkoxydim 40% WDG
Thidiazuron+Diuron 360g/l+180g/l SC
Pyribenzoxim 5% EC

Most Valuable Global Registration			
Product Registration Area			
Florasulam TC	EU		
Imazamox TC	EU		
Rimsulfuron TC	EU		
Foramsulfuron TC	EU		

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Pesticide Formulation Product name

Tricyclazole 40% SC Dinotefuran 40% SG Lambda-cyhalothrin 250g/L CS Imidacloprid 300g/L + Lamdba-cyhalothrin 100g/L SC 106g/L Lamdba-cyhalothrin+141g/LThiamethoxam SC/ZC 20g/L Acetamiprid+30g/L Lamdba-cyhalothrin EC 10g/L Metalaxyl-M+ 25g/L Fludioxonil FS 30g/L Acetamiprid+30g/L Emamectin Benzoate EC 100g/L Acetamiprid+120g/LIndoxacarb EC 60% Pymetrozine+20% Nitenpyram WDG

Most Valuable Global Registration			
Product	Registration Area		
8% Cymoxanil+10% Dimethomorph+50% Mancozeb WP	Indonesia		
200g/L Propiconazole+ 200g/ L Tebuconazole EW	Uzbekistan		
90g/L Fenoxaprop-P- ethyl+45g/L Clodinafop- propargyl+34.5g/ LCloquintocet-mexyl EC	Kazakhstan		
80g/L Triticonazole + 40g/ LPyraclostrobin FS	Kazakhstan		
"104g/L Haloxyfop-P-methyl EC"	Uzbekistan		

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Pesticide Technical Product name	Content	OECD GLP
METALAXYL	98	YES
METALAXYL-M	95	YES
TRICLOPYRICARB	98	NO
PROPAMOCARB	98	YES
PROFENOFOS	95	NO
CHLORPYRIFOS	97	YES
PHOXIM	91	NO
TEBUFENOZIDE	95	NO
PYROXASULFONE	99	YES
SAFLUFENACIL	98	NO

Pesticide Formulation Product name

METALAXYL12% + CUPROUS OXIDE 60% WP METALAXYL-M 6% + CUPROUS OXIDE 60% WP METALAXYL-M 4% + MANCOZEB 64% WG METALAXYL 15% + PROPAMOCARB HCL 1% WP METALAXYL-M 10% + PROPAMOCARB 16.8% SL PROFENOFOS 50% + LUFENURON 5% EC PROFENOFOS 45% + THIAMETHOXAM 10% EC CHLORPYRIFOS/PROFENFOS 45%/40%+ CYPERMETHRIN 5%/4% EC DIAQUAT 20% SL PYROXASULFONE +SAFLUFENACIL

Most Valuable Global Registration			
Product Registration Area			
METALAXYL-M TC			
METALAXYL-M	Australia		
METALAXYL-M	Brazil		
PYROXASULFONE	Australia		

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Pesticide Technical Product name	Content	OECD GLP
Imazamox	97%	YES
Lufenuron	98%	YES
Fluazinam	98%	YES
Clothianidin	98%	YES
Clodinafop-propargyl	97%	NO
Cloquintocet-mexyl	98%	YES
Carfentrazone-ethyl	96%	YES
Isoxaflutole	97%	YES
Pyroxasulfone	95%	YES
Saflufencail	97%	YES

Pesticide Formulation Product name

Lufenuron 5% EC Carfentrazone 40% EC Isoxaflutole 75% WDG Chlorantranilprole 5% + Lufenuron 5% SC Cyhalofop-butyl 10% + Metamifop 10% OD Pyroxasulfone 20% SC Topramezone 30% SC Saflufenacil 2% + Glyphosate 30% OD Clodinafop-propargyl 10% + Pinoxaden 10% EC Novaluron 10% EC

Most Valuable Global Registration			
Product	Registration Area		
Imazamox 97% TC	EU		
Chlorantranilprole 97% TC	EU		
Fluazinam 98% TC	EU		
Flonicamid 96% TC	EU		
Imazethapyr 98% TC	Mexico		
Pyraclostrobin 98% TC	Brazil		
Lufenuron 20% EC	Egypt		
Abamectin 8.4% SC	Peru		
Lufenuron 5% EC	Bolivia		
Teflubenzuron 97.4% TC	Paraguay		

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Pesticide Technical Product name	Content	OECD GLP
Saflufenacil	95%	YES
Metamifop	98%	YES
Fluroxypyr-meptyl	98%	YES
Penoxsulam	98%	YES

Pesticide Formulation Product name

Pyraclostrobin 15%+epoxiconazole 5% SC Abamectin-aminomethyl 2.6%+chlorantraniliprole 9% SC Metamifop 15%+cyhalofop-butyl 20% EC Atrazine 24%+topramezone 1.5%+nicosulfuron 4.5% OD Florasulam 1%+fluroxypyr-meptyl 15% SE Prothioconazole 20%+tebuconazole 20% SC Oxaziclomefone 15% OD Penoxsulam 5% OD Fipronil 10%+thiamethoxam 20% FS Penoxsulam 20% OD

Most Valuable Global Registration		
Product	Registration Area	
Saflufenacil TC	EU	
Penoxsulam TC	EU	
Fluroxypyr-ethyl TC	EU	

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Pesticide Technical Product name	Content	OECD GLP
Prothioconazole	97%	YES
Pyraclostrobin	97.5%	YES
Spirotetramat	96%	YES
Chlorantraniliprole	97%	YES
Tebuconazole	96%	YES
Imidacloprid	97%	YES
Acetamiprid	97%	YES
Difenoconazole	95%	YES
Glufosinate-ammonium	95%	YES
Fluopyram		YES

Pesticide Formulation Product name

Chlorantraniliprole 9% + Emamectin benzoate 2.6% SC Pymetrozine 60% + Nitenpyram 20% WG Bifenazate 300g/L + Etoxazole 150g/L SC Emamectin benzoate 20g/L + Indoxacarb 80g/L SC Prothioconazole 400g/L SC Pyraclostrobin 250g/L + Difenoconazole 150g/L SC Tebuconazole 50% + Trifloxystrobin 25% WG Penoxsulam 10g/L + Cyhalofop-butyl 50g/L OD Glufosinate-ammonium 200g/L SL Diflufenican 10% + Flufenacet 20% SC

Most Valuable Global Registration		
Product	Registration Area	
Prothioconazole		
Fluopyram		
Pymetrozine 60% + Nitenpyram 20% WG	Indonesia	

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Pesticide Technical Product name	Content	OECD GLP
Tribenuron methyl	95%	YES
Pyrazosulfuron ethyl	98%	YES
Bentazone	97%	YES
METRIBUZIN	97%	YES
Carfentrazone	92%	YES
SULFENTRAZONE	95%	YES
Quizalofop-p-ethyl	95%	YES
BENSULFURON METHYL	97%	YES
Thidiazuron	98%	YES
Rimsulfuron	98%	YES

Pesticide Formulation Product name

Tribenron methyl 75% WG Rimsulfuron 25% WG Pyrazosulfuron ethyl 10% WP Metsulfuron methyl 20% WG Chlorimuron ethyl 25% WG Sulfometuron-methyl 75% WG Bensulfuron methyl 60% WG METRIBUZIN 75% WG Metribuzin 480g/I SC BENTAZONE 480G/L SL

Most Valuable Global Registration

Product	Registration Area
Thidiazuron	Australia Brazil
Tribenuron-methyl	EU
thifensulfuron-methyl	EU
RIMSULFURON	EU
NICOSULFURON	EU
IODOSULFURON SODIUM	EU
FLORASULAM	EU
CLORANSULAM METHYL	Brazil
DICLOSULAM	Brazil
SULFENTRAZONE	Canada Brazil US
THIENCARBAZONE-METHYL	EU
MESOSULFURON-METHYL	EU
BENTAZONE	EU

