

2,4-D Survey in China 2023

The Tenth Edition

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Kcomber Inc.

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Executive summary

2,4-D products, with a history of production and application exceeding 30 years in China, enjoy a stable market demand. Farmers prefer to use 2,4-D as a herbicide in wheat-, corn- and rice-growing fields or as a plant growth regulator applied on eggplant, tomato, pumpkin, watermelon, etc. However, the production of 2,4-D butylate products has been banned in China since late Jan. 2021.

In 2023, China's 2,4-D capacity reached 260,700 t/a and the output (converted to technical 100%) slipped to 58,500 tonnes. The ex-works price of 2,4-D technical dropped from the high level in late 2021 and kept the downtrend in 2022 and 2023.

Most 2,4-D products, including 96% 2,4-D technical, 98% 2,4-D technical, 720 g/L 2,4-D amine salt SL and 860 g/L 2,4-D amine salt SL, are for export. Although 2,4-D butylate products were withdrawn from Chinese market from Jan. 2023, demand of the replacements (such as 2,4-D-ethylhexyl) still allows 2,4-D to enjoy a promising prospect in China. In 2024, the expansion of new crop-growing area in China and North American markets is expected and the demand for 2,4-D is likely to increase at home and abroad in the coming future.

Scope and methodology

This report aims to demonstrate the development of 2,4-D industry in China and analyses the factors behind it. There are almost complete records and comments about technology, production, price, exports and consumption of this product in the report.

Region: China
Time scope: 2019–2023

Methodology

The report is drafted by diverse methods as follows:

1. Desk research

The sources of desk research are various, including published magazines, journals, government statistics, industrial statistics, customs statistics, association seminars as well as information from the Internet. A lot of work has gone into the compilation and analysis of the obtained information. When necessary, checks have been made with Chinese suppliers regarding market information such as key producers, key end users, production and demand.

2. Telephone interview

CCM has carried out extensive telephone interviews in order to survey the actual market situation of 2,4-D industry in China.

Interviewees cover:

- Key producers
- Key traders
- Associations
- Experts

3. Network research

CCM adopted network to contact with players in the industry through B2B websites and software. CCM also obtained registration information via network.

Data processing and presentation

The data collected and compiled are sourced from:

- CCM's database
- Published articles from periodicals, magazines and journals, and third-party databases
- Statistics from governments and international institutes
- Telephone interviews with domestic producers, service suppliers, governments, etc.
- Third-party data providers
- Customs statistics
- Comments from industrial experts
- Professional databases from other sources
- Information from the internet

The data from various sources have been combined and cross-checked to make this report as precise and scientific as possible. Throughout the process, a series of internal discussions took place in order to analyse the data and draw conclusions from them.

Unit

USD: currency unit in the US

RMB: currency unit in China, also called Yuan

Tonne: ton, equal to metric ton in this report

t/a: tonne/annual or tonne/year

/t: per tonne

Table 1 Abbreviations and full names

Abbreviation	Full name
AS	Aqueous solution
TC	Technical material
TK	Technical concentrate
EC	Emulsifiable concentrate
ICAMA	Institute for the Control of Agrochemicals, Ministry of Agriculture and Rural Affairs

Source: CCM

Table 2 USD/CNY exchange rate, Jan., 2016–Nov., 2023

Year	Jan.	Feb.	March	April	May	June	July	Aug.	Sept.	Oct.	Nov.	Dec.	Average
2016	6.5527	6.5311	6.5064	6.4762	6.5315	6.5874	6.6774	6.6474	6.6715	6.7442	6.8375	6.9182	6.6425
2017	6.8918	6.8713	6.8932	6.8845	6.8827	6.8019	6.7772	6.7148	6.5909	6.6493	6.6300	6.6067	6.7662
2018	6.5079	6.3045	6.3352	6.2764	6.3670	6.4078	6.6157	6.8293	6.8347	6.8957	6.9670	6.9431	6.6070
2019	6.8482	6.7081	6.6957	6.7193	6.7344	6.8896	6.8716	6.8938	7.0883	7.0726	7.0437	7.0262	6.8826
2020	6.9614	6.9249	6.9811	7.0771	7.0690	7.1315	7.0710	6.9980	6.8498	6.7796	6.7050	6.5921	6.9284
2021	6.5408	6.4623	6.4754	6.5584	6.4895	6.3572	6.4709	6.4660	6.4680	6.4604	6.4192	6.3693	6.4615
2022	6.3794	6.3580	6.3014	6.3509	6.5672	6.6651	6.6863	6.7467	6.8821	7.0992	7.2081	7.1225	6.6972
2023	6.9475	6.7492	6.9400	6.8805	6.9054	7.0965	7.2157	7.1283	7.1788	7.1789	7.1778	7.1104	7.0422

Source: The People's Bank of China

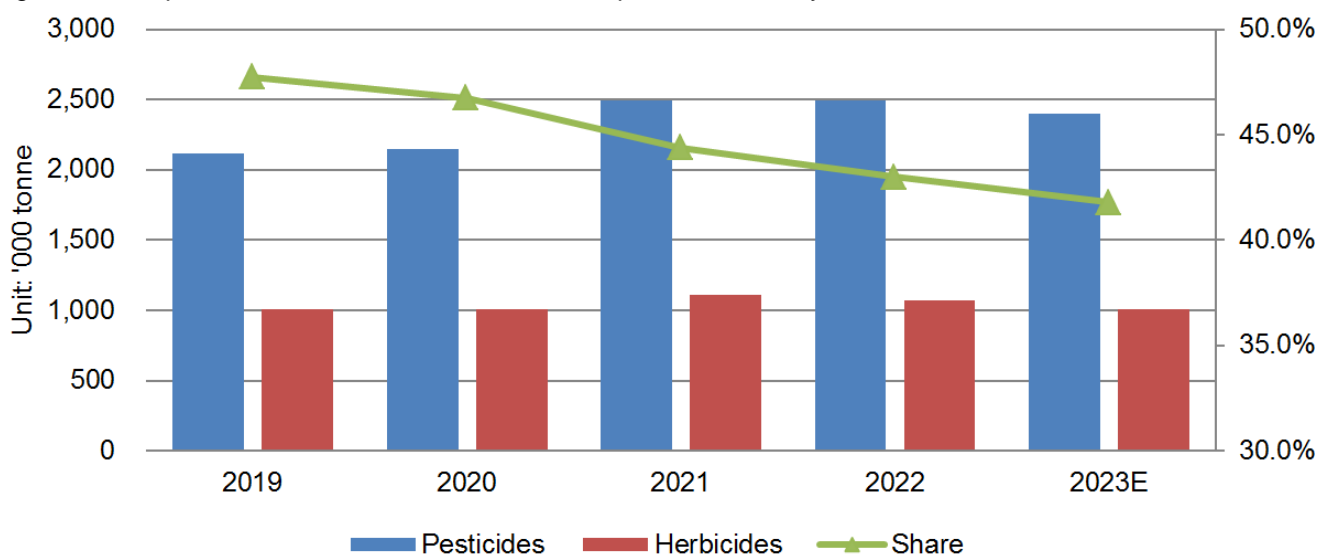
1 Brief introduction to 2,4-D in China

- Brief introduction to herbicide industry

China is now the world's largest exporter of pesticides, and herbicide is an important pesticide category. In recent years, amid the rising labour cost and the pursuit of higher efficiency and cost-effectiveness, herbicides have been widely used in agricultural production. However, the abuse of herbicides can easily lead to destruction of ecological environment and soil fertility. Therefore, in recent years multiple environmental protection policies rolled out and the output of herbicides in China showed a general downward trend. In 2022, China's herbicide output was 1,073,650 tonnes (converted to 100% technical), down by 1.5% year on year. According to National Bureau of Statistics of China, the output of pesticides (by 100% technical) reached 2.16 million tonnes in Jan.–Oct. 2023. It is expected that the 2023 output will be close to or lower than that in 2022, reaching 2,402,000 tonnes. As for herbicides, the largest pesticide category in China will stand at 40%+ of all pesticides, with the average output proportions in 2019–2023 about 45%.

In terms of export in 2022, China's pesticides marked an average price hike YoY, with the value increasing by 29.37% YoY yet the volume (actual volume, the same hereinafter) dropping by 12.49% YoY. Specifically, China exported 1,927,020 tonnes of pesticides at a total value of USD10,363 million. During Jan.–Dec. 2022, 1,517,969 tonnes of herbicides were exported, accounting for 78.77% of the total and amounting to USD7.67 billion; the total value of herbicide imports was USD127.24 million with a volume of 13,070 tonnes (=25.36% of the total).

Figure 1-1 Output and share of herbicides in China's pesticide industry, 2019–2023E



Note: All the volumes are calculated by 100% technical.

Source: National Bureau of Statistics of China

Table 1-1 China's imports and exports of pesticides and herbicides, 2019–2022

Year	Pesticides				Herbicides				Share of herbicides/pesticides			
	Import		Export		Import		Export		Import		Export	
	Volume, tonne	Value, million USD	Volume, tonne	Value, million USD	Volume, tonne	Value, million USD	Volume, tonne	Value, million USD	Volume	Value	Volume	Value
2019	90,000	762	1,468,000	4,860	14,300	100	992,000	2,715	15.89%	13.13%	67.57%	55.86%
2020	110,000	911	2,514,000	7,624	14,000	78	1,236,000	3,069	12.73%	8.57%	49.16%	40.25%

Year	Pesticides				Herbicides				Share of herbicides/pesticides			
	Import		Export		Import		Export		Import		Export	
	Volume, tonne	Value, million USD	Volume, tonne	Value, million USD	Volume, tonne	Value, million USD	Volume, tonne	Value, million USD	Volume	Value	Volume	Value
2021	104,000	917	2,202,000	8,010	17,000	100	1,390,000	4,900	16.35%	10.91%	63.12%	61.17%
2022	51,535	719	1,927,020	10,363	13,070	127	1,517,969	7,669	25.36%	17.70%	78.77%	74.01%

Note: All the volumes in the table are calculated by actual volume.

Source: General Administration of Customs of China

- Position of 2,4-D in herbicide industry

2,4-Dichlorophenoxyacetic acid (commonly referred to as 2,4-D) is one of the most widely used herbicides throughout the world. It effectively controls unwanted and invasive weeds across agricultural fields, lawns, public parks, lakes and more. Introduced in 1946, 2,4-D is among the most rigorously researched of all time.

Very few herbicides have been subjected to the extensive examinations and reviews that 2,4-D has withstood, and as a result, more is known about 2,4-D than almost any other herbicides on the planet. With more than 70 years' history, 2,4-D continues to be one of the most important herbicides for homeowners, land managers and farmers across the globe.

China began to introduce the technology and produce 2,4-D from the 1980s. After more than 30 years' development, China has become one of the major 2,4-D suppliers in the world. In order to survive and prosper in mounting environmental protection pressures, domestic manufacturers, especially large ones, have been seeking technological improvements to enhance their competitiveness, meanwhile expanding production capacity to enhance the market share. As of 2023, the country's capacity amounted to 260,700 t/a, with more new ones under construction or in planning progress.

Since 2019, 2,4-D products have performed stably and still been the mainstream herbicide products in China. The prohibitive use of paraquat AS and resistance against glyphosate might help stimulate the application of 2,4-D products. Plus, a large number of overseas pesticide manufacturers had stopped production of 2,4-D in their own countries and purchased the product from China. Besides, domestic producers expanded capacity in 2023, which greatly increased the share of China's 2,4-D in the global market.

2,4-D has the advantages of low toxicity, friendliness to the environment and mature technology. According to investigations, Chinese 2,4-D technical is mainly exported to overseas market. In the domestic market, enterprises sell its formulations mainly, such as 2,4-D amine salt SL. Most of the 2,4-D formulations are used in China's northern part for killing broadleaf weeds, while farmers in China's southern part usually use the 2,4-D amine salt to kill water hyacinth.

Table 1-2 Domestic output and consumption of 2,4-D technical and related shares in herbicides, 2019–2022

Year	Output, tonne		Output share	Consumption, tonne		Consumption share
	Herbicides (100% AI)	Output share		Herbicides (100% AI)	2,4-D (100% AI)	
2019	1,011,000	69,830	6.91%	95,000	11,230	11.82%
2020	1,004,000	64,144	6.39%	90,535	10,679	11.80%
2021	1,109,000	58,350	5.26%	86,517	10,420	12.04%
2022	1,073,650	61,870	5.76%	114,712	13,536	11.80%

Source: CCM

2 Production of 2,4-D in China

2.1 Technology

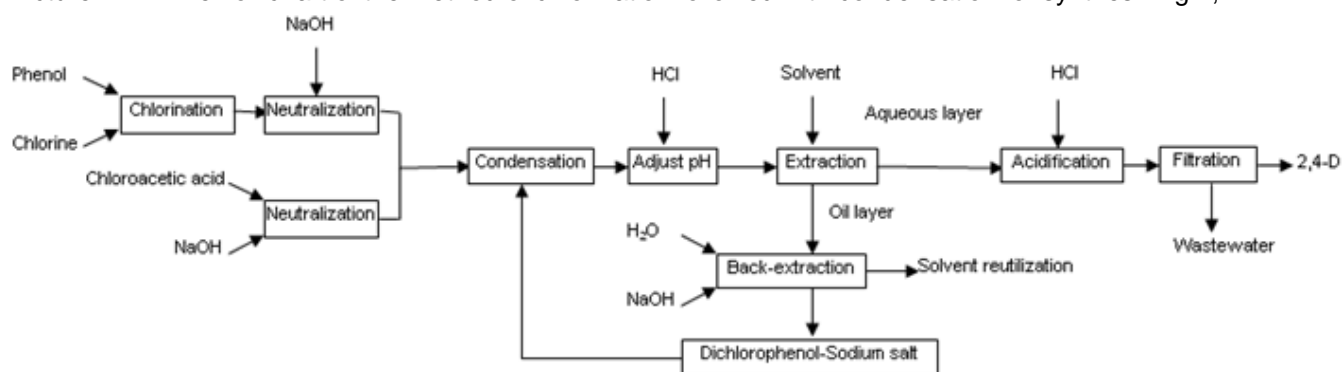
Currently, there are mainly two methods for synthesizing 2,4-D technical. The first method is chloridizing phenol by chlorine and then through condensation with chloroacetic acid; the second method is condensation and then followed by chlorination process.

