

# **2,4-D Survey in China**

**The Ninth Edition**

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**Researched & Prepared by:**

**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 2022, China's 2,4-D capacity remained at 250,700 t/a and the output (converted to technical 100%) increased to 61,870 tonnes. The ex-works price of 2,4-D technical stayed at a high level since the yearly uptrend in 2021, while in the long term the price may loosen as the cost of key raw materials slipped with oversupply.

Most 2,4-D products, including 96% 2,4-D technical, 98% 2,4-D technical, 2,4-D amine salt 720g/L SL and 2,4-D amine salt 860g/L SL, are for export; 2,4-D butylate EC is mainly consumed in the domestic market. Although 2,4-D butylate products are to be withdrawn from Chinese market from Jan. 2023. the replacements, such as 2,4-D-ethylhexyl, still allow 2,4-D to enjoy a promising prospect in China. It is estimated that demand for 2,4-D will keep stable at home and abroad.

## 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: 2017–2022

## 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: 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: USD/CNY exchange rate, Jan. 2016–Sept. 2022

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	-	-	-	6.5486

Source: The People's Bank of China

## 1 Brief introduction to 2,4-D in China

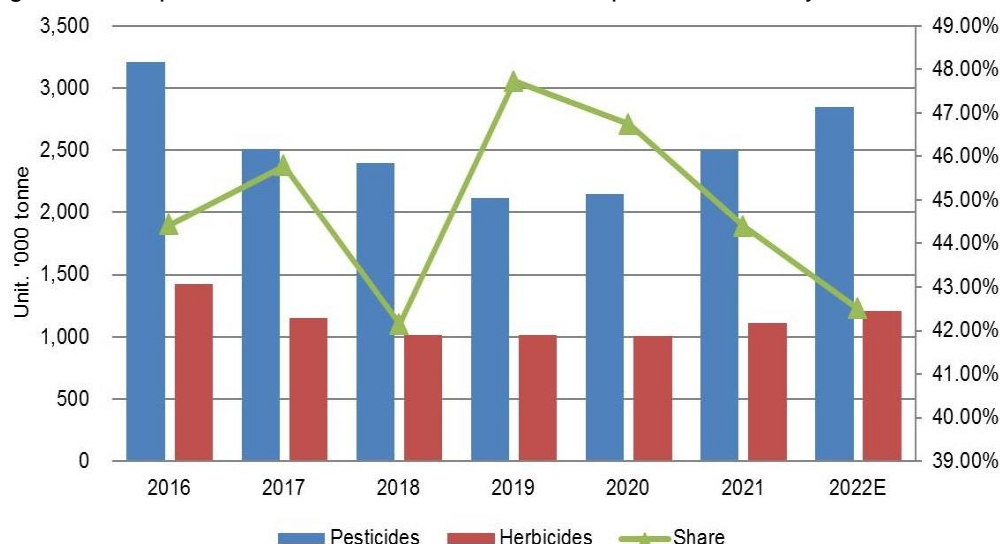
### - Brief introduction to herbicide industry

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 2021, China's herbicide output was 1,109,000 tonnes (converted to 100% technical, the same as below), increasing by 10% year on year.

In terms of export, in 2021 China exported 2,202,000 tonnes of pesticides at a total value of USD8,010 million. Specifically, 1,390,000 tonnes of herbicides were exported with a YoY increase of 12.46%, accounting for more than 63% of total pesticide exports (nearly 14 percentage points higher than that of 2020); the total value of herbicide exports was USD4,900 million, up by 59.66% YoY.

With the structural adjustment of the pesticide industry and development of products with higher added value and efficacy, structure of pesticide output in China has improved. It is expected that the output of China's pesticides (by 100% technical) will reach 2.85 million tonnes in 2022 and herbicides will stand at 42.5%, maintaining its position as the largest pesticide category in China with the average output proportions in 2017–2021 above 45%.

Figure 1-1 Output and share of herbicides in China's pesticide industry, 2016–2022E



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, 2019–2021

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	15.56%	13.12%	67.57%	55.86%
2020	110,000	911	2,514,000	7,624	14,000	78	1,236,000	3,069	12.73%	8.56%	49.16%	40.25%
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%

Source: National Bureau of Statistics 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. As of Sept. 2022, the country's capacity stood at 250,700 t/a. In the past two years, the overall operating rate was at a low level, yet the situation changed this year even in the low season. Since the overseas customers taking stable and large orders from China's major manufacturers in May, the latter had to schedule the production of 2,4-D to August.

Since 2018, 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 2019, 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, 2019–2021

Year	Output, tonne		Output share	Consumption, tonne		Consumption share
	Herbicides (100% technical)	Output share		Herbicides (100% technical)	2,4-D (100% technical)	
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%