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Pesticide Technical Product name	Content	OECD GLP
Metsulfuron Methyl	97%	YES
Thidiazuron	97%	YES
Pyrazosulfuron Ethyl	98%	YES
Sulfometuron Methyl	98%	NO
Tribenuron Methyl	95%	NO
Rimsulfuron	97%	NO
Thifensulfuron methyl	95%	NO
Bispyribac -sodium	95%	NO
Pyribenzoxim	95%	NO
Halosulfuron methyl	95%	NO

Pesticide Formulation Product name

Metsulfuron Methyl 60% 20% WP WDG
Pyrazosulfuron Ethyl 10% WP
Sulfometuron Methyl 75% WDG
Rimsulfuron 25% WDG
Thifensulfuron methyl 75% WDG
Halosulfuron methyl 75% WDG
Tribenuron Methyl 75% WDG
Bispyribac -sodium 40 %SC 20%WP
Pyribenzoxim 10% EC
Thidiazuron 50% WP

Most Valuable Global Registration			
Product	Registration Area		
Metsulfuron Methyl TC	Australia		
Pyrazosulfuron Ethyl 10%WP	Myanmar		
Quinclorac 34% +BensulfuronMethyl 6% WP	Myanmar		

Jiangsu Sword Agrochemicals Co., Ltd.

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Pesticide Technical Product name	Content	OECD GLP
Tebuconazole	97%	YES
Cyproconazole	97%	YES
Triadimenol	97%	NO
Triadimefon	97%	NO
Bitertanol	97%	YES
Paclobutrazol	95%	YES
Metribuzin	97%	YES
Bentazone	96%	YES
Azoxystrobin	98%	YES
Uniconazole	90%	NO

Pest	icide Formu	lation Pro	duct name

Tebuconazole 25% EC	
Tebuconazole 430 g/L SC	
Triadimenol 25% EC	
Metribuzin 70% WP	
Metribuzin 75% WG	
Paclobutrazol 15% WP	
Paclobutrazol 25% SC	
Propineb 70% WP	
Bentazone 40% AS	
Azoxystrobin 200G/L + Cyproconazole 80G/L SC	

Most Valuable Global Registration			
Product	Registration Area		
Tebuconazole TC	EU		
Paclobutrazol TC	EU		
Azoxystrobin TC	EU		
Prothioconazole TC	EU		
Cyproconazole TC	Brazil		
Tebuconazole TC	Brazil		
Tebuconazole TC	Australia		
Metribuzin TC	Australia		
Paclobutrazol TC	Australia		
Paclobutrazol WP	Vietnam		

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Pesticide Technical Product name	Content	OECD GLP
chlorothalonil		YES
metaldehyde	99%	YES
chlorfenapyr	96%	NO
pyrimethanil	98%	NO
picloram	96%	NO
quinclorac	96%	NO
chlorfluazuron	97%	NO
methoxyfenozide	98%	NO
chlorantraniliprole		NO

Pesticide Formulation Product name

Chlorothalonil 720SC Chlorothalonil 500SC

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Pesticide Technical Product name	Content	OECD GLP
Dicamba	98%	YES
Mesotrione	95%	YES
Bifenthrin	98%	YES
Lambda-cyhalothrin	95%	YES
Propiconazole	95%	YES
Difenoconazole	96.5%	YES
Trinexapac-ethyl	97%	YES
Fluazinam	97%	YES
Imazethapyr	98%	YES
Icaridin	97%	YES

Pesticide Formulation Product name

Glyphosate IPA, Glyphosate potassium SL Fluazinam 500g/L SC Lambda-cyhalothrin 75g, 250g/L CS Bifenthrin 170g/L+Thiamethoxam 150g/L SC Imidacloprid 350g/L SC Difenoconazole 125g/L+Azoxystrobin 200g/L SC Permethrin + allethrin 16.86% EC Imidachloprid + Meperfluthrin 21% SC Lambda-cyhalothrin 10% WP Beta-cyfluthrin 12.5% SC

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Pesticide Technical Product name	Content	OECD GLP
flumetralin	98%	YES
pyraclostrobin	98	YES
fluazinam	98	YES
prohexadione calcium	94	YES
Spinosad	90	YES
fluopyram	96	YES
Flurochloridone	98	YES
Glufosinate-P	90	YES
Mesotrione	98	YES
azoxystrobin	98	YES

Pesticide Formulation Product name

fluopyram 500 SC fluazinam 50% SC prohexadione calcium 27.5% WG spinosad 480 SC lambda-cyhalothrin 9.4%+thiamethoxam12.6% SC "2-Naphthoxyacetic acid 20% TA (4-Chlorophenoxy)acetic acid 2.5% TA Gibberellic acid A3 1.0% Tablet" TA 2billion PIB/mI MbNPV SC agricultural organosilicone adjuvant azoxystrobin 200g/L+difenoconazole125g/L SC pyraclostrobin 12.8% + boscalid 25.2% SC

SULICHEM

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Pesticide Technical Product name	Content	OECD GLP
Chlorothalonil	98.5	YES
Azoxystrobin	98	YES
Fluazinam	98	YES
Diflubenzuron	98	YES
Boscalid	98	YES

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Chlorothalonil 720g/l SC
Azoxystrobin 250g/l SC
Fluazinam 500g/l SC
Diflubenzuron 25% WP
Boscalid 50% WDG

Most Valuable Global Registration				
Product Registration Area				
Azoxystrobin TC	Brazil			
Fluazinam TC	Brazil			
Diflubenzuron TC	Brazil			
Boscalid TC	Brazil			

EAGROW

SHANDONG KESAI EAGROW CO., LTD

Pesticide Technical Product name	Content	OECD GLP
ATRAZINE	97%	YES
AMETRYN	97%	YES
BUTACHLOR	95%	YES
ACETOCHLOR	93%	NO

Pesticide Formulation Product name

Nicosulfuron+Mesotrione+Atrazine OD Topramezone+Terbuthylazine OD Pyrazosulfuron-ethyl+Pretilachlor+Penoxsulam TB Pymetrozine+Dinotefron WG Clothianidin+Pyraclostrobin CS Pyribenzoxim+Cyhalofop-Butyl EC Chlorantraniliprole+Emamectin benzoate WG Cyazofamid+Dimethomorph SC Uniconazole+Prohexadione calcium SC Flumioxazin+Glufosinate-Ammonium WP

Most Valuable Global Registration				
Product	Registration Area			
Atrazine	Brazil			
Atrazine WG	Brazil			
Topramezone+Terbuthylazine OD	Paraguay			
Flumioxazin+Glufosinate- Ammonium WG	Paraguay			
Chlorantraniliprole+Emamectin benzoate WG	Paraguay			
Pymetrozine+Dinotefron WG	Paraguay			

KING TECH CORPORATION

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Pesticide Technical Product name	Content	OECD GLP
TETRAMETHRIN	92%	YES
GLUFOSINATE- AMMONIUM	95%	YES
DDVP	95%	YES
LAMBDACYHALOTHRIN	97%	YES
BIFENTHRIN	98%	NO
HEXYTHIAZOX	98%	NO
ABAMECTIN	95%	YES
MALATHION	95%	NO
DIETHYLTOLUAMIDE	95%	NO
CARBARYL	99%	NO

Pesticide Formulation Product name

ATRAZINE500G/L+MESOTRIONE 50G/L SC BUTACHLOR 35%+ PROPANIL 35% EC METSULFURON-METHYL 60% WP 2,4-D dimethyl amine salt AS PROPAMOCARB 722G/L AS IMIDACLOPRID 600G/L FS DIMETHOMORPH 50% WDG PYRAZOSULFURON-ETHYL 10% WP GLYPHOSATE 480G/L SL FENOXAPROP-P-ETHYL EW