At present, the first method is still widely adopted by most 2,4-D producers in China, which is probably going to change as the government becomes stricter on environmental protection. The process in the second method is more reasonable in theory and generates less pollutant, although there are still some technology problems that need to be solved during this process. In 2016, Jiangxi Tianyu Chemical Co., Ltd. put its new production line (capacity: 20,000 t/a) into operation in use of the second method.

The problems in the first method include: difficulty in controlling the completion time of phenol-chlorination, the intermediate compound (2,4-dichlorophenol)'s high content of phenol and byproducts, such as chlorophenol and trichlorophenol, as well as low product content.

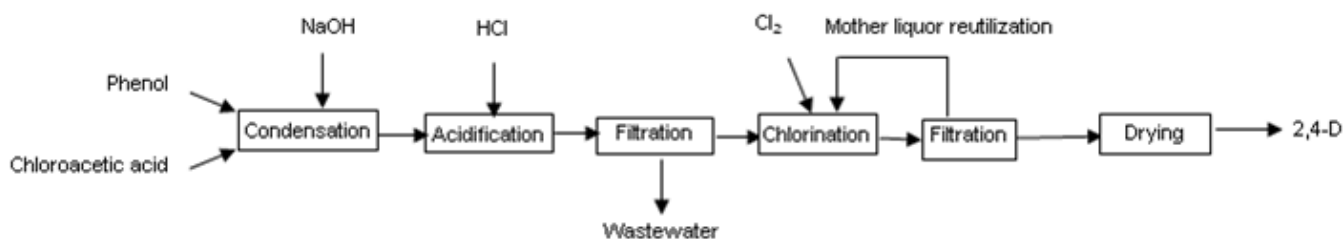
Major domestic 2,4-D technical producers like Changzhou Wintafone Chemical Co., Ltd. and Shandong Weifang Rainbow Chemical Co., Ltd. have been engaged in the research of 2,4-D synthesis technology for many years and have made great progress in improving the purity of 2,4-dichlorophenol and optimizing the production process of 2,4-D, etc., which makes the production process more environment-friendly and cost-effective.

Picture 2.1-1 The flowchart of the method of chlorination followed with condensation for synthesizing 2,4-D



Source: Ministry of Environmental Protection of the People's Republic of China & CCM

Picture 2.1-2 The flowchart of the method of condensation followed with chlorination for synthesizing 2,4-D



Source: Ministry of Environmental Protection of the People's Republic of China & CCM

Picture 2.1-3 Unit consumption volume of main raw materials in two methods for synthesizing 2,4-D

No.	Raw material	Specification	Chlorination first and then condensation	Condensation first and then chlorination
			Unit consumption, t/t	Unit consumption, t/t
1	Phenol	99.0%	0.490	0.450
2	Chloroacetic acid	98.0%	0.632	0.625
3	Liquid chlorine	99.9%	0.735	0.750
4	Liquid caustic soda	32.0%	1.982	2.180

Source: China Crop Protection Industry Association

Picture 2.1-4 Consumption of energy in two methods for synthesizing 2,4-D

No.	Item	Specification	Chlorination first and then condensation	Condensation first and then chlorination
			Consumption quota	Consumption quota
1	Water, t	0.4Mpa	10	10
2	Electricity, kWh	380V/220V	350	350
3	Steam, t	0.8/1.5Mpa	2	2

Source: China Crop Protection Industry Association

2.2 Key raw materials

Raw materials of 2,4-D production, mainly including chloroacetic acid and phenol, have been outsourced by most domestic producers. Their supply and prices have a great impact on 2,4-D industry.

- Chloroacetic acid

In 2021–2023, China's chloroacetic acid production has remained relatively stable, with domestic consumption showing a partially shrinking trend and exports increasing year by year, while the ex-works price of China's chloroacetic acid market was recorded at a low level. For instance, in Shandong Province where many 2,4-D producers are located, the average price of chloroacetic acid was USD449/t in Jan.–Nov. 2023, down by 38% compared with the annual price in 2022. In 2023, the chloroacetic acid price registered a continuous rise in Jan. to Feb., yet turned downward from March to Aug., staying around USD400/t; forced by significant loss margins, the manufacturers of chloroacetic acid lowered the production and the prices rebounded to USD685/t in Sept.; since the market demand indicates no improvement in Q4, the Oct. and Nov. prices slipped to USD549/t and USD432/t, respectively, while the price range in Dec. is unlikely to push up.

On 21 Feb., 2023, Hubei Minteng New Material Technology Co., Ltd. (Hubei Minteng)'s Phase II expansion and modification project of 300,000 t/a (from 24,000 t/a) chloroacetic acid and 150,000 t/a (from 120,000 t/a) epichlorohydrin plants officially began construction and expected to enter the commissioning stage by the end of 2024. On 14 Dec., 2022, the Environmental Impact Report of Phase II was publicised by the Ecological Environment Bureau of Jingzhou City, upon the construction completion of Phase I, which had achieved the one-time success of trial operation in Dec. 2022 (construction started in Nov. 2020) with production lines for 240,000 t/a chloroacetic acid and 120,000 t/a epichlorohydrin.

- Phenol

Phenol is a very important chemical raw material, mainly used in the production of phenolic resin, bisphenol A and caprolactam. It is also applied to produce pesticides, medicines and other products. Only about 5% of China's phenol consumption is used to produce 2,4-D each year.

Import volume of phenol went up year by year in 2018–2021, due to downstream demand growth and shrunk domestic supply caused by environmental protection inspections. In 2022, the total import volume slipped by

21.64% YoY to 409,300 tonnes, given that China was the first to resume production from the impact of COVID-19 pandemic, leading to more phenol capacities released in 2021 and 2022, coupled with the upgrading of machinery and technological improvement.

In 2023, the price of phenol witnessed more ups and downs, with the average price at USD1,105/t from Jan. to Nov., a 31% decrease from the 2022 average (USD1,594/t). During Jan. to Nov., the lowest ex-works price of phenol in East China appeared in June at USD874/t, which has fallen below the lowest point in the same period of the past five years (2018–2022); the highest one hit USD1,351/t in Sept., due to the increasing cost of crude oil, pure benzene, etc. Since the price bottomed in Q2, the domestic operating rate of part phenol producers fell largely in Q3 as a result. In Nov., the price was USD1,100/t, down 5% MoM or 12% YoY.

Generally speaking, the market price of 2,4-D has dropped slowly in 2022 and slipped further in 2023, yet once pushed up in Sept., mainly because of rising cost of key raw materials. In the long run, with China's capacities for these two raw materials further expanded, raw material cost will be brought down for 2,4-D producers and thus their pressures relieved to some extent.

2.3 Registration

As of Dec. 2023, the number of registered 2,4-D products reached 364.

On 7 Sept., 2016, the Ministry of Agriculture (nowadays the Ministry of Agriculture and Rural Affairs) of the People's Republic of China issued the No. 2445 Announcement, which illustrates that from the time this announcement was issued, field test, registration application, and registration renewal application of 2,4-D butylate (including TC, TK, single formulations and mixed formulations) for domestic use are no longer accepted and approved. This marks that the production of 2,4-D butylate for domestic use was banned in China after the expiry dates of their registrations. Along with the registration certificate 50% acetochlor · atrazine · 2,4-D butylate SE (registration code: PD20160077) expired on 28 Jan., 2021, supply of 2,4-D butylate products completely stopped in China ever since; operation and use of such products were also stopped in domestic market upon the two-year validity period since 29 Jan., 2023. It also means that all the 2,4-D butylate products, which are sold in the domestic market and labeled as manufactured after the banned date, should be identified as fake or illegal pesticides.

But 2,4-D butylate TC producers can still register the product for overseas use, and they can change the registration to export-oriented registration when they apply for registration renewal. Overseas market plays a very important role in consuming the 2,4-D products made in China.

Table 2.3-1 Valid registrations of 2,4-D in China, as of Dec. 2023

Specification		Number of registrations
Single formulations	EC	40
	AS	25
	Others	38
Mixed formulations		210
Technical	2,4-D (TC and TK)	29
	2,4-D-ethylhexyl	13
	2,4-D butylate	6
	2,4-D Na	2
	2,4-DB	1
Total		364

Source: Institute for the Control of Agrochemicals, Ministry of Agriculture (ICAMA)

Table 2.3-2 Valid registration of 2,4-D technicals (TC and TK) in China, as of Dec. 2023

No.	Registration code	Registrant (CN)	Registrant	Active ingredient	Content	Type	Expiry date
1	PD20093897	首建科技有限公司	Capital Industry Construction Technology Co., Ltd.	2,4-D	96%	TC	2029/3/25
2	PD20093457	山东潍坊润丰化工股份有限公司	Shandong Weifang Rainbow Chemical Co., Ltd.	2,4-D	98%	TC	2029/3/22
3	PD20190029	辽宁先达农业科学有限公司	Liaoning Cynda Agricultural Science Co., Ltd.	2,4-DB	95%	TC	2029/1/29
4	EX20230136	安道麦辉丰（江苏）有限公司	ADAMA Huifeng (Jiangsu) Co., Ltd.	2,4-D butylate	96%	TC	2028/12/16
5	PD20132175	安徽兴隆化工有限公司	Anhui Xinglong Chemical Co., Ltd.	2,4-D-ethylhexyl	96%	TC	2028/10/28
6	PD20131455	江苏省农用激素工程技术研究中心有限公司	Jiangsu Agrochem Laboratory Co., Ltd.	2,4-D-ethylhexyl	96%	TC	2028/7/4
7	PD20181196	山东科源化工有限公司	Shandong Keyuan Chemical Co., Ltd.	2,4-D-ethylhexyl	97%	TC	2028/3/15
8	PD20121778	安道麦辉丰（江苏）有限公司	ADAMA Huifeng (Jiangsu) Co., Ltd.	2,4-D-ethylhexyl	96%	TC	2027/11/15
9	PD20121610	江苏常丰农化有限公司	Jiangsu CF Agrochemicals Co., Ltd.	2,4-D-ethylhexyl	96%	TC	2027/10/28
10	PD20171970	江苏仁信生物技术有限公司	Jiangsu Sunrise Crop Science Co., Ltd.	2,4-D	98%	TC	2027/9/18
11	PD20171765	山东滨农科技有限公司	Shandong Binnong Technology Co., Ltd.	2,4-D	98%	TC	2027/9/18
12	PD20171643	江苏仁信生物技术有限公司	Jiangsu Sunrise Crop Science Co., Ltd.	2,4-D-ethylhexyl	96%	TC	2027/8/20
13	PD20171094	宁夏格瑞精细化工有限公司	Ningxia Gerui Fine Chemical Co., Ltd.	2,4-D	98%	TC	2027/5/30
14	PD20170719	甘肃智鹏科技有限公司	Gansu Zhipeng Technology Co., Ltd.	2,4-D	98%	TC	2027/4/9
15	PD20170643	威海韩孚生化药业有限公司	Weihai Hanfu Biochemical Medicine Co., Ltd.	2,4-D	98%	TC	2027/4/9
16	PD20170553	江西天宇化工有限公司	Jiangxi Tianyu Chemical Co., Ltd.	2,4-D Na	96%	TC	2027/4/9
17	PD20170425	安道麦股份有限公司	ADAMA Ltd.	2,4-D	98%	TC	2027/3/8
18	PD20161171	福华通达化学股份公司	Fuhua Tongda Chemical Co., Ltd.	2,4-D	98%	TC	2026/9/13
19	PD20161082	江苏诺恩作物科学股份有限公司	Jiangsu Noon Crop Science Co., Ltd.	2,4-D	98%	TC	2026/8/30
20	PD20161061	江西天宇化工有限公司	Jiangxi Tianyu Chemical Co., Ltd.	2,4-D-ethylhexyl	97%	TC	2026/8/30
21	PD20161007	宁夏新安科技有限公司	Ningxia Wynca Technology Co., Ltd.	2,4-D	96%	TC	2026/8/30
22	PD20160947	江苏常丰农化有限公司	Jiangsu CF Agrochemical Co., Ltd.	2,4-D	96%	TC	2026/7/27
23	PD20110525	江苏永泰丰作物科学有限公司	Jiangsu Wintafone Cropscience Co., Ltd.	2,4-D Na	95%	TC	2026/5/12