Source: CCM



## 2 Production of 2,4-D in China

### 2.1 Technology

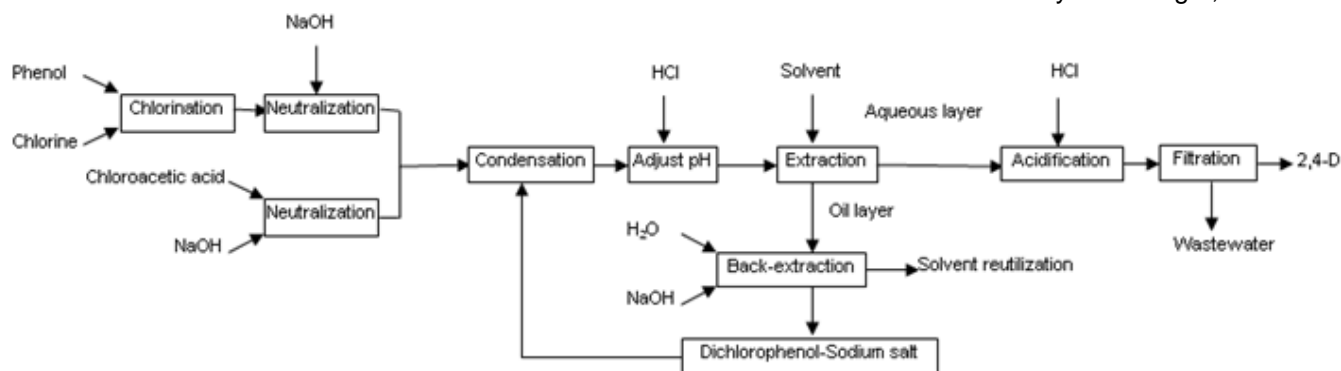
Currently, there are mainly two methods for synthesizing 2,4-D technical. The first method is chloridizing phenol by chlorine and then through condensation with chloroacetic acid; the second method is condensation and then followed by chlorination process.

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.

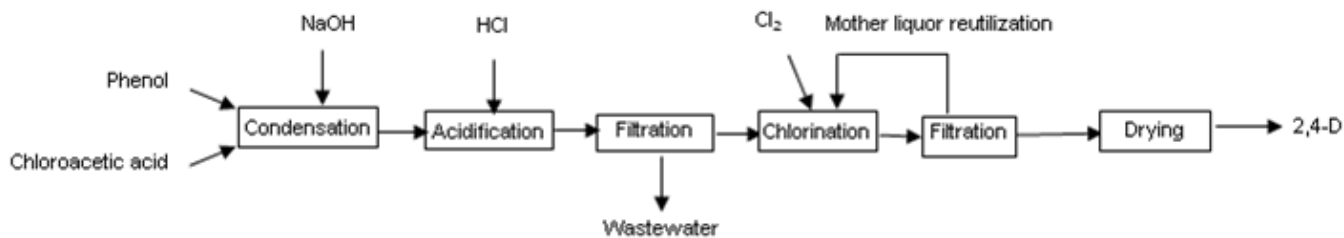
Major domestic 2,4-D technical producers like Changzhou Wintafone Chemical Co., Ltd. and Shandong Weifang Rainbow Chemical Co., Ltd. have been engaged in the research of 2,4-D synthesis technology for many years and have made great progress in improving the purity of 2,4-dichlorophenol and optimizing 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

Amid the sufficient supply and sluggish demand, 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 USD793/t in Q1–Q3, down by 40% compared with the average price in 2021; and the Q4 price is likely to hold its downtrend in consideration that a large sum of inventory in some manufacturers' and traders' warehouse might be offered at a favourable price.

In H1 2022, domestic producers' operating rate was high, but low ex-works price depressed the chloroacetic acid producers' enthusiasm, leading the rate to drop to 51% in June, down by 16% MoM. This annual domestic output is likely to slip to 700,000 tonnes, if the situation doesn't improve. In H1 2021, Dongying Huatai Chemical Group Co., Ltd. put its production lines into use and Jiangsu Dongpu New Material Technology Co., Ltd. completed the construction of 50,000 t/a chloroacetic acid project and put it into trial production before Nov. 2021. Thanks to added capacity thrown into operation, the 2,4-D's supply from China's chloroacetic acid industry would be stable in 2022.

### - 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 2021, the total import volume slipped by 26.43% YoY to 522,300 tonnes, while the export volume from China was about 135,100 tonnes, posting a year-on-year increase of 744.38%. The reason for decreased import and increased export was the realisation of new capacities including the 350,000 t/a from Lihuayi Weiyuan Chemical Co., Ltd. and the 650,000 t/a from Zhejiang Petroleum & Chemical Co., Ltd.

The ex-works price of phenol ran all the way high in 2021 and peaked in Feb. 2022. Then it showed a downtrend and plummeted to USD1,383.64/t in Aug. In June and Sept. 2022, the price of phenol increased slightly due to the equipment maintenance of some major manufacturers. Although each downtime maintenance period lasted for just half a month, it is likely that the price of phenol will keep rising in Q4 2022.

Generally speaking, the market price of 2,4-D was pushed up in 2021 yet slipped down slowly in 2022, mainly because of the cost of key raw materials. In the long run, with China's capacity of these two raw materials reaching its full potential, 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 Oct. 2022, the number of registered 2,4-D products reached 338.