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Pesticide Technical Product name	Content	OECD GLP
Flusulfinam	95%	NO
Fluchloraminopyr-tefuryl	98%	NO
Flufenoximacil	95%	NO
Cinflubrolin	98%	NO
Cypyrafluone	95%	NO
Bipyrazone	96%	NO
Tripyrafluone	95%	NO
Fenpyrazone	95%	NO
Broclozone	95%	NO
Isoflulanam	95%	NO

Pesticide Formulation Product name

Tripyrasulfone 6% OD Fluchloraminopyr-tefuryl 60g/L + Glyphosate 300g/L ME Glufosinate-p 100g/L + Flufenoximacil 10g/L ME Flusulfinam 60g/L SL Propanil 220g/L + Flusulfinam 30g/L ME Bipyrazone 10% OD Cypyrafluone 3% + Isoproturon 22% OD Atrazine 22% + Fenpyrazone 3% OD Broclozone 400g/L SE Clnflubrolin 100g/L EW

Most Valuable Global Registration				
Product	Registration Area			
60g/L Flusulfinam SL	Southeast Asia			
Flusulfinam + Propanil 250g/L	Southeast Asia			
Glufosinate-p 100g/L + Flufenoximacil 10g/L	Southeast Asia			
Fluchloraminopyr-tefuryl 60g/L + Glyphosate 300g/L	Southeast Asia			
280g/I MCPA- isooctyl+Metamifop+ Fluchloraminopyr-tefuryl EC	Southeast Asia			

Lianyungang Liben Crop Science Co., Ltd

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Pesticide Technical Product name	Content	OECD GLP
Glufosinate	97%	YES
Atrazine	95%	YES
Ametryn	95%	YES
Terbuthylazine	95%	YES
Simazine	95%	YES
Azoxystrobin	98%	YES
Pyraclostrobin	98%	YES
Glyphosate	97%	YES
Mesotrione	97%	YES
Chlorantraniliprole	97%	YES

Pesticide Formulation Product name
Atrazine 500G/L SC Paraquat 42% TK Atrazine 90% WDG Atrazine 80% WP
Ametryn 90% WDG Ametryn 80% WP Glufosinate 200G/L SL
Simazine 90% WDG Glufosinate 150G/L SL

Most Valuable Global Registration			
Product	Registration Area		
Trifloxystrobin TC	Australia		
Glufosinate TC	Canada		
Azoxystrobin TC	Canada		
Mesotrione TC	Australia		
Trifloxystrobin TC	EU		
Mesotrione TC	EU		
Azoxystrobin TC	EU		
Prothioconazole TC	EU		
Atrazine TC	Brazil		
Glufosinate TC	Brazil		

Liaoning Zhonghui Biotechnology Co., Ltd.

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Pesticide Technical Product name	OECD GLP
prothioconazole	YES
trifloxystrobin	YES
tebuconazole	YES

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Pesticide Technical Product name	Content	OECD GLP
Glufosinate-P	/	YES
Glufosinate-ammonium	97%	NO
Flumioxazin	98%	NO
Clopyralid	96%	NO
Picloram	95%	NO
Triclopyr-acid	98%	NO
Triclopyr-BEE	98%,95%	NO
Fluroxypyr-acid	98%	NO
Clodinafop-propargyl	96%	NO
Aminopyralid	95%	NO

Pesticide Formulation Product name

Glufosinate-P 10%SL Glufosinate-P 200G/L 20.2%Glufosinate-P+1.5%Flumioxazin SC 240G/L 2,4-D+64G/L Picloram SL Picloram 204G/L SL Flumioxazin 50% WP Triclopyr-acid 345G/L EC Fluroxypyr-meptyl 288G/L

Limin Group Co., Ltd.

Tembotrione

Abamectin

Emamectin benzoate

Spinosad

+86 13866783007		0.000
Pesticide Technical Product name	Content	OECD GLP
Mancozeb	85%	YES
Azoxystrobin	97%	YES
Difenoconazole	95%	YES
Fosetyl-al	96%	YES
Glufosinate-ammonium	95%	YES
Glufosinate-P	90%	NO

YES

YES

YES

YES

Pesticide Formulation Product name

97%

95%

95%

91%

Mancozeb 80% WP Metam-sodium 42% SL Cymoxanil 8%+Mancozeb 64% WP Metalaxyl 8%+Mancozeb 64% WP Fosetyl-al 80% WG Propineb 70% WP Glufosinate Ammonium 20% SL Emamectin Benzoate 1.92% EC/5%SG/5.7%WG Azoxystrobin 25% SC Abamectin 1.8%/5% EC

Most Valuable Global Registration

Product	Registration Area
Mancozeb TC	UK
Glufosinate Ammonium TC	Australia
Spinosad TC	Australia
Difenoconazole TC	Brazil
Mesotrione TC	Brazil
Azoxystrobin TC	Brazil
Prothioconazole TC	Brazil
Mesotrione TC	EU
Fosetyl-al TC	EU
Pyrimethanil TC	EU

COMPANY SHOWCASE

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Pesticide Technical Product name	Content	OECD GLP
Chlorfenapyr	98%	YES
Fluopyram	96%	YES
Cyazofamid	95%	YES
Tolfenpyrad	97%	YES
Tebufenpyrad	96%	YES
Fenpyroximate	97%	YES
Cyantraniliprole	98%	YES
Saflufenacil	97%	YES
Tembotrione	97%	YES
Topramezone	97%	YES

Pesticide Formulation Product name

Chlorantraniliprole 30%+Emamectin benzoate 4.4% WDG Chlorantraniliprole 0.4% +Clothianidin 1.2% GR Lambda cyhalothrin 9.4% + Thiamethoxam 12.6% SC Nitenpyram 20%+Pymetrozine 60% DF Abamectin 4%+Spirotetramat 24% SC Bifenazate 30%+Etoxazole 15% SC Pyraclostrobin 10%+Tebuconazole 30% SC Azoxystrobin 20%+Difenoconazole 12.5% SC Trifloxystrobin 25%+Tebuconazole 50% WDG Maxplus Seaweed fertilizer (antiviral factor)

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Pesticide Technical Product name	Content	OECD GLP
Chlorantraniliprole	97%	YES
Diquat dibromide	40%	YES
Diquat dichloride	42%	YES
Paraquat dichloride	45%	YES
Paraquat dichloride	42%	YES
Glufosinate-P-ammonium	98.5%	YES
chlorpyrifos	97%	YES
lambda-cyhalothrin	95%	YES
Bifenthrin	98%	YES

Pesticide Formulation Product name

Chlorantraniliprole 200g/L SC Diquat 20% SL Diquat 150g/L SL Diquat dichloride 20% SL Paraquat 200g/L SL Paraquat 250g/L SL Glufosinate-P-ammonium 10% SL lambda-cyhalothrin 25g/L EC Chlorpyrifos 40% EC Chlorpyrifos 50% + cypermethrin 5% EC

Most Valuable Global Registration		
Product	Registration Area	
Chlorantraniliprole TC	Australia	

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Pesticide Technical Product name	OECD GLP
Glyphosate	YES
S-METOLACHLOR	YES
BUTACHLOR	YES
ACETACHLOR	YES
DIAZINON	YES
DICHLORVOS	NO
TRICHLORPHON	NO
ALU-100	NO
TCPP	NO
BDP	NO

Pesticide Formulation Product name

Glyphosate 41% Glyphosate 74.7% GR Dichlorvos 1000g/I EC S-metolachlor, 87392-12-9, 960g/I EC) Acetochlor,500g/I EC Butachlor, 600g/I EW Butachlor 35%+Propanil 35% Diazinon, 600g/I EC Glyphosate, 62% SL Glyphosate, 450g/I SL

NINGBO AGROSKYRUN TRADING CO.,LTD

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Pesticide Technical Product name	Content	OECD GLP
Thiodicarb	97%	YES
Lufenuron	95%	YES
Fenpropimorph	97%	YES
Fenpropidin	97%	YES
Bixafen	95%	YES
Saflufenacil	97%	YES
Pyroxasulfone	97%	NO
Prothioconazole	97%	YES
Methomyl	98%	YES
Teflubenzuron	98%	NO