No.	Registration code	Registrant (CN)	Registrant	Active ingredient	Content	Type	Expiry date
24	PD20160636	江西天宇化工有限公司	Jiangxi Tianyu Chemical Co., Ltd.	2,4-D	98%	TC	2026/4/27
25	PD20160304	宁夏宁东弘丰化工有限公司	Ningxia Ningdong Hongfeng Chemical Co., Ltd.	2,4-D	96%	TK	2026/2/26
26	PD20160262	南通泰禾化工股份有限公司	CAC Nantong Chemical Co., Ltd.	2,4-D	98%	TC	2026/2/25
27	PD20160258	内蒙古莱科作物保护有限公司	Inner Mongolia Laike Crop Protection Co., Ltd.	2,4-D	96%	TC	2026/2/25
28	PD20160117	内蒙古中高化工有限公司	Inner Mongolia Zhonggao Chemical Co., Ltd.	2,4-D	98%	TC	2026/1/28
29	PD20160025	浙江宇龙生物科技股份有限公司	Zhejiang Udragon Bioscience Co., Ltd.	2,4-D	96%	TC	2026/1/26
30	PD20060011	科迪华农业科技有限责任公司	Corteva Agriscience	2,4-D-ethylhexyl	94.40%	TC	2026/1/9
31	PD20152544	山东科源化工有限公司	Shandong Keyuan Chemical Co., Ltd.	2,4-D	98%	TC	2025/12/5
32	PD20152034	山东潍坊润丰化工股份有限公司	Shandong Weifang Rainbow Chemical Co., Ltd.	2,4-D-ethylhexyl	96%	TC	2025/9/6
33	PD20101883	唐山晟红化工有限公司	Tangshan Shenghong Chemical Co., Ltd.	2,4-D	96%	TC	2025/8/9
34	PD20101752	安徽华星化工有限公司	Anhui Huaxing Chemical Industry Co., Ltd.	2,4-D	97%	TC	2025/7/7
35	PD20101693	四川润尔科技有限公司	Sichuan Run'er Technology Co., Ltd.	2,4-D	81.30%	TC	2025/6/17
36	PD20150743	江苏莱科化学有限公司	Lion Agrevo (Jiangsu) Co., Ltd.	2,4-D-ethylhexyl	96%	TC	2025/4/20
37	PD20101186	安道麦辉丰(江苏)有限公司	ADAMA Huifeng (Jiangsu) Co., Ltd.	2,4-D	98%	TC	2025/1/28
38	PD20100515	江苏好收成韦恩农化股份有限公司	Jiangsu Good Harvest-Weien Agrochemical Co., Ltd.	2,4-D	96%	TC	2025/1/14
39	PD20100492	山东潍坊润丰化工股份有限公司	Shandong Weifang Rainbow Chemical Co., Ltd.	2,4-D butylate	96%	TC	2025/1/14
40	PD20100053	江苏永泰丰作物科学有限公司	Jiangsu Wintafone Cropsience Co., Ltd.	2,4-D-ethylhexyl	96%	TC	2025/1/4
41	PD20098432	佳木斯黑龙江农药有限公司	Jiamusi Heilong Pesticide Co., Ltd.	2,4-D	96%	TC	2024/12/24
42	PD20097077	山东潍坊润丰化工股份有限公司	Shandong Weifang Rainbow Chemical Co., Ltd.	2,4-D	80.50%	TC	2024/10/10
43	PD20096452	江苏永泰丰作物科学有限公司	Jiangsu Wintafone Cropsience Co., Ltd.	2,4-D butylate	96%	TC	2024/8/5
44	PD20141790	辽宁省大连松辽化工有限公司	Dalian Songliao Chemical Industry Co., Ltd.	2,4-D-ethylhexyl	96%	TC	2024/7/14
45	PD20096062	辽宁省大连松辽化工有限公司	Dalian Songliao Chemical Industry Co., Ltd.	2,4-D butylate	96%	TC	2024/6/18

No.	Registration code	Registrant (CN)	Registrant	Active ingredient	Content	Type	Expiry date
46	PD20095816	江苏永泰丰作物科学有限公司	Jiangsu Wintafone Cropscience Co., Ltd.	2,4-D	96%	TC	2024/5/27
47	PD20095714	佳木斯黑龙江农药有限公司	Jiamusi Heilong Pesticide Co., Ltd.	2,4-D butylate	92%	TC	2024/5/18
48	PD20095450	辽宁省大连松辽化工有限公司	Dalian Songliao Chemical Industry Co., Ltd.	2,4-D	96%	TC	2024/5/11
49	PD20141252	嫩江绿芳化工有限公司	Nenjiang Lvfang Chemical Co., Ltd.	2,4-D-ethylhexyl	96%	TC	2024/5/7
50	PD20094995	河北万全力华化工有限责任公司	Hebei Wanquan Lihua Chemicals Co., Ltd.	2,4-D butylate	96%	TC	2024/4/21
51	PD20094572	河北万全力华化工有限责任公司	Hebei Wanquan Lihua Chemicals Co., Ltd.	2,4-D	96%	TC	2024/4/9

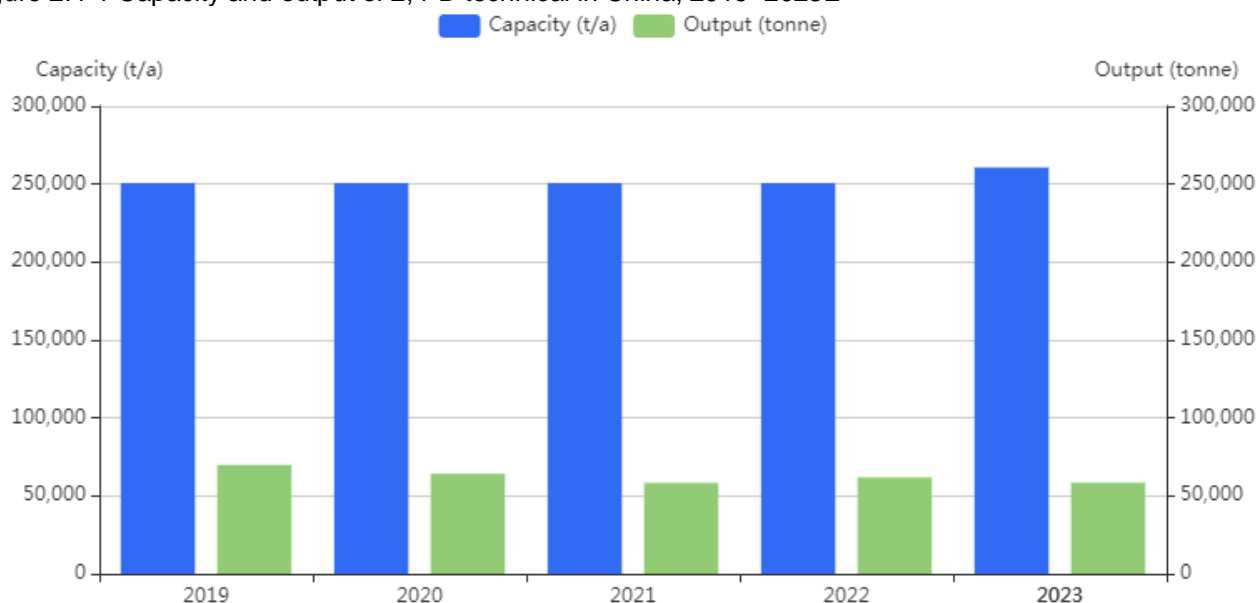
Source: ICAMA

2.4 Capacity and output, 2019–2023E

In 2023, China has the 2,4-D production scale of about 260,700 t/a.

As to the output, since 2018, under environmental protection pressures, many domestic 2,4-D producers have suspended or even stopped production. In 2019, thanks to domestic production recovered, the output increased to 69,830 tonnes. China achieved the target of reducing pesticide use and increasing efficiency of pesticides in 2020 and 2021, and the output dropped to 64,144 tonnes and 58,350 tonnes, respectively, which were also led by 2,4-D manufacturers' lowered operating rates and the Dual Control policy on energy consumption & energy intensity rolled out in some provinces of China before the end of 2021. The situation improved in 2022 when China launched the implementation of enhancement project for soybean and oilseed production. This project has continued to promote in 2023, considering the soybean- and oilseed-planting areas increased by 0.67 million ha+.

Figure 2.4-1 Capacity and output of 2,4-D technical in China, 2019–2023E



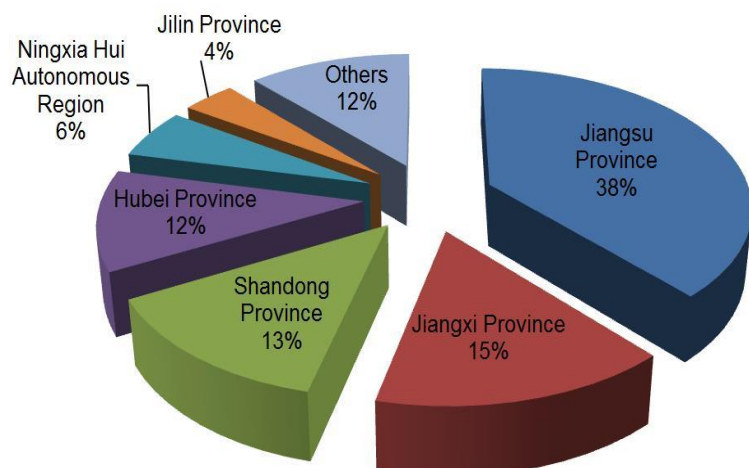
Note: All the volumes of output are calculated by 100% technical.

Source: CCM

2.5 Key producers

At present, most 2,4-D technical producers in China are located in Jiangsu Province even though it has been under great pressures of environmental protection in recent years. Jiangsu has always been a crucial domestic pesticide production base and has advantages on abundant raw material supply, convenient transportation and large consumption.

Picture 2.5-1 Capacity distribution of top six 2,4-D technical manufacturers in China by region, 2023



Source: CCM

In general, there were more than 10 active 2,4-D producers in China. In early April 2023, Jilin Lvsheng Agrochemical Co., Ltd. (Jilin Lvsheng) had built up its 10,000 t/a 2,4-D TC production lines and had finished the completion-based check and acceptance of these lines. With this new capacity put into use, Jilin Lvsheng now becomes one of the major 2,4-D TC suppliers in China.

The oversupply of China's 2,4-D TC unchanged and competition is expected to be fiercer. CAC Nantong Chemical Co., Ltd. (CAC Nantong), one of the major suppliers, filed the ChiNext prospectus on 27 Oct. 2023, projecting to raise funds of USD248.49 million (RMB1.75 billion). The proceeds will be spent on constructing herbicide, fungicide, novel formulation and R&D centre projects as well as replenishing working capital, of which USD142.00 million (RMB1 billion) is for the capacity ramp-up of 2,4-D-ethylhexyl TC and 2,4-D dimethyl amine salt AS among others and for scaled production of prothioconazole TC, trifloxystrobin TC and novel pesticide formulations newly developed by the company.

Table 2.5-1 Production of major 2,4-D technical producers in China, 2019–2023E

No.	Producer	Location	Status, as of Dec. 2023	Capacity, t/a					Output, tonne				
				2023E	2022	2021	2020	2019	2023E	2022	2021	2020	2019
1	CAC Nantong Chemical Co., Ltd.	Jiangsu Province	Active	50,000	50,000	50,000	50,000	50,000	10	500	12,000	18,000	3,000
2	Changzhou Wintafone Chemical Co., Ltd.	Jiangsu Province	Active	50,000	50,000	50,000	50,000	50,000	470	300	1,200	1,500	2,600
3	Jiangxi Tianyu Chemical Co., Ltd.	Jiangxi Province	Active	40,000	40,000	40,000	40,000	40,000	28,000	38,000	21,000	25,000	28,000
4	Shandong Weifang Rainbow	Shandong Province	Active	25,000	20,000	20,000	20,000	20,000	3,500	5,000	6,000	6,000	11,000

No.	Producer	Location	Status, as of Dec. 2023	Capacity, t/a					Output, tonne				
				2023E	2022	2021	2020	2019	2023E	2022	2021	2020	2019
	Chemical Co., Ltd.												
5	ADAMA Ltd. (Hubei Sanonda Co., Ltd.)	Hubei Province	Active	30,000	30,000	30,000	20,000	20,000	20	20	20	0	20
6	Ningxia Gerui Fine Chemical Co., Ltd.	Ningxia Hui Autonomous Region	Active	15,000	15,000	15,000	15,000	15,000	2,800	3,000	6,740	6,000	8,000
7	Weihai Hanfu Biochemical Medicine Co., Ltd.	Shandong Province	Active	10,000	10,000	10,000	10,000	10,000	3,200	4,000	5,200	5,654	6,500
8	Jilin lvsheng Agrochemical Co., Ltd.	Jilin Province	Active	10,000	-	-	-	-	6,000	-	-	-	-

Source: CCM

Potential capacity of China's 2,4-D

In Jan. 2024, Draft Environmental Impact Report of Hubei Xingchen Technology Co., Ltd. (Hubei Xingchen, a sub-subsidiary of Hubei Xingfa Chemicals Group Co., Ltd.)'s 50,000 t/a 2,4-D project was released for public announcement by local government, with public utilities, environmental protection facilities and other supporting facilities in Hubei Province. Up to date, Hubei Xingchen has constructed the 20,000 t/a 2,4-D and 5,000 t/a MCPA and supporting preparations project since July 2022.

On 16 Nov. 2023, Shandong Weifang Rainbow Chemical Co., Ltd. (Weifang Rainbow) announced that its plan to raise fund through share issuance had been approved by China Securities Regulatory Commission. According to Weifang Rainbow's plan, the fund will mainly be invested in the construction of four pesticide projects, including 2,4-D TC and 2,4-D-ethylhexyl TC project (capacity expansion by 40,000 t/a and 20,000 t/a, respectively) of its wholly-owned subsidiary Ningxia Hanrun Biotechnology Co., Ltd.

On 21 Oct. 2023, Gansu Zhipeng Technology Co., Ltd. 90,000 t/a fine chemicals project (Phase II) stage completion of the environmental protection acceptance report in the relevant website. 2,4-D workshop and supporting facilities have been basically completed, and a trial run has been carried out. The acceptance mainly includes production lines for 20,000 t/a 2,4-D and 9,000 t/a 2,4-D-ethylhexyl. The project started construction in March 2021, finished construction in August 2021, installed equipment in September 2021, and carried out equipment commissioning in October 2021.

On 28 Feb. 2023, the EI report of Third Branch of Shandong Weifang Rainbow Chemical Co., Ltd.'s 10,000 t/a 2,4-D technical reform project was approved by Weifang Ecological Environment Bureau Binhai Branch. Upon completion, it will form 10,000 t/a 2,4-D TC or 15,000 t/a 2,4-D-ethylhexyl, 7,000 t/a methyl chloroacetate and 12,000 t/a 2,4-dichlorophenol, with the total project investment of USD28.40 million (RMB200.00 million).

On 28 Dec., 2022, the Environment Impact (EI) Report of Gansu Xinhengmao Technology Co., Ltd.'s chlorophenol production base project (phase I) were publicised. The project, with an investment of USD56.80 million (RMB400 million) and a plant area totalling about 11.47 ha, has two phases of construction, including the production lines for 20,000 t/a 2,4-D TC and 40,000 t/a chlorophenol (phase I), 2,000 t/a prochloraz TC and 10,000 t/a chloroacetic acid (phase II) and others. As of Sept. 2023, the construction of this project was announced to be completed.