On 7 Sept., 2016, the Ministry of Agriculture 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) are no longer accepted and approved. This marks that the production of 2,4-D butylate will be banned in domestic market after their domestic registrations expire. 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 are also expected to be stopped in domestic market since 29 Jan., 2023, as product validity period lasts two years. 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 Oct. 2022

Specification		Number of registrations
Single formulations	EC	32
	AS	30
	Others	29
Mixed formulations		197
Technical	2,4-D	26
	2,4-D-ethylhexyl	13
	2,4-D butylate	6
	2,4-D Na	4
	2,4-DB	1
<b>Total</b>		<b>338</b>

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

Table 2.3-2 Valid registration of 2,4-D technical in China, as of Oct. 2022

No.	Registration code	Registrant (CN)	Registrant	Active ingredient	Content	Expiry date
1	PD20190029	辽宁先达农业科学有限公司	Liaoning Cynda Agricultural Science Co., Ltd.	2,4-DB	95%	2024/1/29
2	PD20181196	山东科源化工有限公司	Shandong Keyuan Chemical Co., Ltd.	2,4-D-ethylhexyl	97%	2023/3/15
3	PD20171970	江苏凯晨化工有限公司	Jiangsu Kaichen Chemical Co., Ltd.	2,4-D	98%	2027/9/18

No.	Registration code	Registrant (CN)	Registrant	Active ingredient	Content	Expiry date
4	PD20171765	山东滨农科技有限公司	Shandong Binnong Technology Co., Ltd.	2,4-D	98%	2027/9/18
5	PD20171643	江苏凯晨化工有限公司	Jiangsu Kaichen Chemical Co., Ltd.	2,4-D-ethylhexyl	96%	2027/8/20
6	PD20171094	宁夏格瑞精细化工有限公司	Ningxia Gerui Fine Chemical Co., Ltd.	2,4-D	98%	2027/5/30
7	PD20170719	甘肃智鹏科技有限公司	Gansu Zhipeng Technology Co., Ltd.	2,4-D	98%	2027/4/9
8	PD20170643	威海韩孚生化药业有限公司	Weihai Hanfu Biochemical Medicine Co., Ltd.	2,4-D	98%	2027/4/9
9	PD20170553	江西天宇化工有限公司	Jiangxi Tianyu Chemical Co., Ltd.	2,4-D Na	96%	2027/4/9
10	PD20170425	安道麦股份有限公司	ADAMA Ltd.	2,4-D	98%	2027/3/8
11	PD20161171	四川省乐山市福华通达农药科技有限公司	Fuhua Tongda Agro-chemical Technology Co., Ltd.	2,4-D	98%	2026/9/13
12	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%	2026/8/30
13	PD20161061	江西天宇化工有限公司	Jiangxi Tianyu Chemical Co., Ltd.	2,4-D-ethylhexyl	97%	2026/8/30
14	PD20161007	宁夏新安科技有限公司	Ningxia Wynca Technology Co., Ltd.	2,4-D	96%	2026/8/30
15	PD20160947	江苏常丰农化有限公司	Jiangsu CF Agrochemical Co., Ltd.	2,4-D	96%	2026/7/27
16	PD20160636	江西天宇化工有限公司	Jiangxi Tianyu Chemical Co., Ltd.	2,4-D	98%	2026/4/27
17	PD20160262	南通泰禾化工股份有限公司	CAC Nantong Chemical Co., Ltd.	2,4-D	98%	2026/2/25
18	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%	2026/2/25
19	PD20160117	内蒙古中高化工有限公司	Inner Mongolia Zhonggao Chemical Co., Ltd.	2,4-D	98%	2026/1/28
20	PD20160025	浙江宇龙生物科技股份有限公司	Zhejiang Udragon Bioscience Co., Ltd.	2,4-D	96%	2026/1/26
21	PD20152544	山东科源化工有限公司	Shandong Keyuan Chemical Co., Ltd.	2,4-D	98%	2025/12/5
22	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%	2025/9/6
23	PD20150743	江苏莱科化学有限公司	Lion Agrevo (Jiangsu) Co., Ltd.	2,4-D-ethylhexyl	96%	2025/4/20
24	PD20141790	大连松辽化工有限公司	Dalian Songliao Chemical Industry Co., Ltd.	2,4-D-ethylhexyl	96%	2024/7/14
25	PD20141252	嫩江绿芳化工有限公司	Nenjiang Green Fang Chemical Co., Ltd.	2,4-D-ethylhexyl	96%	2024/5/7
26	PD20132601	安道麦辉丰（江苏）有限公司	ADAMA Huifeng (Jiangsu)	2,4-D butylate	96%	2023/12/17

No.	Registration code	Registrant (CN)	Registrant	Active ingredient	Content	Expiry date
			Co., Ltd.			
27	PD20132175	安徽兴隆化工有限公司	Anhui Xinglong Chemical Co., Ltd.	2,4-D-ethylhexyl	96%	2023/10/29
28	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%	2023/7/5
29	PD20121778	安道麦辉丰（江苏）有限公司	ADAMA Huifeng (Jiangsu) Co., Ltd.	2,4-D-ethylhexyl	96%	2027/11/15
30	PD20121610	江苏常丰农化有限公司	Jiangsu CF Agrochemical Co., Ltd.	2,4-D-ethylhexyl	96%	2027/10/28
31	PD20110525	江苏永泰丰作物科学有限公司	Jiangsu Wintafone Crop Science Co., Ltd.	2,4-D Na	95%	2026/5/12
32	PD20101883	重庆依尔双丰科技有限公司	Chongqing Yi'er Shuangfeng Technology Co., Ltd.	2,4-D	96%	2025/8/9
33	PD20101752	安徽华星化工有限公司	Anhui Huaxing Chemical Industry Co., Ltd.	2,4-D	97%	2025/7/7
34	PD20101693	四川润尔科技有限公司	Sichuan Run'er Technology Co., Ltd.	2,4-D Na	96%	2025/6/17
35	PD20101186	安道麦辉丰（江苏）有限公司	ADAMA Huifeng (Jiangsu) Co., Ltd.	2,4-D	98%	2025/1/28
36	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%	2025/1/14
37	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%	2025/1/14
38	PD20100053	江苏永泰丰作物科学有限公司	Jiangsu Wintafone Crop Science Co., Ltd.	2,4-D-ethylhexyl	96%	2025/1/4
39	PD20098432	佳木斯黑龙农药有限公司	Jiamusi Heilong Pesticide Co., Ltd.	2,4-D	96%	2024/12/24
40	PD20097077	山东潍坊润丰化工股份有限公司	Shandong Weifang Rainbow Chemical Co., Ltd.	2,4-D Na	80.50%	2024/10/10
41	PD20096452	江苏永泰丰作物科学有限公司	Jiangsu Wintafone Crop Science Co., Ltd.	2,4-D butylate	96%	2024/8/5
42	PD20096062	大连松辽化工有限公司	Dalian Songliao Chemical Industry Co., Ltd.	2,4-D butylate	96%	2024/6/18
43	PD20095816	江苏永泰丰作物科学有限公司	Jiangsu Wintafone Crop Science Co., Ltd.	2,4-D	96%	2024/5/27
44	PD20095714	佳木斯黑龙农药有限公司	Jiamusi Heilong Pesticide Co., Ltd.	2,4-D butylate	92%	2024/5/18
45	PD20095450	大连松辽化工有限公司	Dalian Songliao Chemical Industry Co., Ltd.	2,4-D	96%	2024/5/11
46	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%	2024/4/21
47	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%	2024/4/9