Pesticide Formulation Product name

Methomyl 90% SP Fenpropimorph 75% EC Malathion 1000g/L EC Saflufenacil 70% WG Pyroxasulfone 30% + Flumioxazin 20% SC Topramezone 336g/L SC Bixafen 12.5% + Prothioconazole 17.5% + Trifloxystrobin 15% SC Pyraclostrobin 250 g/L + Fluxapyroxad 250 g/L EC Propamocarb 772 g/L SL Fenpropidin 750g/L EC

Most Valuable Global Registration

Product	Area
Prothioconazole TC	EU
Bixafen TC	EU
Malathion 1000g/L EC	Brazil
Saflufenacil 70% WG	Paraguay
Bixafen 125g/L+ Prothioconazole 175g/L + Trifloxystrobin 150g/L SC	Paraguay
Thiodicarb TC	Brazil
Fenpropimorph 750g/L EC	Paraguay
Thiamethoxam 141g/L + Lambda- cyhalothrin 106g/L SC	Colombia
Topramezone 336g/L SC	Paraguay

COMPANY SHOWCASE

Ningbo Generic Chemical Co., Ltd

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Pesticide Technical Product name	Content	OECD GLP
Dicamba	98%	YES
Fomesafen	98%	YES
Glyphosate	95%	YES
Nicosulfuron	98%	YES
Pendimethalin	97%	YES
Bifenthrin	98%	YES
Chlorantraniliprole	98%	YES
Thiamethoxam	98%	YES
Fluopicolide	98%	YES
Prothioconazole	98%	YES

Pesticide Formulation Product name

2,4-D 240g/L+Picloram 64g/L SL Atrazine 500g/L+Mesotrione 50g/L SC Bentazone 400g/L+MCPA 60g/L SL Diuron 46.8%+Hexazinone 13.2% WG Emamectin benzoate 1%+Lambda-cyhalothrin 4% EW Azoxystrobin 200g/L+Cyproconazole 80g/L SC Azoxystrobin 200g/L+Difenoconazole 125g/L SC Boscalid 25.2%+Pyraclostrobin 12.8% WG Difenoconazole 250g/L+Propiconazol 250g/L EC Chlorantraniliprole 100g/L+Thiamethoxam 200g/L SC

Most Valuable Global Registration		
Product	Registration Area	
Glufosinate-ammonium SG	Brazil	
Chlorantraniliprole SC	Colombia	
Thiamethoxam+Lambda-cyhalothrin SC	Colombia	
Azoxystrobin+Difenoconazole SC	Colombia	
Kasugamycin SL	Colombia	
Bacillus subtilis SC	Peru	
Cyprodinil+Fludioxonil WG	Peru	
Oregano extract SL	Peru	
Clothianidin+Deltamethrin SC	Peru	
Imidacloprid+Spirotetramat SC	Peru	

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Pesticide Technical Product name	Content	OECD GLP
Imazamox	98%	NO
Spinosad	90%	NO
Chlorantraniliprole		NO
Pyriproxyfen		NO
Pendimethalin		NO
Kasugamycin		NO
Pyraclostrobin		NO
Clopyralid		NO

Pesticide Formulation Product name

Imazamox 4% SL Spinosad 5% SC Chlorantraniliprole Pyriproxyfen Pendimethalin Kasugamycin Pyraclostrobin Clopyralid

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Pesticide Formulation Product name

Bentazone 480g/L SL Bentazone 400g/L + MCPA 60g/L SL Oxadiazon 250g/L EC Oxadiazon 35% SC Metamifop 15% EC Propanil30% + Metamifop 10% EC Oxadiargyl 10% EC Oxadiargyl 400g/L SC Oxadiargyl 10% OD Propanil34% EC

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Pesticide Technical Product name	Content	OECD GLP
ABAMECTIN TC	92%	YES
Emamectin benzoate TC	95%	YES

Pesticide Formulation Product name

ABAMECTIN 1.8%EC ABAMECTIN 3.2% EC ABAMECTIN 3.6% EC EMAMECTIN BENZOATE 5%WDG EMAMECTIN BENZOATE 5.7%WDG

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Pesticide Technical Product name	Content	OECD GLP
Difenoconazole	96%	YES
Chlorothalonil	98%	YES
Lambda-cyhalothrin	96%	YES
Fluazinam	98%	YES

Pesticide Formulation Product name

Abamectin + Spirotetramat 155 g/L SC Clothianidin + Lambda-cyhalothrin 280 g/L ZC Butachlor + Oxadiargyl 318 g/L CS Chlorantraniliprole + Lambda-cyhalothrin 150 g/L ZC S-metolachlor 480 g/L CS Clothianidin + Pymetrozine 220 g/L SC Pyraclostrobin + Tebuconazole 345 g/L Carboxin + Thiamethoxam + Thiram 380 g/L FS Cyazofamid + Cymoxanil 255 g/L SC Cyhalofop-butyl + Penoxsulam 167 g/L OD

Most Valuable Global Registration		
Product	Registration Area	
Gibberellic acid + Indol-3-ylacetic acid + 14-hydroxylated brassinosteroid 0.136%	Global	
Cymoxanil + Dimethomorph 700 g/Kg	Global	
Flumioxazin + S-metolachlor 350 g/L	Global	
Prothioconazole + Pyraclostrobin 340 g/L	Global	
Lambda-cyhalothrin + Lufenuron 160 g/L	Global	
Lambda-cyhalothrin 250 g/L	Global	
Mesotrione + Nicosulfuron 140 g/L	Global	
Chlorantraniliprole + Emamectin benzoate 63 g/L	Global	
Boscalid + Cyprodinil 285 g/L	Global	
S-metolachlor + Terbuthylazine 424 g/L	Global	

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Pesticide Technical Product name	Content	OECD GLP
ABAMECTIN	95%	YES
EMAMECTIN BENZOATE	95%	NO
SPINOSAD	92%	NO
SPINETORAM	82%	NO
GIBBERELLIC ACID	90%	NO

Pesticide Formulation Product name

ABAMECTIN FORMULATION EC EMAMECTIN BENZOATE FORMULATION WG SPINOSAD FORMULATION SC SPINETORAM FORMULATION SC

Most Valuable Global Registration		
Product	Registration Area	
SPINOSAD TC	EU,US	
ABAMECTIN TC	Australia	
GIBBERELLIC ACID TC	EU,Australia	
EMAMECTIN BENZOATE TC	Australia	

Qingdao Zhongda Agritech Co., Ltd.

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Pesticide Technical Product name	Content	OECD GLP
oligasaccharins	85%	NO

Pesticide Formulation Product name

Kasugamycin0.5%+Metalaxyl-M0.2% GR Tebuconazole30%+Trifloxystrobin10% SC Oligosaccharins5.995%+28-homobrossinolide0.005% SL Chlorfenapyr28.5%+Chlorantraniliprole9.5% SC Fluopicolide15%+Cyazofamid10% SC Oxine copper33%+Kasugamycin3% SC Copper oxychloride700g/I SC 8% Fluopyram + 32% Oxine-copper SC 25% Bifenazate + 15% Cyflumetofen SC 7.5% Dinotefuran + 22.5% Pyridaben SC

Rainbow Agro

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- 🙎 Rainbow
- in rainbowagro.com

Pesticide Technical Product name	OECD GLP
Glyphosate	YES
Glufosinate ammonium	YES
2,4-D	YES
MCPA	YES
Atrazine	YES
Ametryn	YES
Flumioxazin	YES
Sulfentrazone	YES
Clethodim	YES
Captan	YES

Pesticide Formulation Product name

Glyphosate Isopropylamine Salt 480G/L SL Glufosinate-ammonium 200G/LS SL Paraquat 200G/L SL 2,4-D Dimethylamine Salt 720G/L SL MCPA 750G/L SL Atrazine 90% WG Ametryn 80% WG Clethodim 240G/L EC S-metolachlor 960g/I EC Chlorantraniliprole 200G/L SC