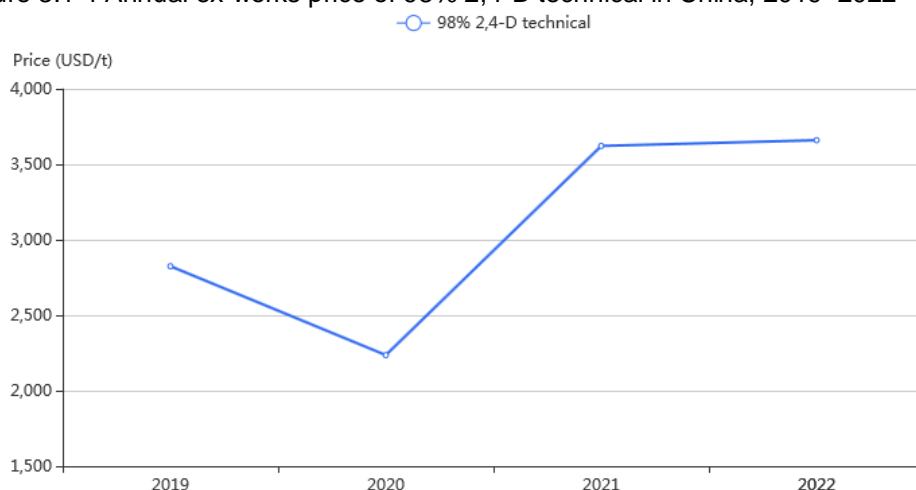
3 Price & exports of 2,4-D in China, 2021–Q3 2023

3.1 Price

In China, with production and operation resumption of 2,4-D manufacturers, the annual ex-works price of 2,4-D significantly dropped in 2019 and even further in 2020. However, domestic production of 2,4-D technical was affected by policies, such as the Dual Control on energy consumption and Power Rationing (as of 31 Dec., 2021) which gave rise to the supply shortage and intermittent suspension of pesticide production in Zhejiang and Jiangsu provinces, etc.; the average ex-works price in Q4 2021 hit USD4,807/t, up by 32.31% QoQ. Entering 2022, as the policy impact eased, China's major manufacturers resumed the normal 2,4-D supply, which led to this product's price keeping downtrend in H1 and then hovering around USD3,400/t in H2. The annual ex-works price of 2022 reached USD3,660/t, up by 1.05% YoY (vs USD3,622/t in 2021).

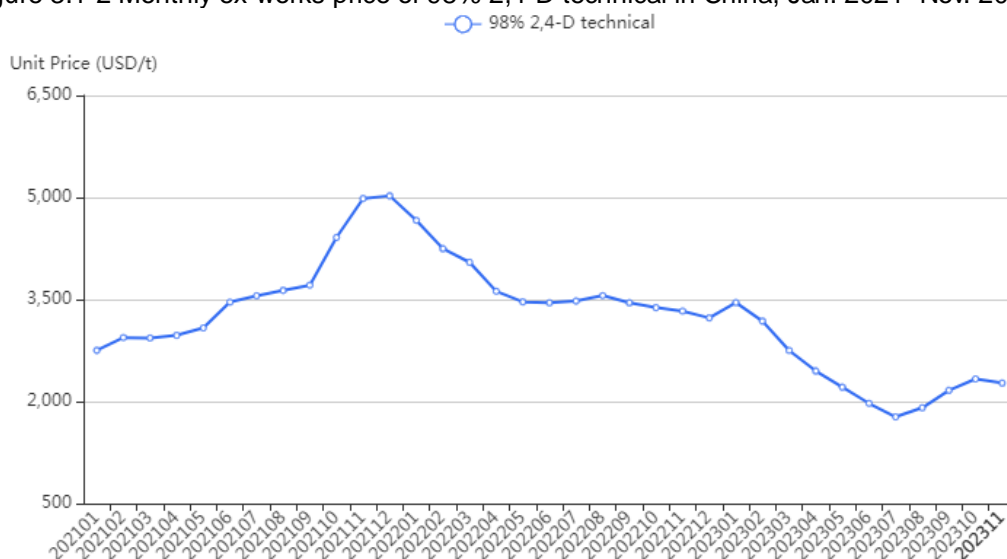
In 2023, with decreasing demand abroad, the monthly price of China's 2,4-D had plunged smoothly since Jan. and bottomed at USD1,774/t in July, with a yearly decrease of 48.99%. Later (esp. in Sept.), due to the price rise of its raw materials (chloroacetic acid and phenol), the ex-works price of 98% 2,4-D technical rebounded then fell slightly to USD2,271/t in Nov., down by 2.61% MoM or 31.80% YoY.

Figure 3.1-1 Annual ex-works price of 98% 2,4-D technical in China, 2019–2022



Source: CCM

Figure 3.1-2 Monthly ex-works price of 98% 2,4-D technical in China, Jan. 2021–Nov. 2023



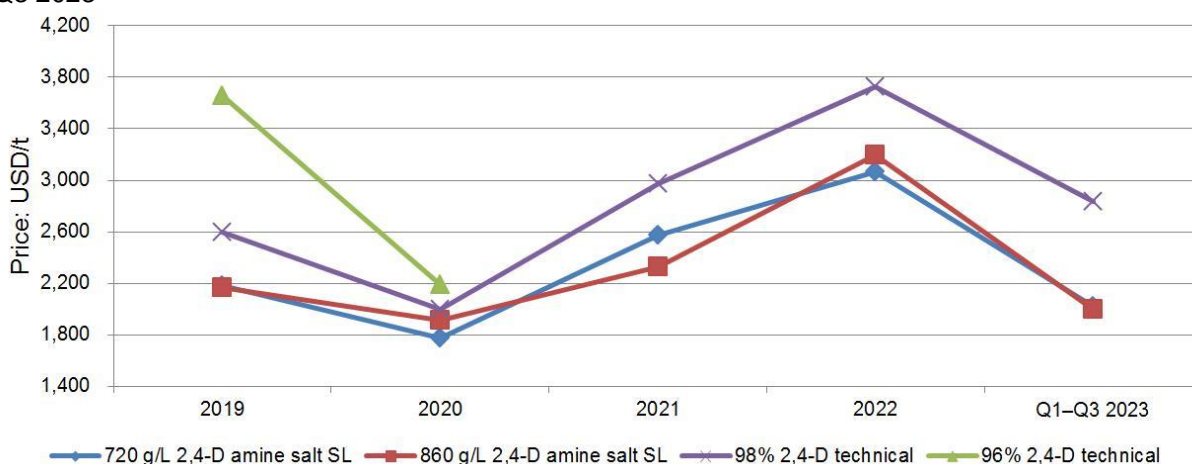
Source: CCM

3.2 Exports status

Chinese pesticide suppliers answer to about 70% of global demand. During 2019–Sept. 2023, export prices in 2020 were the lowest; the export price of all 2,4-D products peaked in 2022—prices for 720 g/L 2,4-D amine salt SL, 860 g/L 2,4-D amine salt SL and 98% technical on average were USD3,062/t, USD3,199/t and USD3,723/t, separately, thanks to the easing global COVID-19 pandemic, China's domestic economy has continued to recover from the production disruption in early 2020.

However, China's pesticide production grew steadily in 2021–2022, resulting in excessive supply in the industry, with the price downturn on weak demand witnessed in 2023. Exports of 98% technical and 2,4-D amine salt formulations (720 g/L SL and 860 g/L SL) dropped greatly in Jan.–Sept., each registering 25%, 35% or 39% of decrease in average price compared with the same period of 2022. As for the overseas demand, the first three-quarter exports for 98% technical out of these three China's 2,4-D varieties experienced the largest shrink in volume (calculated by actual volume), down by 59.71% YoY, accounting for merely 47.1% or 33.7% of the total in 2021 or 2022, respectively.

Figure 3.2-1 Annual export price of main specifications of 2,4-D technical and formulations in China, 2019–Q3 2023

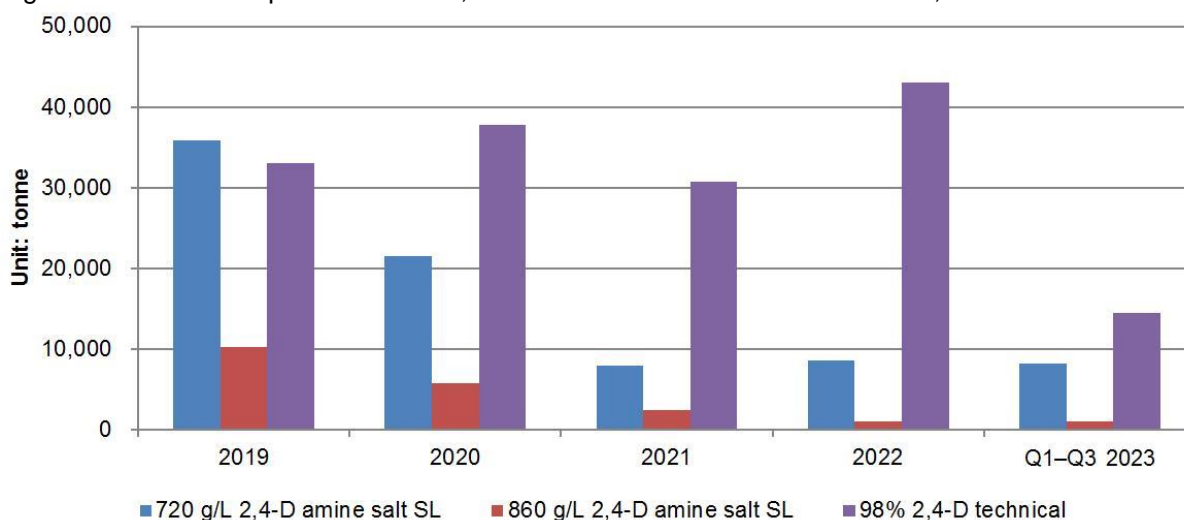


Note: 1. Since April 2020, China's export data are sourced from data of the customs of various destinations. 2. The annual export price and volume of 96% 2,4-D technical had been calculated by other type of technical like 98% TC since 2021.

Source: Tranalysis

- Exports of 2,4-D

Figure 3.2-2 Annual export volume of 2,4-D technical and formulations in China, 2019–Q3 2023



Note: 1. Since April 2020, China's export data are sourced from data of the customs of various destinations. 2. All the volumes are calculated by 100% technical.

Source: Tranalysis

3.2.1 Details in 2021–Q3 2023

-By month

Table 3.2.1-1 Monthly exports of 2,4-D technical and formulations in China, Q1–Q3 2023

Month	600 g/L 2,4-D Amine salt SL		720 g/L 2,4-D Amine salt SL		80% 2,4-D Amine salt SG		860 g/L 2,4-D Amine salt SL		96% 2,4-D Amine salt SG		304 g/L 2,4-D SL		98% 2,4-D TC		Total value, million USD
	Volume, tonne	Price, USD/kg	Volume, tonne	Price, USD/kg	Volume, tonne	Price, USD/kg	Volume, tonne	Price, USD/kg	Volume, tonne	Price, USD/kg	Volume, tonne	Price, USD/kg	Volume, tonne	Price, USD/kg	
Jan.	107.697	1.54	1,182.851	2.89	0.000	/	80.285	2.59	0.000	/	1.159	4.74	2,707.800	3.41	13
Feb.	182.176	2.32	1,319.798	2.89	72.000	5.65	51.822	2.44	0.000	/	1.159	4.74	814.336	3.38	8
March	562.529	2.75	804.026	2.44	0.000	/	41.387	2.32	0.000	/	92.080	4.83	2,191.668	3.12	11
April	325.807	1.66	1,060.660	2.03	24.000	5.59	0.000	/	0.000	/	134.271	4.96	1,232.480	2.84	7
May	401.780	1.47	2,926.060	2.11	0.000	/	495.557	2.47	0.000	/	229.866	4.80	1,133.512	2.71	12
June	304.362	1.76	4,089.952	1.84	0.000	/	797.317	1.93	38.400	2.68	288.913	4.76	2,125.291	2.41	16
July	263.151	1.29	3,556.293	1.67	48.000	5.83	317.338	1.25	0.000	/	702.234	4.17	1,926.000	2.61	15
Aug.	212.689	0.91	1,212.236	1.51	0.000	/	64.621	1.59	0.000	/	122.954	3.64	2,550.601	2.41	9
Sept.	107.609	1.35	421.441	1.46	0.000	/	0.000	/	0.000	/	25.123	3.45	120.825	1.79	1
Total/Ave	2,467.801	1.82	16,573.318	2.02	144.000	5.70	1,848.327	2.00	38.400	2.68	1,597.760	4.42	14,802.513	2.83	91

Note: 1. Since April 2020, China's export data are sourced from data of the customs of major destinations. 2. Unless indicated "100% AI", all the volumes in the table are calculated by actual volume. Source: Tranalysis

Table 3.2.1-2 Monthly exports of 2,4-D technical and formulations in China, 2022

Month	600 g/L 2,4-D Amine salt SL		720 g/L 2,4-D Amine salt SL		80% 2,4-D Amine salt SG		860 g/L 2,4-D Amine salt SL		304 g/L 2,4-D SL		98% 2,4-D TC		Total value, million USD
	Volume, tonne	Price, USD/kg	Volume, tonne	Price, USD/kg	Volume, tonne	Price, USD/kg	Volume, tonne	Price, USD/kg	Volume, tonne	Price, USD/kg	Volume, tonne	Price, USD/kg	
Jan.	0.000	/	1,897.319	3.09	0.000	/	29.512	3.69	22.000	6.01	3,421.900	4.59	22
Feb.	1.140	2.63	998.251	2.93	0.000	/	49.368	3.34	66.000	6.01	2,431.000	4.33	14
March	242.975	5.49	1,777.081	2.86	5.326	7.83	55.611	3.49	131.200	5.67	5,996.174	3.96	31
April	140.351	2.34	331.001	3.46	168.000	5.58	376.497	2.97	185.001	5.82	2,385.500	3.90	14
May	367.219	2.68	2,428.111	2.94	0.000	/	23.100	3.10	25.837	5.73	5,767.200	3.54	29
June	145.317	1.15	2,108.627	3.39	0.000	/	119.564	3.15	254.703	5.66	6,708.600	3.58	33
July	54.850	1.04	1,425.780	3.07	0.000	/	703.008	3.47	953.526	5.02	3,241.800	3.50	23
Aug.	113.073	1.62	1,656.240	3.34	0.000	/	164.240	3.20	774.172	4.72	3,861.100	3.41	23
Sept.	72.672	2.59	1,658.718	3.17	0.000	/	70.970	2.65	40.173	5.12	2,929.871	3.61	16
Oct.	218.443	2.41	1,154.288	2.99	0.000	/	111.884	2.88	100.488	5.13	4,243.650	3.46	20
Nov.	120.585	1.21	887.109	2.92	0.000	/	105.549	2.63	152.640	4.77	1,894.644	3.43	10
Dec.	79.076	1.53	1,023.768	2.52	0.000	/	0.000	/	124.136	5.37	1,025.000	3.32	7
Total/Ave	1,555.700	2.60	17,346.293	3.06	173.326	5.65	1,809.302	3.20	2,829.877	5.12	43,906.439	3.72	242