No.	Registration code	Registrant (CN)	Registrant	Active ingredient	Content	Expiry date
48	PD20093897	首建科技有限公司	Shoujian Technology Co., Ltd.	2,4-D	96%	2024/3/26
49	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%	2024/3/23
50	PD20060011	科迪华农业科技有限责任公司	Corteva Agriscience	2,4-D-ethylhexyl	94.40%	2026/1/9

Source: ICAMA

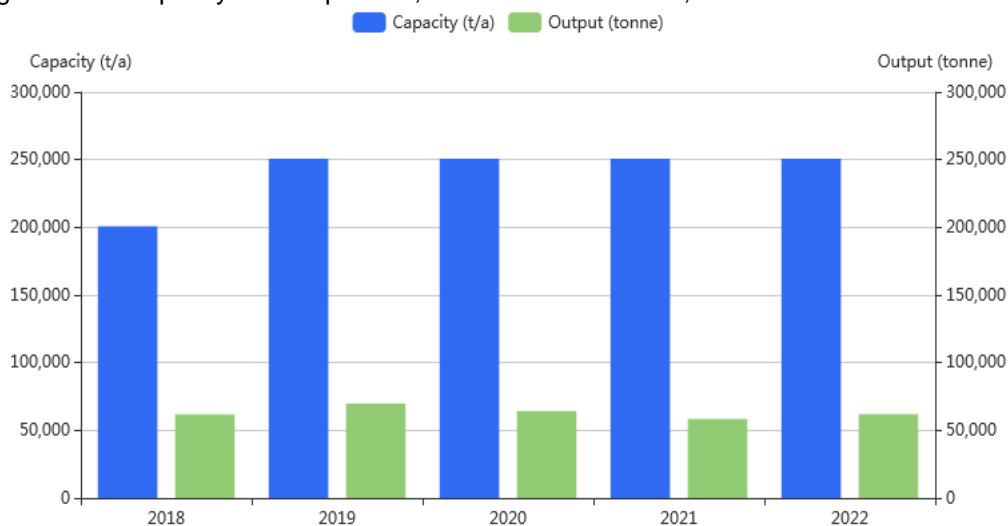
## 2.4 Capacity and output, 2018–2022

In 2022, China has the 2,4-D production scale of about 250,700 t/a as much as last year.

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 last year. The situation improved in 2022 when China planned to expand overall crop-growing areas for more soybean and oil crops, and the output of 2,4-D in 2022 is estimated to reach 61,870 tonnes.

Over recent years, fierce competition caused by oversupply and heavy environmental protection pressure has greatly challenged domestic players. China's 2,4-D industry has witnessed fast growth in capacity, especially since the acceleration of industry integration. Yet there was an obvious output decline in 2018, mainly due to stricter implementation of environmental protection laws and sluggish demand from overseas market. After the temporary supply shortage in 2018, domestic 2,4-D supply increased greatly along with recovering demand since 2019.

Figure 2.4-1 Capacity and output of 2,4-D technical in China, 2018–2022E



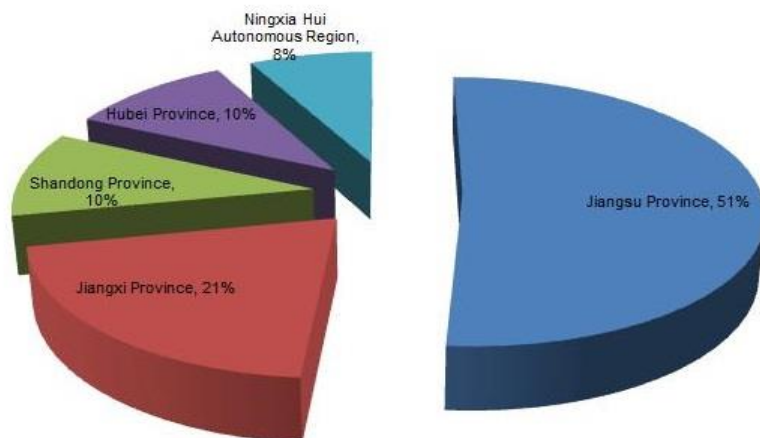
Note: All the volumes of output are calculated by 100% technical.  
Source: CCM



## 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, 2022



Source: CCM

In general, there were more than 10 active 2,4-D producers in China in 2022.