Most Valuable Global Registration

Product	Registration Area
2,4-D 2-ethylhexyl ester 452.5G/L + Florasulam 6.25G/L SE	Russia
pyroxasulfone	Argentina
Ethiprole 200G/L SC	Brazil
Propamocarb Hydrochloride 625G/L + Fluopicolide 62.5G/L SC	South Africa
Cyprodinil 37.5% + Fludioxonil 25% WG	Mexico
pyroxasulfone 850WG	Australia
Spinosad 480 SC	UK
Boscalid 26.7% + Pyraclostrobin 6.7 % WG	ltaly
Clethodim 120 EC	Poland

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Pesticide Technical Product name	Content	OECD GLP
S-metolachlor	97%	YES
Terbuthylazine	97%	YES
Pendimethalin	97%	YES
Fluazifop-p-butyl	97%	YES
Mesosulfuron-Methyl	98%	YES
Fomesafen	97%	YES
Flumioxazin	97%	YES
Bentazone	97%	YES
Glufosinate-ammonium	97%	YES
Mesotrione	97%	YES

Pesticide Formulation Product name

S-metolachlor 96% EC Terbuthylazine 87.5% WG Pendimethalin 45% CS Mesosulfuron-Methyl 3%+Iodosulfuron-methyl 0.6% WG Fluazifop-p-butyl 15% EC Fomesafen 25% SL Flumioxazin 2%+S-metolachlor 50% SE Bentazone 48% SL Glufosinate-ammonium 60%+Flumioxazin 6% WP Flumioxazin 48% SC

Most Valuable Global Registration		
Product	Registration Area	
Terbuthylazine	EU/Australia/America	
Mesotrione	EU/America	
Bentazone	EU/Australia	
S-metolachlor	Australia/America	
Fluazifop-P-butyl	EU/Australia	
Mesosulfuron-Methyl	EU/Australia	
Fomesafen	America	
Pendimethalin	EU/Australia	
Glufosinate-ammonium	Australia/America	
Flumioxazin	EU/Australia/America	

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Pesticide Technical Product name	OECD GLP
Clethodim	YES
Imazethapyr	YES
lmazapyr	YES
Imazapic	YES
lmazamox	YES
Clomazone	YES
Dimethomorph	YES
Picolinafen	YES
2,4-DB	YES
Pyraflufen-ethyl	YES

Pesticide Formulation Product name

Clethodim 240g/L EC Clethodim 360g/L EC Imazethapyr 100g/L SL Imazethapyr 70% WG Imazamox 70% WG Clomazone 480/500 g/L EC Clomazone 360g/L CS Flumioxazin 50% WP Dimethomorph 50% WP Dimethomorph 500g/L SC

Most Valuable Global Registration		
Product	Registration Area	
Clethodim TC	Argentina,Brazil,EU,Australia,UK	
Clethodim 240g/L EC/ Clethodim 360g/L EC	Argentina,Brazil	
Imazethapyr TC	Argentina, Brazil, Australia	
lmazapyr TC	Australia, Argentina, Brazil	
Imazapic TC	Australia, Argentina, Brazil	
Imazamox TC	EU,UK,Argentina	
Clomazone TC	EU, Argentina, Brazil, Australia	
Dimethomoroph TC	Australia,UK,Argentina,Brazil,Mex co	
Pyraflufen-ethyl TC	Australia,EU,UK,Argentina	
Picolinafen TC	EU,UK,Australia	
2.4-DB TC	UK.FU.Australia.Argentina	

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Pesticide Technical

Product name	Content	OECD GLP
Haloxyfop-P-methyl	98%	YES
Fluazifop-P-butyl	95%	YES
Penoxsulam	98%	NO
MCPA SODIUM	88%	NO
Cyhalofop-butyl	98%	NO
Clodinafop-propargyl	97%	NO
Metamifop	98%	NO
Glufosinate-L- ammonium	92%	NO
Picoxystrobin	98%	NO
Fluazinam	98%	NO

Shandong Jingbo Agrochemicals Technology Co., Ltd.

Pesticide Technical Product name	Content	OECD GLP
Quizalofop-p-ethyl	98%	YES
Nicosulfuron	95%	YES
Topramezone	97%	YES
Pyroxasulfone	98%	YES
Flumioxazin	97%	YES
Trifloxystrobin	98%	YES
Kresoxim-methyl	98%	YES
Boscalid	98%	YES
Indoxacarb	98%	YES
Flonicamid	97%	YES

Pesticide Formulation Product name

Quizalofop-p-ethyl 5% EC Nicosulfruon 40g/l OD Topramezone 30% SC Flumioxazin 50% WP Tebuconazole 50%+Trifloxystrobin 25% WDG Kresoxim-methyl 50% WDG Boscalid 50% WDG Indoxacarb 15% EC Indoxacarb 30% WDG Flonicamid 50% WDG

Most Valuable Global Registration			
Product	Registration Area		
Indoxacarb	Brazil		
Quizalofop-p-ethyl	Australia		
Indoxacarb	Australia		
Prothioconazole	Australia		
Quizalofop-p-ethyl	EU		
Nicosulfuron	EU		
Flonicamid	EU		
Boscalid	EU		
Trifloxystrobin	EU		
Prothioconazole	EU		

Shandong Kangqiao Bio-technology Co., Ltd.

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Pesticide Technical Product name	Content	OECD GLP
Pyraclostrobin	98%	YES
Spirodiclofen	98%	YES
Thifluzamide	96%	YES

Pesticide Formulation Product name

Pyraclostrobin 25% SC Pyraclostrobin 250g/L EC Pyraclostrobin5%+Metiram55% WDG Pyraclostrobin6.7%+Dimethomorph12% WDG Pyraclostrobin13%+Boscalid25% WDG Pyraclostrobin12.5%+Thifluzamide12.5% SC Pyraclostrobin23.7%+Epoxiconazole14.3% SC Pyraclostrobin15%+Difenoconazole25% SC Spirodiclofen 240g/L SC Thifluzamide 240g/L SC

Most Valuable Global Registration			
Product Registration Area			
Pyraclostrobin TC	EU		
Pyraclostrobin 250g/L EC	Canada		
Spirodiclofen 98% TC	Brazil		
Thifluzamide 96% TC	Brazil		

Shandong Luba Chemical Co., Ltd.

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Pesticide Technical Product name	Content	OECD GLP
Paraquat	42%, 45%	YES
Diquat	40%	YES
Glufosinate-P	90%	YES
Fluroxypyr-Meptyl	98%	YES
Haloxyfop-P-Methyl	97%	YES
Topramezone	97%	YES
Metamifop	96%	YES
Chlorpyrifos	97%	YES
Malathion	95%	YES
Penoxsulam	97%	YES

Pesticide Formulation Product name

Paraquat 200g/L, 250g/L SL Diquat 20%,32% SL Glufosinate-P 10%,20% SL Fluroxypyr 200g/L EC Haloxyfop-P-Methyl 108g/L,20%, 48% EC Topramezone 30% SC Metamifop 10% EC Chlorpyrifos 40% 45%EC Malathion 45%EC 950g/L ULV Penoxsulam 20% SC

Most Valuable Global Registration		
Product	Registration Area	
Chlorpyrifos TC/EC	Brazil	
Diquat TC/SL	Brazil	
Malathion TC/EC	Brazil	
Haloxyfop TC/	Brazil	

Shandong New Power Biotechnology Co., Ltd., Dezhou New Power Fine Chemical Co.,Ltd.,

- xsl_wudp@163.com
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Pesticide Technical Product name	Content	OECD GLP
Indoxacarb	97%	YES
Diafenthiuron	98%	YES
Cyenopyrafen	97%	NO
DIPPI	97%	NO

Pesticide Formulation Product name

lambda-cyhalothrin 5%+imidacloprid10% SC Spirotetramat 11%+Buprofezin 22% SC Kasugamycin 3%+zhongshengmycin 2% SC Indoxacarb 15% SC Indoxacarb 30% WDG Indoxacarb 9% +Diafenthiuron 36% SC Indoxacarb 12.5% +Chlorantraniliprole 12.5% SC Indoxacarb 5%+ Chlorfenapyr 10% SC Cyenopyrafen 30% SC Cyenopyrafen 20%+ Bifenazate 30% SC

SHANDONG SINO-AGRI UNITED BIOTECHNOLOGY CO., LTD.