Note: 1. Since April 2020, China's export data are sourced from data of the customs of major destinations. 2. Unless indicated "100% AI", all the volumes in the table are calculated by actual volume.
Source: Tranalysis

Table 3.2.1-3 Monthly exports of 2,4-D technical and formulations in China, 2021

Month	600 g/L 2,4-D Amine salt SL		720 g/L 2,4-D Amine salt SL		80% 2,4-D Amine salt SG		860 g/L 2,4-D Amine salt SL		96% 2,4-D Amine salt SG		304 g/L 2,4-D SL		95% 2,4-D TC		98% 2,4-D TC		Total value, million USD
	Volume, tonne	Price, USD/kg	Volume, tonne	Price, USD/kg	Volume, tonne	Price, USD/kg	Volume, tonne	Price, USD/kg	Volume, tonne	Price, USD/kg	Volume, tonne	Price, USD/kg	Volume, tonne	Price, USD/kg	Volume, tonne	Price, USD/kg	
Jan.	49.589	1.40	896.466	2.10	0.000	/	333.884	1.95	0.000	/	88.049	2.83	15.000	3.96	2,324.470	2.39	8
Feb.	0.000	/	315.507	2.18	0.000	/	367.328	2.06	0.000	/	49.730	2.80	15.000	4.31	1,285.358	2.45	5
March	157.569	2.48	263.505	2.30	0.000	/	29.264	2.60	19.200	3.53	138.393	3.30	0.000	/	3,364.213	2.65	11
April	47.996	1.66	506.466	2.58	0.000	/	182.210	2.10	0.000	/	24.894	2.97	0.000	/	2,208.488	2.81	8
May	66.000	3.17	1,000.841	2.38	0.000	/	97.750	2.32	0.000	/	110.000	3.44	0.000	/	5,727.801	2.67	18
June	0.000	/	1,341.695	2.37	24.000	4.52	122.767	2.47	0.000	/	175.977	3.89	0.000	/	2,338.540	2.77	11
July	132.000	2.72	442.607	2.41	24.004	4.52	895.680	2.30	0.000	/	60.214	3.36	0.000	/	2,503.010	3.27	12
Aug.	16.128	2.12	583.660	3.01	0.000	/	118.456	3.08	0.000	/	27.000	3.64	0.000	/	3,161.186	3.20	12
Sept.	60.400	1.83	348.400	3.10	24.000	5.00	243.392	2.54	0.000	/	22.000	3.78	0.000	/	2,491.140	2.96	9
Oct.	110.000	6.30	878.104	2.89	0.000	/	28.573	3.22	0.000	/	16.000	4.20	0.000	/	341.816	3.92	5
Nov.	12.000	3.87	855.340	2.81	0.000	/	109.160	3.26	0.000	/	11.935	5.45	0.000	/	2,819.130	3.71	13
Dec.	120.938	3.04	570.088	3.02	0.000	/	0.000	/	0.000	/	32.000	5.27	0.000	/	2,838.928	3.66	13
Total/Ave	772.621	3.05	8,002.679	2.58	72.004	4.68	2,528.465	2.33	19.200	3.53	756.193	3.52	30.000	4.14	31,404.080	2.98	126

Note: 1. Since April 2020, China's export data are sourced from data of the customs of major destinations. 2. Unless indicated "100% AI", all the volumes in the table are calculated by actual volume.
Source: Tranalysis

-By destination

Table 3.2.1-4 Export volume of 2,4-D technical and formulations from China by destination in Q1–Q3 2023, tonne

No.	Country	600 g/L 2,4-D Amine salt SL	720 g/L 2,4-D Amine salt SL	80% 2,4-D Amine salt SG	860 g/L 2,4-D Amine salt SL	96% 2,4-D Amine salt SG	304 g/L 2,4-D SL	98% 2,4-D TC	Total (100% AI 2,4-D)
1	Brazil	0.000	8,024.920	0.000	1,135.200	0.000	785.600	3,149.300	7,945.734
2	Argentina	0.000	0.000	0.000	0.000	0.000	0.000	5,187.200	5,083.456
3	the US	0.000	0.000	0.000	0.000	0.000	0.000	3,145.416	3,082.508
4	Uganda	54.580	4,893.564	0.000	0.000	0.000	0.000	339.088	2,804.195
5	The Philippines	1,446.647	27.804	0.000	0.000	0.000	0.000	440.000	1,110.559
6	Mexico	768.081	42.000	144.000	0.000	0.000	531.481	424.402	1,032.987
7	Russia	0.000	0.000	0.000	0.000	0.000	0.000	842.400	825.552
8	Nigeria	0.000	1,489.434	0.000	0.000	0.000	0.000	6.036	750.632
9	Paraguay	0.000	106.646	0.000	32.000	38.400	4.802	594.171	686.043
10	Turkiye	0.000	0.000	0.000	0.000	0.000	0.000	469.600	460.208
11	Peru	0.000	728.422	0.000	36.887	0.000	119.579	0.000	414.305
12	Ecuador	0.000	247.413	0.000	138.480	0.000	17.418	129.300	334.920
13	Thailand	0.000	0.000	0.000	485.920	0.000	0.000	0.000	281.834
14	Ukraine	0.000	396.900	0.000	0.000	0.000	0.000	0.000	198.450
15	Costa Rica	0.000	90.000	0.000	0.000	0.000	0.000	75.600	119.088
16	Bangladesh	115.750	103.530	0.000	19.840	0.000	0.000	0.000	116.517

No.	Country	600 g/L 2,4-D Amine salt SL	720 g/L 2,4-D Amine salt SL	80% 2,4-D Amine salt SG	860 g/L 2,4-D Amine salt SL	96% 2,4-D Amine salt SG	304 g/L 2,4-D SL	98% 2,4-D TC	Total (100% AI 2,4-D)
17	Cameroon	0.000	228.709	0.000	0.000	0.000	0.000	0.000	114.355
18	Tanzania	49.615	154.441	0.000	0.000	0.000	0.000	0.000	100.043
19	Panama	33.128	39.534	0.000	0.000	0.000	0.000	0.000	35.006
20	Colombia	0.000	0.000	0.000	0.000	0.000	138.880	0.000	33.331
Total		2,467.801	16,573.318	144.000	1,848.327	38.400	1,597.760	14,802.513	25,529.722

Note: 1. Since April 2020, China's export data are sourced from data of the customs of major destinations. 2. Unless indicated "100% AI", all the volumes in the table are calculated by actual volume.
Source: Tranalysis

Table 3.2.1-5 Export volume of 2,4-D technical and formulations from China by destination in 2022, tonne

No.	Country	600 g/L 2,4-D Amine salt SL	720 g/L 2,4-D Amine salt SL	80% 2,4-D Amine salt SG	860 g/L 2,4-D Amine salt SL	304 g/L 2,4-D SL	98% 2,4-D TC	Total (100% AI 2,4-D)
1	Brazil	0.000	6,526.057	0.000	1,013.012	1,965.049	17,801.891	21,768.040
2	The US	0.000	0.000	0.000	0.000	0.000	13,332.064	13,065.423
3	Argentina	0.000	0.000	0.000	0.000	0.000	5,109.000	5,006.820
4	Ghana	0.000	3,507.851	0.000	25.162	0.000	0.000	1,768.519
5	Nigeria	0.000	2,805.927	0.000	0.000	0.000	0.000	1,402.963
6	The Philippines	1,048.353	89.934	0.000	6.300	0.000	894.000	1,406.984
7	Mexico	429.158	70.004	168.000	0.000	716.449	520.000	1,048.362
8	Russia	0.000	0.000	0.000	0.000	0.000	1,803.384	1,767.316
9	Turkiye	0.000	0.000	0.000	0.000	0.000	1,439.600	1,410.808
10	Paraguay	0.000	35.134	0.000	56.800	0.000	1,107.700	1,136.057

No.	Country	600 g/L 2,4-D Amine salt SL	720 g/L 2,4-D Amine salt SL	80% 2,4-D Amine salt SG	860 g/L 2,4-D Amine salt SL	304 g/L 2,4-D SL	98% 2,4-D TC	Total (100% AI 2,4-D)
11	Uganda	0.000	1,105.607	0.000	0.000	0.000	75.600	626.892
12	Peru	0.000	862.250	0.000	110.481	44.760	0.000	505.946
13	Ecuador	0.000	386.175	0.000	246.428	2.300	379.400	708.380
14	Costa Rica	0.000	45.440	0.000	0.000	0.000	832.400	838.472
15	Tanzania	0.000	786.775	0.000	0.000	0.000	0.000	393.387
16	Ukraine	0.000	645.078	0.000	0.000	0.000	0.000	322.539
17	India	0.000	0.000	0.000	0.000	0.000	576.000	564.480
18	Thailand	0.000	0.000	0.000	351.120	0.000	0.000	203.650
19	Bangladesh	55.965	147.155	0.000	0.000	0.000	0.000	99.321
20	Cameroon	0.000	148.457	0.000	0.000	0.000	0.000	74.229
	Others	22.224	184.449	5.326	0.000	101.318	35.400	165.717
	Total	1,555.700	17,346.293	173.326	1,809.302	2,829.877	43,906.439	54,284.305

Note: 1. Since April 2020, China's export data are sourced from data of the customs of major destinations. 2. Unless indicated "100% AI", all the volumes in the table are calculated by actual volume.
Source: Tranalysis

Table 3.2.1-6 Export volume of 2,4-D technical and formulations from China by destination in 2021, tonne

No.	Country	600 g/L 2,4-D Amine salt SL	720 g/L 2,4-D Amine salt SL	80% 2,4-D Amine salt SG	860 g/L 2,4-D Amine salt SL	96% 2,4-D Amine salt SG	304 g/L 2,4-D SL	95% 2,4-D TC	98% 2,4-D TC	Total (100% AI 2,4-D)
1	Brazil	0.000	2,860.317	0.000	806.400	0.000	0.000	0.000	16,974.000	18,532.391
2	The US	0.000	0.000	0.000	0.000	0.000	0.000	0.000	7,283.379	7,137.711
3	Argentina	0.000	0.000	0.000	0.000	0.000	0.000	0.000	3,515.801	3,445.485
4	Ecuador	0.000	627.938	0.000	640.239	0.000	0.000	0.000	460.242	1,136.345
5	Mexico	528.254	551.036	72.004	0.000	0.000	446.995	0.000	125.600	806.485
6	Indonesia	0.000	19.200	0.000	841.040	0.000	0.000	30.000	746.000	1,256.983
7	Nigeria	0.000	1,614.590	0.000	0.000	0.000	0.000	0.000	0.000	807.295
8	Peru	0.000	851.502	0.000	31.267	0.000	33.275	0.000	0.000	451.872
9	Uganda	0.000	446.711	0.000	0.000	0.000	0.000	0.000	108.300	329.489
10	The Philippines	180.071	91.854	0.000	0.000	0.000	0.000	0.000	204.000	328.680
11	Russia	0.000	0.000	0.000	0.000	0.000	0.000	0.000	450.000	441.000
12	Turkiye	0.000	0.000	0.000	0.000	0.000	0.000	0.000	443.800	434.924
13	Paraguay	0.000	47.619	0.000	0.000	19.200	0.000	0.000	354.000	386.089
14	India	0.000	0.000	0.000	0.000	0.000	0.000	0.000	324.006	317.526
15	Panama	39.215	0.000	0.000	0.000	0.000	229.491	0.000	0.000	73.117
16	Ghana	0.000	266.898	0.000	0.000	0.000	0.000	0.000	0.000	133.449
17	Costa Rica	0.000	83.200	0.000	0.000	0.000	0.000	0.000	175.600	213.688

No.	Country	600 g/L 2,4-D Amine salt SL	720 g/L 2,4-D Amine salt SL	80% 2,4-D Amine salt SG	860 g/L 2,4-D Amine salt SL	96% 2,4-D Amine salt SG	304 g/L 2,4-D SL	95% 2,4-D TC	98% 2,4-D TC	Total (100% AI 2,4-D)
18	Colombia	0.000	65.702	0.000	59.520	0.000	20.809	0.000	94.776	165.247
19	Bangladesh	25.080	147.051	0.000	0.000	0.000	0.000	0.000	0.000	85.062
20	Kenya	0.000	9.398	0.000	149.999	0.000	0.000	0.000	0.000	91.698
	Others	0.000	319.663	0.000	0.000	0.000	25.623	0.000	144.576	307.665
	Total	772.621	8,002.679	72.004	2,528.465	19.200	756.193	30.000	31,404.080	36,882.202

Note: 1. Since April 2020, China's export data are sourced from data of the customs of major destinations. 2. Unless indicated "100% AI", all the volumes in the table are calculated by actual volume.
Source: Tranalysis

-By exporter

Table 3.2.1-7 Export volume of 2,4-D technical and formulations from China by exporter in Q1–Q3 2023, tonne