According to the semi-annual report of ADAMA Ltd. (ADAMA, 000553), since the completion of the relocation and upgrade of production facilities at its Jingzhou site in Hubei Province, the production resumed normal operation in 2022. Besides, Ningxia Gerui Fine Chemical Co., Ltd., a subsidiary of Weifang Rainbow, will implement a new IPO project, covering 20,000 t/a 2,4-D. With a 24-month construction period, the project will push up the company's 2,4-D production capacity at 35,000 t/a on 28 July 2023.

Table 2.5-1 Production of major 2,4-D technical producers in China, 2018–2022

No.	Producer	Location	Status, as of Oct. 2022	Capacity, t/a					Output, tonne				
				2022	2021	2020	2019	2018	2022E	2021	2020	2019	2018
1	CAC Nantong Chemical Co., Ltd.	Jiangsu Province	Active	50,000	50,000	50,000	50,000	20,000	13,000	12,000	18,000	3,000	1,500
2	Changzhou Wintafone Chemical Co., Ltd.	Jiangsu Province	Active	50,000	50,000	50,000	50,000	50,000	1,500	1,200	1,500	2,600	4,000
3	Jiangxi Tianyu Chemical Co., Ltd.	Jiangxi Province	Active	40,000	40,000	40,000	40,000	20,000	22,000	21,000	25,000	28,000	20,000
4	Shandong Weifang Rainbow Chemical Co., Ltd.	Shandong Province	Active	20,000	20,000	20,000	20,000	20,000	5,000	6,000	6,000	11,000	9,000
5	ADAMA Ltd. (Hubei Sanonda Co., Ltd.)	Hubei Province	Active	30,000	30,000	20,000	20,000	20,000	1,500	20	0	20	20
6	Ningxia Gerui Fine Chemical Co., Ltd.	Ningxia Hui Autonomous Region	Active	15,000	15,000	15,000	15,000	15,000	6,000	6,740	6,000	8,000	3,500

Source: CCM

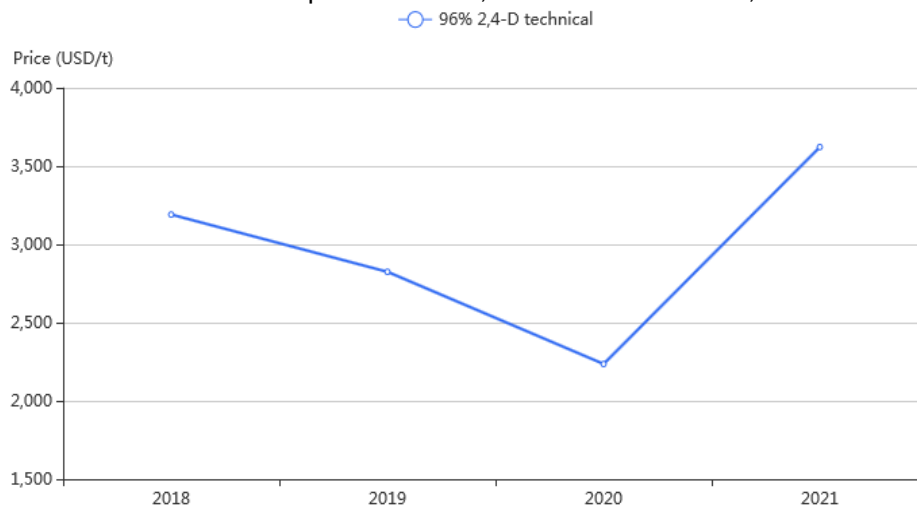
### 3 Price & exports of 2,4-D in China, 2020-H1 2022

#### 3.1 Price

The annual ex-works price of 2,4-D stood at USD3,190.71/t in 2018, for the tight supply resulting from high environmental protection pressures. In 2019, with production and operation resumption of its manufacturers, the price significantly dropped in China and kept stable in 2020. However, domestic production of 2,4-D technical was affected by policies, such as the Dual Control on energy consumption and Power Rationning (as of 31 Dec., 2021), leading to the supply shortage and intermittent suspension of pesticide production in Zhejiang and Jiangsu provinces, etc. In 2021, due to the price rise of its raw materials, the 2,4-D price increased to USD3,621.84/t, up by 62% from USD2,235.94/t in 2020.