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- Frank Yanghttps://www.sdznlh.com/

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Pesticide Technical Product name	Content	OECD GLP
Imidacloprid	97%	YES
Acetamiprid	99%	YES
Nitenpyram	98%	YES
Pymetrozine	98%	YES
Propamocarb hydrochloride	95%	YES
Chlorfenapyr	98%	YES
Pyridaben	98%	YES
Propyzamide	98%	YES
Diflufenican	98%	YES
Dicamba	98%	YES

Pesticide Formulation Product name

Imidacloprid 2%-70% ALL Acetamiprid 5%-60% ALL pyraclostrobin 5% +fluopimomide 25% ZC Nitenpyram 20% + Pymetrozine 60% WG Azoxystrobin 200g/L+ Difenoconazole 125g/L SC Thiamethoxam 12.6% +lambda-cyhalothrin 9.6% ZC Emamectin Benzoate 5.7% WG Chlorfenapyr 240g/L SC Glufosinate-ammonium 200g/L SL Florasulam 0.6%+ 2,4-D-estylhexyl 45.4% SC

COMPANY SHOWCASE

Shandong Xinlong Pharmaceutical co., ltd

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- Rose Liu
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Pesticide Technical Product name	Content	OECD GLP
chlorfenapyr		YES
flusilazole	95%	YES
Epoxiconazole		NO

Posticido	Formul	lation	Produ	ict name
i esticide	1 Unitu	ation	11000	ict name

chlorfenapyr 240g/l chlorfenapyr 360g/l emamectin benzoate1.8%+chlorfenapyr 19% Chlorfenapyr 24%+Lufenuron 6% Flusilazole 400g/l EC Flusilazole 25% EW Chlorfenapyr 20%+Chlorantraniliprole 10% Chlorfenapyr 15%+Tolfenpyrad 15% Flusilazole 12%+Carbendazim 25% Chlorfenapyr 10%+Flonicamid 10%

Most Valuable Global Registration			
Product	Registration Area		
chlorfenapyr TC	Brazil		
chlorfenapyr TC	Australia		
chlorfenapyr 240g/L SC	Philippines		
Chlorfenapyr 20%+Chlorantraniliprole 10% SC	Indonesia		
emamectin benzoate 1.8%+chlorfenapyr 19% SC	Vietnam		

Shanghai Heben-Eastsun Medicaments Co., Ltd.

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Pesticide Technical Product name	OECD GLP
Azoxystrobin	YES
Chlorfenapyr	NO

Pesticide Formulation Product name

Azoxystrobin 250G/L SC Chlorfenapyr 240G/L SC Azoxystrobin 200G/L+ Difenoconazole 125G/L SC Azoxystrobin 200G/L+ Cyproconazole 80G/L SC Aluminum Fosetyl 80% WDG Fipronil 80% WDG Prothioconazole 210G/L+ Tebuconazole 210G/L SC

Most Valuable Global Registration		
Product	Registration Area	
Azoxystrobin TC	Brazil	
Azoxystrobin TC	Australia	

Shanghai Profirst Co., Ltd.

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- +86-13701791095/+86-15902190115

Pesticide Technical Product name	Content	OECD GLP
Abamectin	95%	NO
Chlorfenapyr	98%	NO
Clothianidin	97%	NO
Dichlorvos	95%	NO
Triflumuron	98%	NO
Hydramethylnon	95%	NO
Fluazinam	98%	NO
Lambda-cyhalothrin	96%	NO
Mepiquat chloride	98%	NO
1-NAA (Na)	98%	NO

Pesticide Formulation Product name

Ethephon 40%/70% SL

Metaldehyde 5%/6%/10%/12%/15% GR Petroleum oil 95% EC

Adjuvant

Tank mix adjuvant: Organosilicone surfactant PASS (or low-foaming PASS-LF)

Tank mix adjuvant: Tank cleaner Pro-Clean Tank mix adjuvant: Drift control agent Pro-ATD N for drones Tank mix adjuvant: Compatibility agent Pro-Mix for drones Tank mix adjuvant: Water conditioner Pro-Buffer L2A Tank mix adjuvant: Silicone defoamer Pro-DFM Tank mix adjuvant: Vegetable oil adjuvant Pro-MSO Plus In-can additive: Calcium dodecylbenzene sulfonate In-can additive: Sodium dioctyl sulfosuccinate In-can additive: Tristyrylphenyl ether phosphate TEA salt In-can additive: Alcohol ethoxylates In-can additive: Castor oil ethoxylates In-can additive: Alkyl Polyglucoside In-can additive: Surfactants for Glyphosate/ Glufosinateammonium/Paraguat/Diguat SL In-can additive: Thickening emulsifier for Abamectin EC In-can additive: Surfactants for SL/SC/EC/OD Solvents: methyl oleate, solvent oil, N,N-dimethyl (C8-10) amide

Shanghai Yuelian Biotech Co., Ltd.

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- +86 158 0086 5613

Pesticide Formulation Product name

Azoxystrobin 20% + Flutriafol 20% SC Cyazofamid 8% + Cymoxanil 16% SC Fluxapyroxad 7.5% + Propiconazole 15% ME Difenoconazole 20% + Pyraclostrobin 20% ME Prohexadione calcium10% SC Chlorantraniliprole 19% + Emamectin benzoate 5% OD Saflufenacil 1% + Glyphosate 39% OD Flonicamid 15% + Acetamiprid 10% ME Methoxyfenozide 30% + Indoxacarb 10% SC Dinotefuran 8% + Tolfenpyrad 12% ME

Shaoxing East lake High-Tech CO., LTD

 jisheng@el-ht.com +86 13957570775 Ji Sheng 		0.000	
 www.el-ht.com 13957570775 		13.39	
Pesticide Technical Product name	Content	OECD GLP	
Ethephon	93%	YES	
Pesticide Formulation Product name			
Ethephon 40% SL Ethephon 75% SL Ethephon 70% SL Ethephon 1% PA	Ethephon Ethephon Ethephon	2.5% PA 5% PA 12.5% PA	

Shaoxing Shangyu Xin Yinbang Biochemical CO.,LTD

rjm@ybchem.com +86 13616749358 Jimmy www.xybchem.com 13616749358 **Pesticide Technical** Content OECD GLP Product name Bifenazate 97 YES Methoxyfenozide 97 YES Prothioconazole 98 YES 99 NO Hymexazol Rimsulfuron 95 NO

COMPANY SHOWCASE

Pesticide Formulation Product name

Bifenazate 43% SC Bifenazate 50% SC Methoxyfenozide 24%SC

Shenzhen Baocheng Chemical Industry CO., LTD.