No.	Exporter	600 g/L 2,4-D Amine salt SL	720 g/L 2,4-D Amine salt SL	80% 2,4-D Amine salt SG	860 g/L 2,4-D Amine salt SL	96% 2,4-D Amine salt SG	304 g/L 2,4-D SL	98% 2,4-D TC	Total (100% AI 2,4-D)
1	Shandong Weifang Rainbow Chemical Co., Ltd.	1,295.293	2,885.520	96.000	215.264	0.000	25.201	1,682.180	3,894.833
2	Thai Harvest Ltd.	142.720	624.000	0.000	0.000	0.000	0.000	1,212.400	1,565.803
3	Nufarm Chemical (Shanghai) Co., Ltd.	0.000	0.000	0.000	0.000	0.000	0.000	1,564.000	1,532.720
4	Sino-Agri Red Sun Bio-Technology Co., Ltd.	0.000	576.000	0.000	0.000	0.000	0.000	1,140.000	1,405.200
5	Red Surcos Trade (Shanghai) Co., Ltd.	0.000	0.000	0.000	0.000	0.000	0.000	1,320.000	1,293.600
6	Shanghai Hui Song (H&S) Agro-Solution Co., Ltd.	0.000	2,072.728	0.000	0.000	0.000	0.000	0.000	1,036.364
7	Zhejiang Zhongshan Chemical Industry Group Co., Ltd.	0.000	977.521	0.000	643.200	0.000	422.400	0.000	963.193

No.	Exporter	600 g/L 2,4-D Amine salt SL	720 g/L 2,4-D Amine salt SL	80% 2,4-D Amine salt SG	860 g/L 2,4-D Amine salt SL	96% 2,4-D Amine salt SG	304 g/L 2,4- D SL	98% 2,4-D TC	Total (100% AI 2,4-D)
8	Jiangxi Tianyu Chemical Co., Ltd.	0.000	0.000	0.000	0.000	0.000	0.000	802.000	785.960
9	Jade Stone FZCO	0.000	1,265.221	0.000	0.000	0.000	0.000	0.000	632.611
10	Rainbow Agrosiences Mx Co., Ltd.	140.195	32.000	48.000	0.000	0.000	318.620	294.002	483.481
11	JAT Offshore S.A.L.	0.000	963.962	0.000	0.000	0.000	0.000	0.000	481.981
12	Shanghai Alfa International Trade Co., Ltd.	0.000	573.000	0.000	288.000	0.000	0.000	0.000	453.540
13	CAC Shanghai International Trade Co., Ltd.	0.000	0.000	0.000	0.000	0.000	0.000	424.071	415.590
14	Shandong Rainbow Carpet Co., Ltd.	0.000	791.495	0.000	0.000	0.000	0.000	0.000	395.748
15	Ningbo Tide Import and Export Co., Ltd.	0.000	725.675	0.000	0.000	0.000	0.000	0.000	362.838
16	Shanxi Reliance Chemicals Co., Ltd.	0.000	192.025	0.000	0.000	0.000	0.000	260.000	350.813
17	Shanghai Runshen International Logistics Co., Ltd.	0.000	576.000	0.000	0.000	0.000	0.000	0.000	288.000
18	Sino Dg International Logistics Co., Ltd.	0.000	509.800	0.000	0.000	0.000	0.000	0.000	254.900
19	Shandong Rainbow Agrosiences Co., Ltd.	42.385	90.603	0.000	0.000	38.400	15.842	151.500	247.791
20	Shanghai Safechem International Trade Co., Ltd.	0.000	0.000	0.000	0.000	0.000	0.000	240.000	235.200
Others		847.208	3,717.767	0.000	701.863	0.000	815.697	5,712.360	8,449.560
Total		2,467.801	16,573.318	144.000	1,848.327	38.400	1,597.760	14,802.513	25,529.722

Note: 1. Since April 2020, China's export data are sourced from data of the customs of major destinations. 2. Unless indicated "100% AI", all the volumes in the table are calculated by actual volume.
Source: Tranalysis

Table 3.2.1-8 Export volume of 2,4-D technical and formulations from China by exporter in 2022, tonne

No.	Exporter	600 g/L 2,4-D Amine salt SL	720 g/L 2,4-D Amine salt SL	80% 2,4-D Amine salt SG	860 g/L 2,4-D Amine salt SL	304 g/L 2,4-D SL	98% 2,4-D TC	Total (100% AI 2,4-D)
1	Shandong Weifang Rainbow Chemical Co., Ltd.	952.998	3,736.435	173.326	324.882	570.038	6,578.663	9,217.587
2	Nufarm Chemical (Shanghai) Co., Ltd.	0.000	0.000	0.000	0.000	0.000	9,202.624	9,018.572
3	Jiangxi Tianyu Chemical Co., Ltd.	0.000	0.000	0.000	0.000	0.000	3,515.600	3,445.288
4	CAC Shanghai International Trade Co., Ltd.	0.000	0.000	0.000	0.000	287.109	2,851.560	2,863.435
5	Thai Harvest Ltd.	199.557	922.604	0.000	0.000	0.000	1,944.424	2,458.634
6	Ningxia Rainbow Chemical Co., Ltd.	0.000	0.000	0.000	0.000	0.000	2,946.040	2,887.119
7	Weihai Hanfu Biochemical Medicine Co., Ltd.	0.000	0.000	0.000	0.000	0.000	1,663.720	1,630.446
8	Red Surcos Trade (Shanghai) Co., Ltd.	0.000	0.000	0.000	0.000	0.000	1,658.000	1,624.840
9	Lier Chemical Co., Ltd.	0.000	0.000	0.000	0.000	1,300.000	0.000	312.000
10	Sumitomo Chemical (Shanghai) Co., Ltd.	0.000	0.000	0.000	0.000	0.000	903.840	885.763
11	Shanghai Safechem International Trade Co., Ltd.	0.000	0.000	0.000	0.000	0.000	894.000	876.120
12	Shenzhen Baocheng Chemical Industry Co., Ltd.	0.000	892.150	0.000	0.000	0.000	0.000	446.075
13	Ningbo Tide Import and Export Co., Ltd.	0.000	630.886	0.000	0.000	0.000	152.348	464.744
14	Shanghai Shenyuan International Logistics Co., Ltd.	0.000	0.000	0.000	756.480	0.000	0.000	438.758
15	Wynca (Hong Kong) Limited	0.000	657.548	0.000	0.000	0.000	0.000	328.774

No.	Exporter	600 g/L 2,4-D Amine salt SL	720 g/L 2,4-D Amine salt SL	80% 2,4-D Amine salt SG	860 g/L 2,4-D Amine salt SL	304 g/L 2,4-D SL	98% 2,4-D TC	Total (100% AI 2,4-D)
16	Sunward Logistics Co., Ltd.	0.000	500.160	0.000	0.000	96.020	0.000	273.125
17	Jade Stone FZCO	0.000	560.160	0.000	0.000	0.000	0.000	280.080
18	Access Trading Shanghai Co., Ltd.	0.000	524.160	0.000	0.000	0.000	0.000	262.080
19	Zhuochen Industries (Shanghai) Co., Ltd.	0.000	401.568	0.000	0.000	0.000	60.000	259.584
20	Asia Shipping	0.000	449.280	0.000	0.000	0.000	0.000	224.640
	Others	403.145	8,071.342	0.000	727.940	576.710	11,535.620	16,086.641
	Total	1,555.700	17,346.293	173.326	1,809.302	2,829.877	43,906.439	54,284.305

Note: 1. Since April 2020, China's export data are sourced from data of the customs of major destinations. 2. Unless indicated "100% AI", all the volumes in the table are calculated by actual volume.
Source: Tranalysis

Table 3.2.1-9 Export volume of 2,4-D technical and formulations from China by exporter in 2021, tonne

No.	Exporter	600 g/L 2,4-D Amine salt SL	720 g/L 2,4-D Amine salt SL	80% 2,4-D Amine salt SG	860 g/L 2,4-D Amine salt SL	96% 2,4-D Amine salt SG	304 g/L 2,4-D SL	95% 2,4-D TC	98% 2,4-D TC	Total (100% AI 2,4-D)
1	Jiangxi Tianyu Chemical Co., Ltd.	0.000	0.000	0.000	0.000	0.000	0.000	0.000	16,580.348	16,248.741
2	Shandong Weifang Rainbow Chemical Co., Ltd.	653.797	2,025.231	72.004	1,121.681	19.200	373.766	0.000	666.268	2,779.547
3	Ningxia Gerui Fine Chemical Co., Ltd.	0.000	0.000	0.000	0.000	0.000	0.000	0.000	3,379.402	3,311.813
4	CAC Nantong Chemical Co., Ltd.	0.000	2,937.012	0.000	0.000	0.000	0.000	0.000	0.000	1,468.506
5	CAC Shanghai International Trade Co., Ltd.	0.000	64.390	0.000	0.000	0.000	0.000	0.000	2,682.400	2,660.947
6	Weihai Hanfu Biochemical Medicine Co., Ltd.	0.000	140.717	0.000	0.000	0.000	0.000	0.000	1,070.000	1,118.959
7	Red Surcos Trade (Shanghai) Co., Ltd.	0.000	0.000	0.000	0.000	0.000	0.000	0.000	1,117.000	1,094.660
8	Qingdao Greenfield Imp & Exp Co., Ltd.	0.000	0.000	0.000	107.760	0.000	0.000	0.000	234.000	291.821
9	Ningbo Generic Chemical Co., Ltd.	39.215	36.540	0.000	198.400	0.000	18.034	0.000	0.000	155.709
10	NGC Agrosiences International Co., Ltd.	0.000	47.391	0.000	190.720	0.000	0.000	0.000	0.000	134.313
11	Zhejiang Chemicals Import and Export Corp.	0.000	232.984	0.000	0.000	0.000	0.000	0.000	0.000	116.492
12	China Jiangsu International Economic and Technical Cooperation Group, Ltd.	0.000	25.001	0.000	0.000	0.000	0.000	0.000	207.600	215.948
13	Shenzhen Iprochem Co., Ltd.	0.000	31.285	0.000	149.799	0.000	0.000	0.000	50.000	151.526
14	Ningbo Sunjoy Bioscience Co., Ltd.	0.000	187.296	0.000	0.000	0.000	33.517	0.000	0.000	101.692
15	Sh-Inform Chemical Co., Ltd.	0.000	49.850	0.000	158.720	0.000	0.000	0.000	0.000	116.983

No.	Exporter	600 g/L 2,4-D Amine salt SL	720 g/L 2,4-D Amine salt SL	80% 2,4-D Amine salt SG	860 g/L 2,4-D Amine salt SL	96% 2,4-D Amine salt SG	304 g/L 2,4-D SL	95% 2,4-D TC	98% 2,4-D TC	Total (100% AI 2,4-D)
16	Ningbo Double Fusion Import and Export Co., Ltd.	0.000	205.358	0.000	0.000	0.000	0.000	0.000	0.000	102.679
17	Shanghai Safechem International Trade Co., Ltd.	0.000	0.000	0.000	0.000	0.000	0.000	0.000	204.000	199.920
18	Shanghai Hui Song (H&S) Agro-Solution Co., Ltd.	0.000	197.638	0.000	0.000	0.000	0.000	0.000	0.000	98.819
19	Jiangsu Joc Great Wall Corp.	0.000	196.798	0.000	0.000	0.000	0.000	0.000	0.000	98.399
20	Nanjing Red Sun Co., Ltd.	0.000	23.560	0.000	141.360	0.000	0.000	0.000	0.000	93.769
Others		79.608	1,601.628	0.000	460.025	0.000	330.876	30.000	5,213.062	6,320.959
Total		772.621	8,002.679	72.004	2,528.465	19.200	756.193	30.000	31,404.080	36,882.202

Note: 1. Since April 2020, China's export data are sourced from data of the customs of major destinations. 2. Unless indicated "100% AI", all the volumes in the table are calculated by actual volume.
Source: Tranalysis

-By manufacturer

Table 3.2.1-10 Export volume of 2,4-D technical and formulations from China by producer in Q1–Q3 2023, tonne

No.	Producer	600 g/L 2,4-D Amine salt SL	720 g/L 2,4-D Amine salt SL	80% 2,4-D Amine salt SG	860 g/L 2,4-D Amine salt SL	96% 2,4-D Amine salt SG	304 g/L 2,4-D SL	98% TC	Total (100% AI 2,4-D)
1	Jiangxi Tianyu Chemical Co., Ltd.	0.000	0.000	0.000	0.000	0.000	0.000	5,346.471	5,239.542
2	Shandong Weifang Rainbow Chemical Co., Ltd.	1,259.997	2,875.152	0.000	215.264	0.000	0.000	1,700.180	3,808.204
3	Weihai Hanfu Biochemical Medicine Co., Ltd.	0.000	0.000	0.000	0.000	0.000	0.000	240.000	235.200
4	Changzhou Wintafone Chemical Co., Ltd.	0.000	371.040	0.000	0.000	0.000	0.000	0.000	185.520

No.	Producer	600 g/L 2,4-D Amine salt SL	720 g/L 2,4-D Amine salt SL	80% 2,4-D Amine salt SG	860 g/L 2,4-D Amine salt SL	96% 2,4-D Amine salt SG	304 g/L 2,4-D SL	98% TC	Total (100% AI 2,4-D)
5	Jiangsu CF Agrochemical Co., Ltd.	0.000	61.040	0.000	0.000	0.000	0.000	0.000	30.520
6	Shandong Avilive Chemical Co., Ltd.	0.000	0.000	0.000	0.000	0.000	96.000	0.000	23.040
7	Nanjing CF Agrochemical Co., Ltd.	0.000	40.800	0.000	0.000	0.000	0.000	0.000	20.400
Others		1,207.804	13,225.286	144.000	1,633.063	38.400	1,501.760	7,515.862	15,987.296
Total		2,467.801	16,573.318	144.000	1,848.327	38.400	1,597.760	14,802.513	25,529.722

Note: 1. Since April 2020, China's export data are sourced from data of the customs of major destinations. 2. Unless indicated "100% AI", all the volumes in the table are calculated by actual volume.
Source: Tranalysis

Table 3.2.1-11 Export volume of 2,4-D technical and formulations from China by producer in 2022, tonne