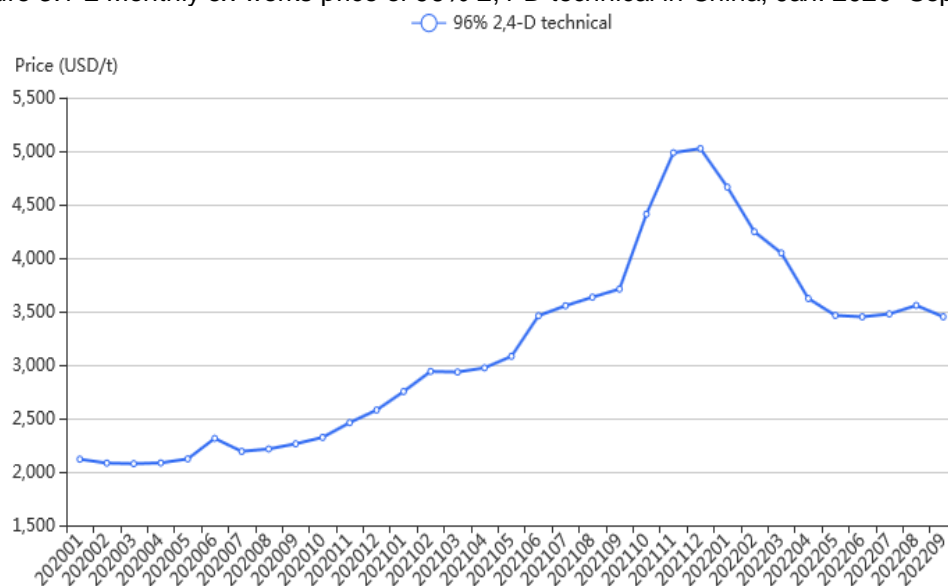
Entering 2022, as the policies impact eased, China's major manufacturers resumed the normal 2,4-D supply, which led to the decline in monthly prices of H1; yet in the low season from May to Sept., with increasing demand abroad it hovered around USD3,450/t and is not expected to change much in Nov.-Dec. Escalating geopolitical tensions between Russia and Ukraine have led to a price hike in raw materials, which might drive up China's 2,4-D price.

Figure 3.1-1 Annual ex-works price of 96% 2,4-D technical in China, 2018–2021



Source: CCM

Figure 3.1-2 Monthly ex-works price of 96% 2,4-D technical in China, Jan. 2020–Sept. 2022



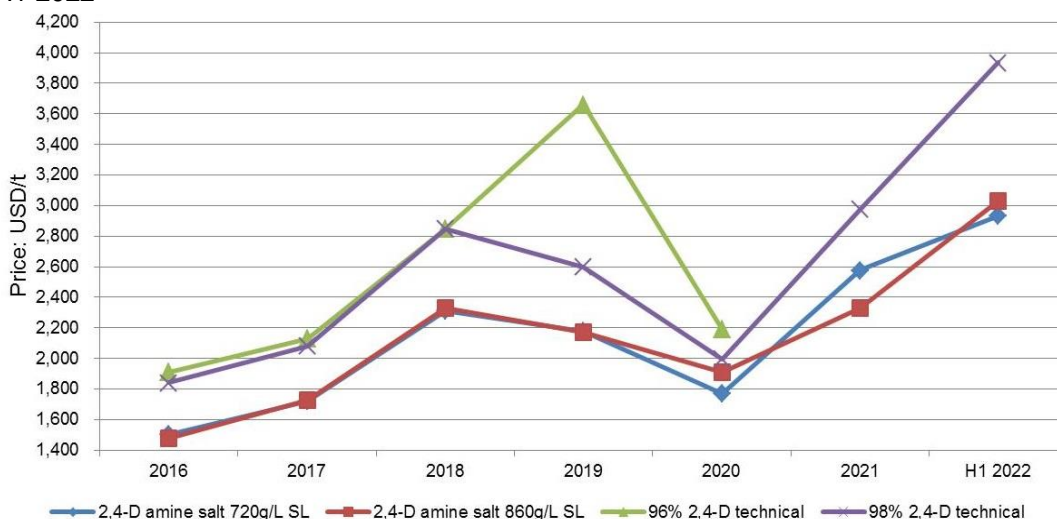
Source: CCM

### 3.2 Exports status

Chinese pesticide suppliers answer to about 70% of global demand. In 2022, the COVID-19 pandemic has directed more overseas orders to China. In H1 2022, a price hike on the exports of 2,4-D technical and formulations was witnessed. During 2016–2022, export prices in 2016 were the lowest; the export price of all 2,4-D products, except 96% 2,4-D technical—be calculated by other type of technical like 98% TC since April 2020, peaked in H1 2022. On average, H1 2022 export prices for the four specific varieties were USD2,142/t, USD2,140/t, USD2,548/t and USD2,611/t, respectively. Compared with such figures, prices of all three products in H1 2022 saw double-digit increases from the average, and the price of 98% 2,4-D technical up by near 49%, topped the list in H1 2022.

Thanks to the easing global COVID-19 pandemic, China's domestic economy has continued to recover since 2021. China maintained stability in its domestic economy and pesticide production grew steadily in 2021–2022. Due to the shrinking demand and production caused by the COVID-19 pandemic, export prices of all types of China's 2,4-D dropped greatly in 2020, and the prices of 2,4-D amine salt 720g/L SL, 2,4-D amine salt 860g/L SL experienced smaller shrinks.