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Pesticide Technical Product name	Content	OECD GLP
CHLORANTRANILIPROLE	97%	YES
SPIROTETRAMAT	98%	YES
TEFLUBENZURON	97%	YES
BROMACIL	95%	YES
FLUMIOXAZIN	97%	YES
PYROXASULFONE	96%	YES
TOPRAMEZONE	97%	YES
FLUOPYRAM	98%	YES
PROTHIOCONAZOLE	97%	YES
TEMBOTRIONE	95%	YES

Pesticide Formulation Product name

Cyhalofop-butyl + Bispyribac-sodium OD TEBUCONAZOLE + PROTHIOCONAZOLE EC/SC Glyphosate+Glufosinate SL Cletodim + Haloxifop-p-methyl EC Trifloxystrobin + Tebuconazole SC CHLORFENAPYR + CHLORANTRANILIPROLE SC Dinotefuran + Bifenthrin SC Flumioxazin + Diclosunam WDG PYRACLOSTROBIN + EPOXICONAZOLE SC TEMBOTRIONE + ATRAZINE OD

Most Valuable Global Registration		
Product	Registration Area	
Glyphosate 480 SL	Switzerland	
Bromacil TC	Mexico	
Pyraclostobin TC	Paraguay	
Clethodim 240 EC	Australia	
Glufosinate 200 SL	Australia	
Azoxystrobin 250 SC	Australia	

SHIJIAZHUANG NONGXIN BIO-TECHNOLOGY GROUP CO., LTD

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Pesticide Technical Product name	Content	OECD GLP
Chlorothalonil	98%	YES
Imidacloprid	97%	YES
Glyphosate	95%	NO
Cypermethrin		NO

Pesticide Formulation Product name

Chlorantraniliprole30% SC Chlorantraniliprole12.5%+Indoxacarb12.5% SC Chlorfenapyr15%+tolfenpyrad15% SC Pyriproxyfen15%+Spirotetramat10% SC Chlorantraniliprole12.4%+Lambda-cyhalothrin6.3% SC Prothioconazole20%+Penconazole20% SC chlorfenapyr15%+Tolfenpyrad15 SC flonicamid25%+Pymetrozine37.5 WDG Acetamiprid15%+Spirotetramat15% SC Dinetofuran30%+Thiamethoxam20% WDG

MEEAN

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Pesticide Technical Product name	Content	OECD GLP
glyphosate tech	97%	YES

Sino-Agri Red Sun(Nanjing) Biological Technology Co., Ltd.

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- http://www.sino-agri-sal.com/

Pesticide Technical Product name	Content	OECD GLP
Glyphosate	95%	YES
Paraquat	42%	YES
Diquat dichloride	42%	YES
Diquat dibromide	40%	YES
Glufosinate-ammonium	95%	YES
Chlorantraniliprole	97%	YES
Pyroxasulfone	98%	YES
Topramezone	97%	YES
Lambda-cyhalothrin	96%	YES
Imidacloprid	97%	YES

Pesticide Formulation Product name

Chlorantraniliprole 100G/L+Lambda-cyhalothrin 50G/L ZC Flonicamid 30%+Acetamiprid 20% WDG Thiamethoxam 12.6% + Lambda-cyhalothrin 9.4% SC Azoxystrobin 20% + Difenoconazole 12.5% SC Prothioconazole 175G/L+Trifloxystrobin175G/L SC Cyhalofop-butyl 5% + Penoxsulam 1% OD Pyroxasulfone85% WDG Saflufenacil70% WDG Glyphosate 30% + Glufosinate-ammonium 10% SL Imidacloprid 30% + Lambda-cyhalothrin 10% SC

Most Valuable Global Registration		
Product	Registration Area	
Pyroxasulfone TC	Australia	
Prothioconazole TC	Brazil	
Fluazinam TC	Brazil	
Mancozeb	Brazil	
Triclopyr-butotyl	Brazil	

Sinochem Agro Co.,Ltd

http://www.sinochemagro.com/

Pesticide Technical Product name	Content	OECD GLP
Glyphosate	95%	YES
Clethodim	94%, 70%TK,37%TK,	YES
Paraquat	42%TK	YES
Bifenthrin	97%TC	YES
Fluazinam	97%TC	YES
GLufosinate	95%TC	YES
Haloxyfop-p-methyl	97%TC	YES
Trinexapac-ethyl	96%TC	YES
Tebuconazole	95%TC	YES
Dicamba	98%TC	YES

Pesticide Formulation Product name

Glyphosate 72% WG Clethodim 240/360 EC Paraquat 200 SL Glyphosate 540K SL Clethodim 15% + Haloxyfop-p-methyl 7.5% EC Glyphosate IPA 480 SL Atrazine 90% WG

TRUSTCHEM CO., LTD

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Pesticide Technical Product name	Content	OECD GLP
2,4-D		YES
2,4-D EHE	96%	YES
IMAZAMOX		YES
FLUMETSULAM		YES
MCPA	97%	YES
MCPA EHE	96%	YES
METHOXYFENOZIDE	97%	YES
IMAZALIL	98%	YES
FLORASULAM		YES
PROPICONAZOLE		YES

Pesticide Formulation Product name

GLYPHOSATE IPA 41% SL GLYPHOSATE POTASSIUM SALT SL(620G/L;540G/L) GLYPHOSATE 68%, 72%, 88% SG GLUFOSINATE 200,150G/L SL 2,4D AMINE 720,860,806 G/L SL 2,4D AMINE 240G/L+PICLORAM 64G/L SL IMAZAMOX 70% WDG EMAMECTIN BENZOATE 10% +LUFENURON 40% WG 450G/L PENDIMETHALIN CS 10%ABAMECTIN CS 23% LAMBDA-CYHALOTHRIN CS

Most Valuable Global Registration		
Product	Registration Area	
Nicosulfuron 96% TC	Brazil	
Nicosulfuron 40g/L OD	Brazil	
Imazamox 98% TC	Canada	
Pinoxaden 97% TC	Canada	
Imazamox 98% TC	EU	
Methoxyfenozide 98% TC	EU	
Imazalil 98% TC	EU	
Pinoxaden 97% TC	EU	

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- C chongzi489755

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Product name	Content	OECD GLP
Clethodim	94%	YES
Flumioxazin	98%	YES
Oxyfluorfen	97%	YES
Metalaxyl-M	94%	YES
Prothioconazole	97%	YES
Imazalil	98%	YES
Myclobutanil	98%	YES
Ethiprole	94%	YES
Spirotetramat	97%	YES

Pesticide Formulation Product name

Most Valuable Global Registration

Registration Area

EU,US,Australia,Brazil,Argentina

US,Brazil,Argentina

Australia, US, Brazil, Argentina

Brazil, US, EU, Argentina

US,Brazil Australia,EU

Australia, US, Brazil, Argentina

US,Brazil,Argentina

EU,Australia,Brazil,Argentina

Australia,US

Prothioconazole 210g/l + Tebuconazole 210g/l SC

Prothioconazole 34% + Picoxystrobin 40% WG

Prothioconazole 480g/l SC

Ethiprole 200g/l SC

Clethodim 360g/l EC

Clethodim 480g/l EC

Flumioxazin 480g/l SC

Flumioxazin 51% WG

Bromacil 80% WG/WP

Pinoxaden 100g/l EC

Product

Clethodim

Clethodim

Clethodim

Flumioxazin

Flumioxazin

Pinoxaden Metalaxyl-M

Metalaxyl-M +

Chlorothalonil

Prothioconazole Prothioconazole

YONEL

YongNong BioSciences CO.,LTD.