No.	Producer	600 g/L 2,4-D Amine salt SL	720 g/L 2,4-D Amine salt SL	80% 2,4-D Amine salt SG	860 g/L 2,4-D Amine salt SL	304 g/L 2,4-D SL	98% 2,4-D TC	Total (100% AI 2,4-D)
1	Jiangxi Tianyu Chemical Co., Ltd.	0.000	0.000	0.000	0.000	0.000	18,788.608	18,412.836
2	Shandong Weifang Rainbow Chemical Co., Ltd.	952.998	3,736.435	0.000	324.882	0.000	6,578.663	8,942.117
3	Weihai Hanfu Biochemical Medicine Co., Ltd.	17.600	128.147	0.000	0.000	0.000	2,856.068	2,871.116
4	Ningxia Rainbow Chemical Co., Ltd.	0.000	0.000	0.000	0.000	0.000	2,946.040	2,887.119
5	Lier Cropscience Co., Ltd.	0.000	0.000	0.000	0.000	1,300.000	0.000	312.000
6	Jiangsu CF Agrochemical Co., Ltd.	0.000	1,071.948	0.000	11.160	0.000	0.000	542.447
7	CAC Nantong Chemical Co., Ltd.	0.000	282.720	0.000	0.000	0.000	121.600	260.528
8	Changzhou Wintafone Chemical Co., Ltd.	0.000	393.159	0.000	0.000	0.000	0.000	196.580

No.	Producer	600 g/L 2,4-D Amine salt SL	720 g/L 2,4-D Amine salt SL	80% 2,4-D Amine salt SG	860 g/L 2,4-D Amine salt SL	304 g/L 2,4-D SL	98% 2,4-D TC	Total (100% AI 2,4-D)
9	Ningxia Wynca Technology Co., Ltd.	0.000	302.784	0.000	0.000	0.000	0.000	151.392
10	Shandong Avilive Chemical Co., Ltd.	0.000	0.000	0.000	0.000	160.000	0.000	38.400
Others		585.102	11,431.101	173.326	1,473.260	1,369.877	12,615.460	19,669.770
Total		1,555.700	17,346.293	173.326	1,809.302	2,829.877	43,906.439	54,284.305

Note: 1. Since April 2020, China's export data are sourced from data of the customs of major destinations. 2. Unless indicated "100% AI", all the volumes in the table are calculated by actual volume.
Source: Tranalysis

Table 3.2.1-12 Export volume of 2,4-D technical and formulations from China by producer in 2021, tonne

No.	Producer	600 g/L 2,4-D Amine salt SL	720 g/L 2,4-D Amine salt SL	80% 2,4-D Amine salt SG	860 g/L 2,4-D Amine salt SL	96% 2,4-D Amine salt SG	304 g/L 2,4-D SL	95% 2,4-D TC	98% 2,4-D TC	Total (100% AI 2,4-D)
1	Jiangxi Tianyu Chemical Co., Ltd.	0.000	0.000	0.000	0.000	0.000	0.000	0.000	17,769.348	17,413.961
2	CAC Nantong Chemical Co., Ltd.	0.000	3,049.402	0.000	0.000	0.000	0.000	0.000	2,706.400	4,176.973
3	Shandong Weifang Rainbow Chemical Co., Ltd.	653.797	2,002.097	0.000	1,121.681	19.200	121.045	0.000	458.960	2,446.562
4	Ningxia Gerui Fine Chemical Co., Ltd.	0.000	0.000	0.000	0.000	0.000	0.000	0.000	3,711.710	3,637.475
5	Weihai Hanfu Biochemical Medicine Co., Ltd.	0.000	66.650	0.000	0.000	0.000	0.000	0.000	1,294.000	1,301.445
6	Nanjing CF Agrochemical Co., Ltd.	0.000	477.716	0.000	0.000	0.000	0.000	0.000	0.000	238.858
7	Jiangsu CF Agrochemical Co., Ltd.	0.000	39.265	0.000	308.519	0.000	0.000	0.000	0.000	198.573
8	Shandong Keyuan Chemical Industry Co., Ltd.	0.000	0.000	0.000	52.080	0.000	0.000	0.000	258.000	283.046
9	Lier Chemical Co., Ltd.	0.000	0.000	0.000	0.000	0.000	119.925	0.000	0.000	28.782

No.	Producer	600 g/L 2,4-D Amine salt SL	720 g/L 2,4-D Amine salt SL	80% 2,4-D Amine salt SG	860 g/L 2,4-D Amine salt SL	96% 2,4-D Amine salt SG	304 g/L 2,4-D SL	95% 2,4-D TC	98% 2,4-D TC	Total (100% AI 2,4-D)
10	Jingma Chemicals Co., Ltd.	0.000	0.000	0.000	111.360	0.000	0.000	0.000	0.000	64.589
11	Changzhou Wintafone Chemical Co., Ltd.	0.000	85.201	0.000	0.000	0.000	0.000	0.000	0.000	42.601
12	Anhui Xinglong Chemical Co., Ltd.	0.000	0.000	0.000	0.000	0.000	50.233	0.000	0.000	12.056
13	Zhejiang Funong Biological Technology Co., Ltd.	0.000	0.000	0.000	0.000	0.000	20.050	0.000	0.000	4.812
14	Jiangsu Wintafone Crop Science Co., Ltd.	0.000	17.920	0.000	0.000	0.000	0.000	0.000	0.000	8.960
Others		118.823	2,264.427	72.004	934.825	0.000	444.940	30.000	5,205.662	7,023.508
Total		772.621	8,002.679	72.004	2,528.465	19.200	756.193	30.000	31,404.080	36,882.202

Note: 1. Since April 2020, China's export data are sourced from data of the customs of major destinations. 2. Unless indicated "100% AI", all the volumes in the table are calculated by actual volume.
Source: Tranalysis

4 Consumption of 2,4-D in China, 2019–2023

4.1 Consumption overview, 2019–2023

In 2019–2023, over 80% of China's 2,4-D technical (converted into 100% technical) was exported, and the rest was used to produce other 2,4-D products, mainly including 2,4-D butylate, 2,4-D amine salt, 2,4-D-ethylhexyl and 2,4-D Na. In China, 2,4-D products are utilised as herbicides in the form of esters and amine salts. The main specifications of 2,4-D formulations in domestic market include 720 g/L 2,4-D amine salt SL and 860 g/L 2,4-D amine salt SL.

In China, the consumption of 2,4-D in China will rise slightly for more crop-growing area as expected in 2023. Unless there is crop resistance to glyphosate in China in the future and 2,4-D is needed to solve the problem, the amount of 2,4-D in China will not change much.

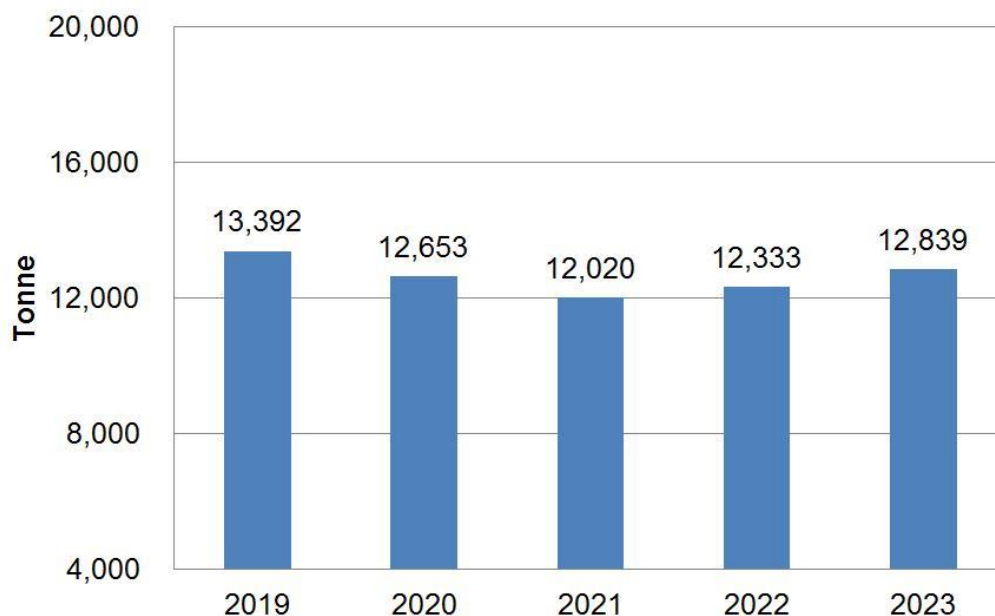
Table 4.1-1 Production, export, import and apparent consumption of 2,4-D in China, 2019–2023E

Year	Capacity of 2,4-D technical, t/a	Output of 2,4-D technical, tonne (converted to 100% technical)	Import volume, tonne (converted to 100% technical)	Export volume, tonne (converted to 100% technical)	Apparent consumption volume, tonne
2019	250,700	69,830	0	58,600	11,230
2020	250,700	64,144	0	53,465	10,679
2021	250,700	58,350	0	47,930	10,420
2022	250,700	67,820	0	56,140	11,680
2023E	260,700	58,500	0	46,550	11,950

Note: The output and export for 2023 are estimated.

Source: China Customs & CCM

Figure 4.1-1 Actual consumption volume of 2,4-D (converted into 100% technical) in China, 2019–2023



Note: All the volumes are calculated by 100% technical.

Source: CCM

4.2 Share by crop, 2023

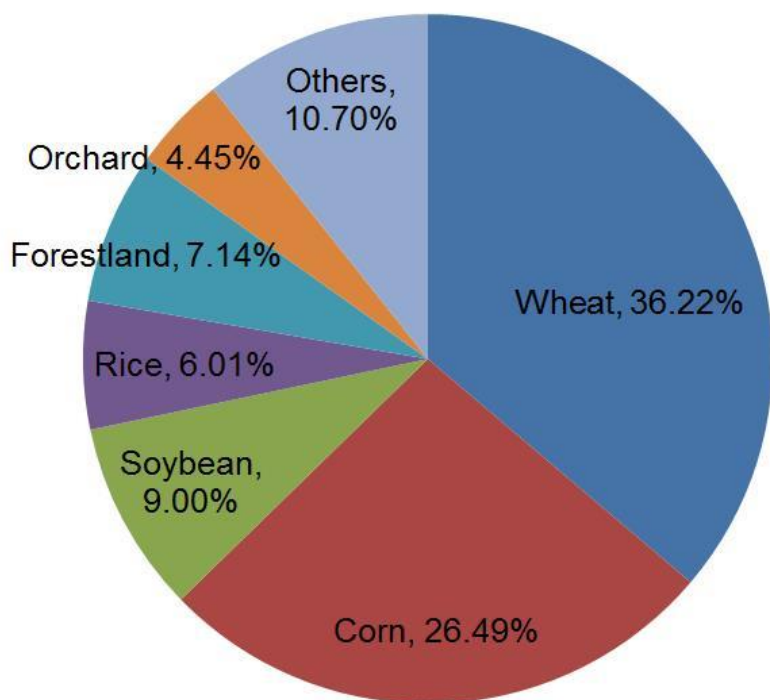
In 2013–2016, 2,4-D formulations witnessed stable growth in domestic consumption, with the application volume growing on corn, forestland, rice, etc. From 2019 to 2023, influenced by the zero-growth policy in pesticide use, domestic consumption experienced a year-on-year decline. However, in order to guarantee the supply of grains and agricultural products, the grain sown area hit 118.97 million ha in 2023, marking an increase of 0.5% YoY. Therefore, 2,4-D consumption is expected to increase in consideration of food security.

Among all 2,4-D products, 2,4-D butylate is commonly used in wheat and corn fields. But since it could cause many problems, 2,4-D butylate is of high possibility to be gradually replaced by 2,4-D-ethylhexyl, which is produced more costly than 2,4-D butylate. Raw materials for these two products are different but they are produced with similar technology. In addition, 2,4-D-ethylhexyl has the distinct advantage that it is less volatile than 2,4-D butylate, so it does not drift very far away to damage the broad-leaved plants around. This contributes to its high competitiveness in high-temperature areas.

The weaknesses of 2,4-D butylate, like easily volatilising in the air and requiring strict utilising conditions, have not only deterred researchers from further developing but also led to the decision by the Chinese government to stop 2,4-D butylate's domestic application and sales from 2023. 2,4-D butylate can drift to 500 meters away from the original farmland and affect sensitive crops, such as tomatoes, grapes and other broad-leaved plants, which will become worse if the product is used in high-temperature and dry places. Besides, 2,4-D butylate is likely to remain in sprayers and not easy to be cleaned and disposed of. It would damage broad-leaved plants like vegetables if the sprayers are used by mistake. Furthermore, 2,4-D butylate takes effect in places where the temperature is higher than 10 °C, and the optimum temperature is regarded as 20 °C–30 °C. It would perform badly and even out of work if the temperature is lower than 10 °C.

But some farmers do prefer 2,4-D butylate and almost use it in every stage of planting corn and wheat to control weeds on the ground, for the product can be absorbed by object plants quickly and is not easily carried away by rain. Besides, its effect on the soil does not last for a very long time, which is beneficial to the further planting. The characteristics above and the low market price have earned 2,4-D butylate the edge that being utilised in China for decades.