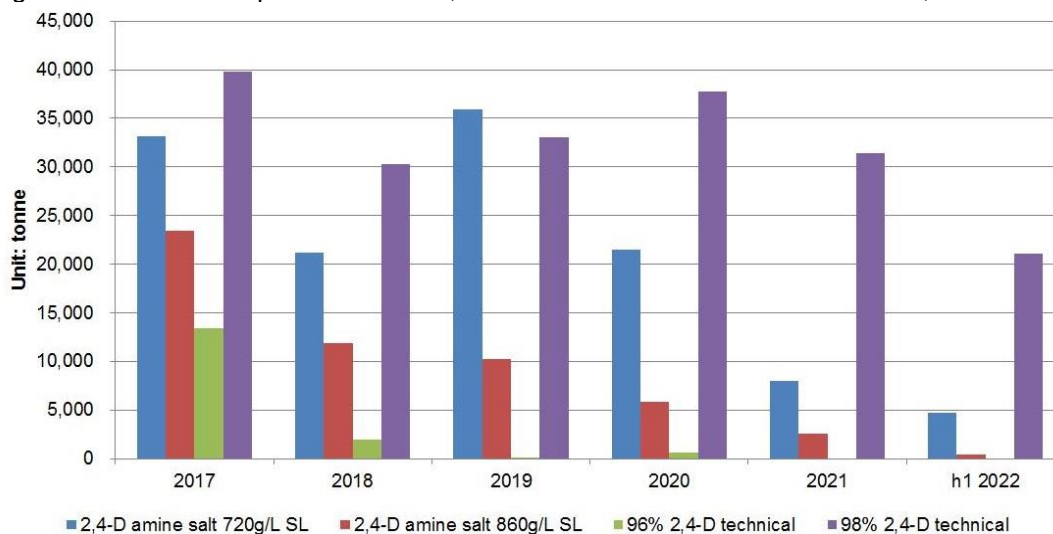
Figure 3.2-1 Annual export price of main specifications of 2,4-D technical and formulations in China, 2016–H1 2022



Source: Tranalysis

### - Exports of 2,4-D

Figure 3.2-2 Annual export volume of 2,4-D technical and formulations in China, 2017–H1 2022



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 2020-H1 2022

#### -By months

Table 3.2.1-1 Monthly exports of 2,4-D technical and formulations in China, H1 2022

Month	2,4-D Amine salt 600g/L SL		2,4-D Amine salt 720g/L SL		2,4-D Amine salt 80% SG		2,4-D Amine salt 860g/L SL		304g/L 2,4-D SL		98% 2,4-D TC		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	/	1,813.264	3.04	0.000	/	29.512	3.69	22.000	6.01	3,421.900	4.59	21
Feb.	1.140	2.63	993.251	2.93	0.000	/	15.128	3.92	66.000	6.01	2,409.400	4.33	14
March	242.975	5.49	1,559.210	2.73	5.326	7.83	55.611	3.49	131.200	5.67	5,924.174	3.96	30
April	140.351	2.34	113.136	4.23	168.000	5.58	257.777	2.85	185.001	5.82	2,114.200	3.92	12
May	346.035	2.66	107.194	2.79	0.000	/	6.300	1.20	25.837	5.73	5,130.400	3.55	20
June	13.788	1.20	73.181	2.74	0.000	/	0.000	/	32.000	5.03	2,077.000	3.29	7
<b>Total/Ave</b>	<b>744.288</b>	<b>3.50</b>	<b>4,659.235</b>	<b>2.93</b>	<b>173.326</b>	<b>5.65</b>	<b>364.327</b>	<b>3.03</b>	<b>462.038</b>	<b>5.75</b>	<b>21,077.074</b>	<b>3.93</b>	<b>104</b>

Source: Tranalysis

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

Month	2,4-D Amine salt 600g/L SL		2,4-D Amine salt 720g/L SL		2,4-D Amine salt 80% SG		2,4-D Amine salt 860g/L SL		2,4-D Amine salt 96% SG		304g/L 2,4-D SL		95% 2,4-D TC		98% 2,4-D TC		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
<b>Total/Ave</b>	<b>772.621</b>	<b>3.05</b>	<b>8,002.679</b>	<b>2.58</b>	<b>72.004</b>	<b>4.68</b>	<b>2,528.465</b>	<b>2.33</b>	<b>19.200</b>	<b>3.53</b>	<b>756.193</b>	<b>3.52</b>	<b>30.000</b>	<b>4.14</b>	<b>31,404.080</b>	<b>2.98</b>	<b>126</b>

Source: Tranalysis

Table 3.2.1-3 Monthly exports of 2,4-D technical and formulations in China, 2020

Month	2,4-D amine salt 600g/L SL		2,4-D amine salt 720g/L SL		2,4-D amine salt 80% SG		2,4-D amine salt 860g/L SL		2,4-D amine salt 96% SG		95% 2,4-D TC		96% 2,4-D TC		98% 2,4-D TC		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.	421.145	1.80	4,360.019	1.79	0.000	/	445.788	1.94	0.000	/	9.000	3.64	0.000	/	3,861.000	1.90	16
Feb.	134.700	1.56	1,115.422	1.62	20.400	5.26	158.085	1.63	0.000	/	0.000	/	0.000	/	1,087.000	1.83	4
March	904.583	1.93	4,611.041	1.68	19.600	4.69	586.808	1.65	0.000	/	0.000	/	16.000	4.35	5,160.450	1.78	19
April	685.064	2.09	4,838.505	1.65	58.000	3.53	586.089	1.74	9.600	2.77	0.000	/	16.000	4.45	4,758.506	1.80	19
May	445.680	1.60	473.606	3.04	40.000	4.49	344.696	1.88	19.200	2.77	10.000	3.96	549.120	2.05	4,088.809	1.99	12
June	313.739	1.38	1,543.005	1.92	0.000	/	1,631.543	1.95	0.000	/	10.000	3.96	18.000	2.37	1,769.749	2.11	11
July	105.253	1.36	2,442.033	1.93	0.000	/	837.030	1.98	0.000	/	0.000	/	0.000	/	3,500.808	2.12	14
Aug.	46.000	1.55	477.075	1.69	0.000	/	299.631	2.05	0.000	/	10.000	3.96	0.000	/	3,558.053	2.11	9
Sept.	279.029	1.72	587.146	1.77	0.000	/	176.231	1.95	0.000	/	0.000	/	0.000	/	2,898.100	2.07	8
Oct.	13.081	1.44	481.027	1.84	0.000	/	298.850	2.05	0.000	/	10.000	3.96	0.000	/	2,540.450	2.12	7
Nov.	22.084	1.86	294.776	1.83	0.000	/	343.920	2.16	0.000	/	0.000	/	0.000	/	2,175.840	2.17	6
Dec.	25.187	1.39	304.745	1.82	0.000	/	103.846	1.91	0.000	/	0.000	/	0.000	/	2,363.800	2.24	6
<b>Total/Ave</b>	<b>3,395.545</b>	<b>1.79</b>	<b>21,528.401</b>	<b>1.77</b>	<b>138.000</b>	<b>4.23</b>	<b>5,812.517</b>	<b>1.91</b>	<b>28.800</b>	<b>2.77</b>	<b>49.000</b>	<b>3.90</b>	<b>599.120</b>	<b>2.19</b>	<b>37,762.565</b>	<b>1.99</b>	<b>131</b>