- jackwang@yongnongchem.com
- Jack Wang
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Pesticide Technical Product name	Content	OECD GLP
Glufosinate-P	91%	YES
Glufosinate-ammonium	95%	YES
Diquat	40%	YES
Picloram	95%	YES
Aminopyralid	95%	YES
Desmedipham/ Phmedipham	97%	YES
Metamitron	98%	YES
Ethofumesate	97%	YES
Prochloraz	90%	YES
Fipronil	97%	YES

Pesticide Formulation Product name

Etoxazole 72%/80% WDG Bifenazate 480g/L SC Spirodiclofen 240g/L SC Acequinocyl 150g/L SC Chlorpyrifos 47.5/400/500g/L + Cypermethrin 4.75/ 40/50g/ L EC Chlorfenapyr 240g/L SC Indoxacarb 150g/L SC Pyraclostrobin 250g/L EC Desmedipham 71g/L +Phmedipham 91g/L + Ethofumesate 112g/L EC Clopyralid 267g/L + Picloram 67g/L SL

Most Valuable Global Registration			
Product	Registration Area		
Diquat 240g/L	Canada		
Glufosinate-ammonium 150g/L	Canada		
Glufosinate-ammonium 280g/L	Canada		
Acequinocyl 150g/L	US		
Diquat 200g/L	Brazil		
Glufosinate-ammonium 200g/L	Brazil		
Trifloxystrobin 50%	Brazil		
Ethiprole 200g/L	Brazil		
Glufosinate-P 100g/L	Nigeria/Kenya		
Glufosinate-P 100g/L	Vietnam		

Zhejiang Corechem Co.,Ltd

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Pesticide Technical Product name	Content	OECD GLP
Hexazinone		YES
Ethephon	91%	YES
Diflufenican		YES
Fluazinam		YES
Flumioxazin 97% TC		NO

Pesticide Formulation Product name

Hexazinone 25% SL Ethephon 40%SL Ethephon 900g/L SL Diflufenican 500g/l SC Fluazinam 500g/l SC

Most Valuable Global Registration			
Product	Registration Area		
Hexazinone TC	Brazil		
Ethephon TC	Brazil		
Diflufenican TC	Brazil		
Fluazinam TC	Brazil		
Flumioxazin 97% TC	EU		

COMPANY SHOWCASE

Zhejiang Hetian Chemical Co., Ltd

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Pesticide Technical Product name	Content	OECD GLP
Tebuthiuron	98%	YES
Flumetsulam	98%	NO
Flumetralin	98%	NO
Fluazinam	98%	NO
Fenhexamid	98%	NO
Propargite	90%	NO

Pesticide Formulation Product name

Tebuthiuron 500g/l SC Flumetsulam 80% WDG Tebuthiuron 20% G Propargite 730g/l EC Flumetralin 125g/l EC Flumetralin 125g/l+butralin 180g/l EC Fluazinam 500g/l SC Fluazinam 200g/l+dimethomorph 200g/l SC Thidiazuron 360g/l+diuron 180g/l SC Carbosulfan 200g/l EC

Most Valuable Global Registration		
Product	Registration Area	
tebuthiuron	Brazil, Australia	

Zhejiang Sega Science and Technology Co., Ltd

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Pesticide Technical Product name	Content	OECD GLP
Lufenuron		YES
Tricyclazole	95%	NO
Emamectin benzoate	95%	YES
Proparmocarb	95%	NO
Tridermorph	98%	NO
Flutriafol	95%	NO
Difenoconazole	95%	NO
Pinoxaden	95%	YES
Brassinolide	90%	NO
Gibberellic acid	90%	NO

Pesticide Formulation Product name

Lufenuron40%+Emamectin benzoate5% WG Lufenuron 5% EC Nitenpyram10% SL Dinotefuran40% SG Pinoxaden5% EC Difenoconazole15%+Propiconazole15% EC Tricyclazole 75% WG Famoxadone22.5%+Cymoxanil30% WG Tridemorph 86% OL Brassinolide0.002%+GA47 0.398% SL

Most Valuable Global Registration		
Product	Registration Area	
Lufenuron	Brazil	
Flutriafol	Brazil	

Tide Group

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Pesticide Technical Product name	OECD GLP
Glyphosate	YES
Glufosinate ammonium	YES
2, 4-D	YES
Clethodim	YES
Picoxystrobin	YES
Mesotrione	YES
Azoxystrobin	YES
Imidacloprid	YES

Pesticide Formulation Product name

Glyphosate Isopropylamine Salt 480G/L SL Glufosinate-ammonium 280G/L SL 2,4-D Dimethylamine Salt 806G/L SL Clethodim 240G/L EC Hydrogen cyanamide 50% SL Malathion 1000G/L EC Azoxystrobin 250G/L SC Acephate 90% WDG Paclobutrazol 250G/L SC

Zhejiang Udragon Pesticides and Chemicals Co., Ltd.

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Christina Wuwww.udragon.com.cn

Pesticide Technical Product name	Content	OECD GLP
Difenoconazole	95%	YES
Fludioxonil	99%	YES
Penconazole	97%	YES
Tetraconazole	95%	YES
Metconazole	98%	YES
Fluxapyroxad	98%	YES
Trifloxystrobin	97.5%	YES
Zoxamide	98%	YES
Boscalid	98%	YES
Tiorantraniliprole	95%	YES

Pesticide Formulation Product name

Difenoconazole 250g/L EC Difenoconazole 125g/L+Azoxystrobin 200g/L SC Fludioxonil 25%+Cyprodinil 37% WDG Penconazole 100g/L EC Boscalid 50% WDG Prothioconazole 175g/L+Trifloxystrobin 150g/L SC Tiorantraniliprole 10% SC Tiorantraniliprole 10%+Chlorfenapyr 15% SC Zoxamide 20%+Metalaxyl-M SC Difenoconazole 25%+Fluxapyroxad 10% SC

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Pesticide Technical Product name	Content	OECD GLP
S-metolachlor	97%	YES
Atrazine	97%	YES
Ametryn	97%	YES
Prometryne	96%	YES
Terbuthylazine	97%	YES
Mesotrione	98%	YES
Bentazon	97%	YES
Propanil	98%	YES
Chlorantraniliprole	95.3%	YES
Metamitron	98%	YES

Pesticide Formulation Product name

Atrazine 38% SC, 48% WP, 50% SC, 80% WP, 90% WG S-metolachlor 960g/I EC Bentazone 480g/L SL, 560g/L SL S-metolachlor+Atrazine 670g/L SE Metamitron 58% SC, 75% WG Mesotrione 10% OD, 15% SC, 40% SC, 75% WG Ametryn 40% WP, 50% SC, 80% WG, 80% WP Prometryn 40% WP, 50% SC Terbuthylazine 50% SC, 88% WG, 90% WG Glyphosate / AS, 41% SL, 510g/L SL, 68% SG

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产品名称	Product	产品名称	Product
精草铵膦原药92%	L-Glufosinate 92%TC	2-氯-5-氯甲基吡啶	2-Chloro-5-chloromethyl pyridine(CCMP)
高效氟吡甲禾灵原药97%	Haloxyfop-R-methyl 97%TC	2,3-二氯-5-三氟甲基吡啶	2,3-Dichloro-5-trifluoromethyl pyridine (DCTF)
精吡氟禾草灵原药95%	Fluazifop-P-butyl 95%TC	2-氨基-3-氯-5-三氟甲基吡	2-Amino-3-chloro-5- (trifluoromethyl)pyridine(ACTF)
2甲4氯钠盐 88%	MCPA SODIUM 88% TC	2-氯-3-三氟甲基吡啶	2-Chloro-3-trifluoromethyl pyridine
五氟磺草胺原药98%	Penoxsulam 98%TC	2-氯-4-三氟甲基吡啶	2-chloro-4-trifluromethyl pyridine
五氟磺酰氯98.5%	2-(2,2-difluoroethoxy)-6-(trifluoroMethyl) benzene-1-sulfonyl chloride	2-氯-5-三氟甲基吡啶	2-Chloro-5-trifluoromethyl pyridine (CTF)
嘧 啶 胺 98%	2-Amino-5,8-dimethoxy-[1,2,4] triazolo[1,5-c]pyrimidine	2-氯-6-三氯甲基吡啶	2-Chloro-6-trichloromethyl pyridine (CTC)
对羟基苯氧基丙酸99%	(R)-(+)-2-(4-Hydroxyphenoxy) propionic acid(DHPPA)	2-氟-6-三氟甲基吡啶	2-Fluoro-6-trifluoromethyl pyridine (FTF)
对羟基苯氧基丙酸甲酯99%	Methyl (R)-2-4-hydroxyphenoxy propionate(MAQ)	2-羟基-6-三氟甲基吡啶	2-Hydroxy-6-trifluoromethyl pyridine (HTF)
甲基亚磷酸二乙酯98%	Methyldiethoxyphosphine	3-异色酮	3-Isochromanone

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