Figure 4.2-1 Consumption of 2,4-D formulations (converted into 100% technical) by crop in China, 2023

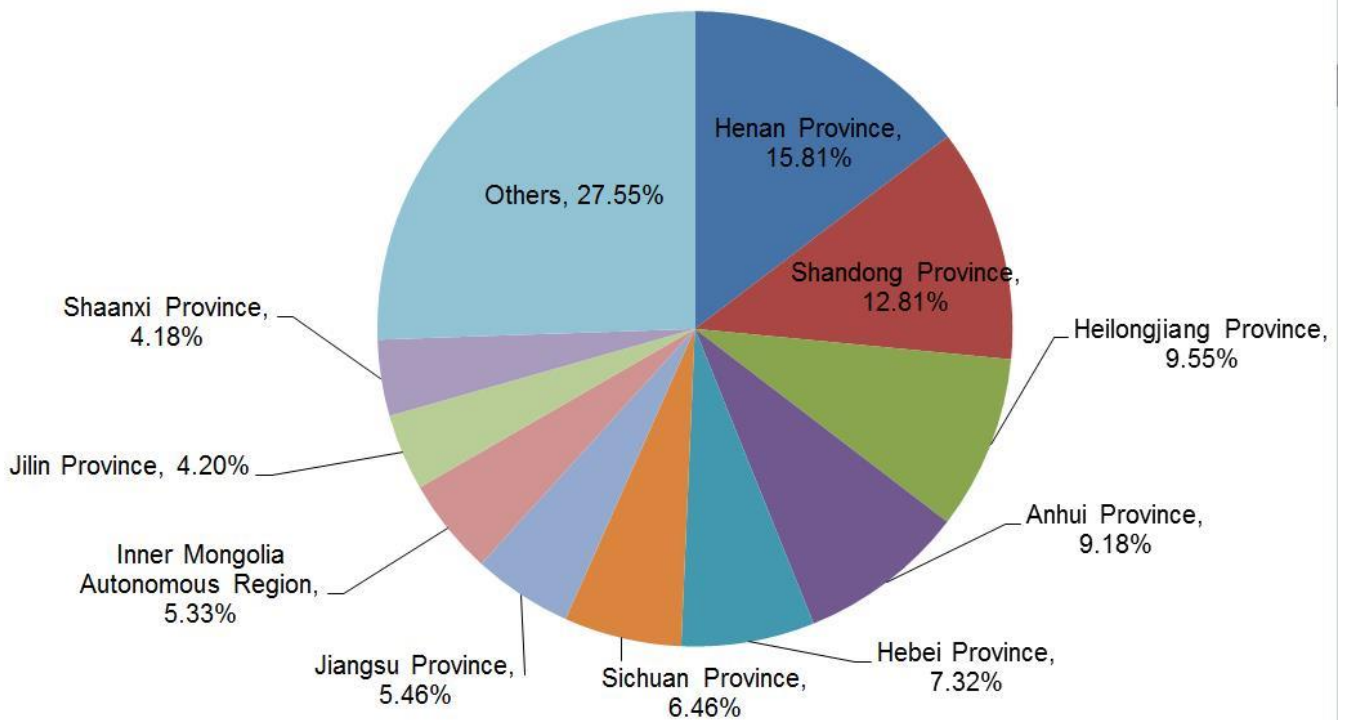


Note: Due to rounding, the total may not equal 100.00%.
Source: CCM

4.3 Share by region, 2023

Regional distribution of 2,4-D consumption is closely related to the planting structure of crops, the condition of application and the growth rate of weeds in China. As analysed, annual consumption volume of 2,4-D (mainly 2,4-D esters) in wheat, corn and soybean has maintained over 70% in 2013–2023; thus, the major planting regions of wheat, corn and soybean take leading positions in the consumption of 2,4-D, such as Henan, Shandong, Heilongjiang, Anhui and Hebei provinces.

Figure 4.3-1 Consumption of 2,4-D formulations (calculated by 100% technical) in China by region, 2023



Note: Due to rounding, the total may not equal 100.00%.
Source: CCM

5 Forecast on 2,4-D industry in China, 2024–2028

5.1 Key influencing factors

- Policy on environmental protection

In recent years, most of the unqualified 2,4-D technical enterprises have stopped production, owing to their failure in reaching the standard of pollutant treatment. As sewage discharge of 2,4-D technical production would disrupt the environment, the supervision over 2,4-D technical production is very strict in China, and relevant policies have been rolled out, such as the *Environmental Protection Laws of the People's Republic of China* issued on 1st Jan., 2015, which prohibits the capacity expansion of 2,4-D technical unless the manufacturer undertakes a technological reform.

At present, 2,4-D is a widely-used herbicide, featuring good solubility, which will cause pollution to groundwater and surface water. The product and its metabolic products with biotoxicity, like 2,4-dichlorophenol, pose a tangible threat to human health and natural environment.

- Production cost

Production cost of 2,4-D technical grows in China. Continuous high interest rates over the recent two years, slower-than-expected economic growths after the COVID-19 pandemic and increasing extreme weather across the world have posed a certain impact on international trade, undermining the pesticide industry and the development of Chinese pesticide enterprises. Besides, uncertainties around the world, especially escalating geopolitical tensions in East Europe and Middle East, may engender inflation, supply chain disruption, sky-high crude oil price and higher shipping cost, along with some aftermaths. There will be difficulties at all levels for China's pesticide industry to fare well in the near future.

- Demand

By now, there is still an oversupply of 2,4-D technical in China. Most 2,4-D products, including 98% TC, 720 g/L 2,4-D amine salt SL and 860 g/L 2,4-D amine salt SL, are for export. In 2022 and 2023, with increasing soybean-growing areas in China, the domestic demand for pesticides, including 2,4-D went up apparently.

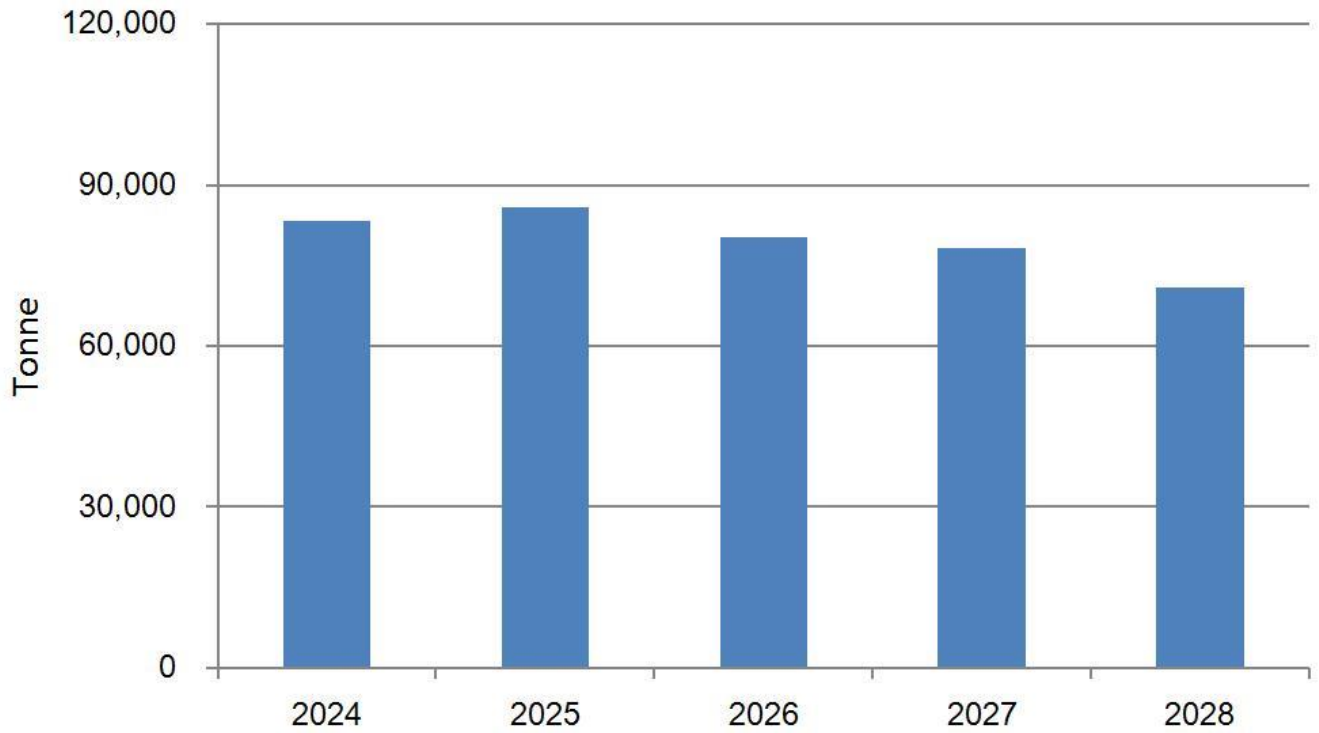
The overseas market provides an important outlet for the consumption of China's superfluous output. With the completion of the digestion of the international market inventory, it is expected that a recovery of overseas demand will come forth in H2 2024 and the performance of China's pesticide imports and exports will improve. However, since the Indian competitors are providing pesticide products with lower prices, it will place a challenge on China's pesticide exports.

5.2 Forecast on supply and demand

In the coming one or two years, 2,4-D still enjoys a promising prospect in China, when Chinese genetically modified (GM) herbicide-tolerant crops (mainly corn and soybean) are worth of wide cultivation and promotion, boosting the demand for herbicides for GM herbicide-tolerant crops. The competitive pattern of 2,4-D is likely to reshape, considering that China classifies new projects for glyphosate production units as restricted ones, and some regions in China have taken measures to restrict or ban glyphosate.

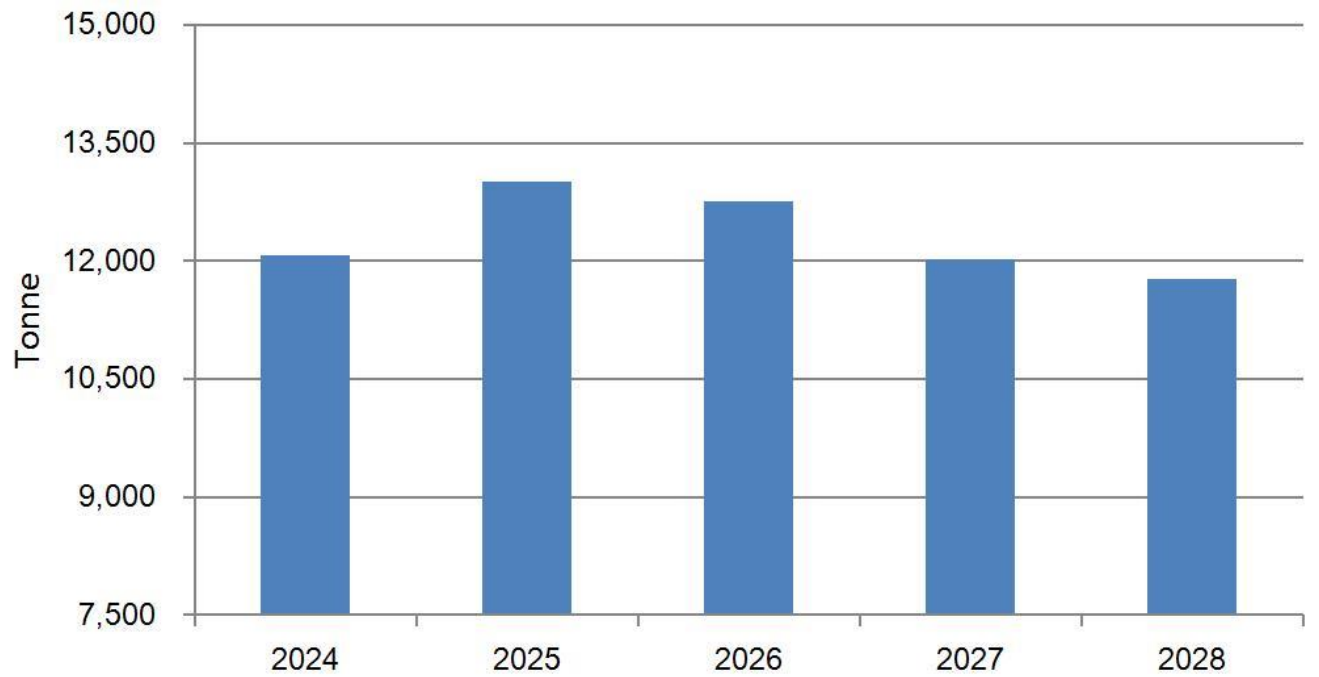
However, both supply and demand of 2,4-D technical may decrease overall in the long run, as environmental protection policies continue to tighten and China's regulations on the zero-growth policy in pesticide use persist,

Figure 5.2-1 Forecast on supply of 2,4-D technical (calculated by 100% technical) in China, 2024–2028



Source: CCM

Figure 5.2-2 Forecast on demand for 2,4-D formulations (calculated by 100% technical) in China, 2024–2028



Source: CCM

6 Conclusion

In order to meet stricter environmental protection requirements, China's 2,4-D enterprises have been moving towards an energy-saving production process since July 2018. By gaining advantages in ecological protection, well-qualified producers have better survived the fierce competition, and put more efforts on product quality improvement. For example, Jiangxi Tianyu Chemical Co., Ltd. (Jiangxi Tianyu), a subsidiary of CAC Nantong Chemical Co., Ltd., took part in the revision of *FAO Specifications and Evaluations for Agricultural Pesticides 2,4-D* in Feb. 2021 and completed safety facilities acceptance inspection of its safety and environmental protection technology upgrading project on 12 June 2023.

In China, with the popularisation of minimum- and non-tillage techniques, chemical weeding is expected to gain more traction with farmers. Therefore, more 2,4-D products will be needed in wheat-, corn-, and rice-growing areas. In addition, weed's gradual resistance to 2,4-D's competitors, such as glyphosate, provides 2,4-D products with a broader space for development.

What's more, in spite of severe overcapacity and stricter environmental protection policies, there is still development space for the 2,4-D producers in China, which is related to technological innovation and environmental protection in the next few years, including:

- Technological development of pollutant treatment
- R&D and promotion of environmental-friendly formulations
- Domestic and overseas market exploration
- Increasing planting area of GM crops

Specifically, the compounding formulation with 2,4-D and glyphosate has been widely recognised in China and the market share is climbing up since China has expanded overall crop-growing areas to guarantee food supply in 2021–2025. In China, 2,4-D demand in the local farmlands rose in 2022, yet it witnessed large scale of inventories and a sluggish overseas demand in 2023. However, China's 2,4-D industry is likely to obtain growths in the near future for the following reasons:

- Obvious growth of crop-growing and soybean-corn compound areas in China in 2022 and 2023;
- Introduction and industrialisation of genetically modified (GM) crops in China: On 7 Dec. 2023, China officially issued the approved list of GM corn and soybean varieties, which were composed of 37 corn varieties and 14 soybean varieties.
- New demand from North American market—Corteva Agriscience's new corn variety, which allows for the ultimate weed management flexibility with tolerance to 2,4-D choline, glyphosate, glufosinate and FOP herbicides, will be available for planting in the 2024 growing season in the U.S. and Canada.

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