Source: Tranalysis

**-By destination**

Table 3.2.1-4 Export volume of 2,4-D technical and formulations from China by destination in H1 2022, tonne

No.	Country	2,4-D Amine salt 600g/L SL	2,4-D Amine salt 720g/L SL	2,4-D Amine salt 80% SG	2,4-D Amine salt 860g/L SL	304g/L 2,4-D SL	98% 2,4-D TC
1	The US	0.000	0.000	0.000	0.000	0.000	9,675.440
2	Brazil	0.000	674.940	0.000	256.532	0.000	7,823.200
3	Ghana	0.000	1,783.404	0.000	0.000	0.000	0.000
4	Argentina	0.000	0.000	0.000	0.000	0.000	1,548.400
5	Mexico	423.557	50.000	168.000	0.000	436.201	395.000
6	Nigeria	0.000	1,369.423	0.000	0.000	0.000	0.000
7	Russia	0.000	0.000	0.000	0.000	0.000	882.934
8	The Philippines	271.122	24.912	0.000	6.300	0.000	354.000
9	Peru	0.000	523.472	0.000	37.015	5.719	0.000
10	Ecuador	0.000	61.963	0.000	64.480	0.000	140.500
11	Costa Rica	0.000	19.840	0.000	0.000	0.000	110.400
12	Turkey	0.000	0.000	0.000	0.000	0.000	119.600
13	South Korea	0.000	71.200	0.000	0.000	0.000	0.000
14	Bangladesh	27.385	43.440	0.000	0.000	0.000	0.000
15	Panama	22.224	8.225	0.000	0.000	20.118	0.000
16	Tanzania	0.000	28.416	0.000	0.000	0.000	0.000
17	Paraguay	0.000	0.000	0.000	0.000	0.000	24.000
18	Kenya	0.000	0.000	5.326	0.000	0.000	0.000
19	Chile	0.000	0.000	0.000	0.000	0.000	3.600
<b>Total</b>		<b>744.288</b>	<b>4,659.235</b>	<b>173.326</b>	<b>364.327</b>	<b>462.038</b>	<b>21,077.074</b>

Source: Tranalysis



Table 3.2.1-5 Export volume of 2,4-D technical and formulations from China by destination in 2021, tonne

No.	Country	2,4-D Amine salt 600g/L SL	2,4-D Amine salt 720g/L SL	2,4-D Amine salt 80% SG	2,4-D Amine salt 860g/L SL	2,4-D Amine salt 96% SG	304g/L 2,4-D SL	95% 2,4-D TC	98% 2,4-D TC
1	Brazil	0.000	2,860.317	0.000	806.400	0.000	0.000	0.000	16,974.000
2	The US	0.000	0.000	0.000	0.000	0.000	0.000	0.000	7,283.379
3	Argentina	0.000	0.000	0.000	0.000	0.000	0.000	0.000	3,515.801
4	Ecuador	0.000	627.938	0.000	640.239	0.000	0.000	0.000	460.242
5	Mexico	528.254	551.036	72.004	0.000	0.000	446.995	0.000	125.600
6	Indonesia	0.000	19.200	0.000	841.040	0.000	0.000	30.000	746.000
7	Nigeria	0.000	1,614.590	0.000	0.000	0.000	0.000	0.000	0.000
8	Peru	0.000	851.502	0.000	31.267	0.000	33.275	0.000	0.000
9	Uganda	0.000	446.711	0.000	0.000	0.000	0.000	0.000	108.300
10	The Philippines	180.071	91.854	0.000	0.000	0.000	0.000	0.000	204.000
11	Russia	0.000	0.000	0.000	0.000	0.000	0.000	0.000	450.000
12	Turkey	0.000	0.000	0.000	0.000	0.000	0.000	0.000	443.800
13	Paraguay	0.000	47.619	0.000	0.000	19.200	0.000	0.000	354.000
14	India	0.000	0.000	0.000	0.000	0.000	0.000	0.000	324.006
15	Panama	39.215	0.000	0.000	0.000	0.000	229.491	0.000	0.000
16	Ghana	0.000	266.898	0.000	0.000	0.000	0.000	0.000	0.000
17	Costa Rica	0.000	83.200	0.000	0.000	0.000	0.000	0.000	175.600
18	Colombia	0.000	65.702	0.000	59.520	0.000	20.809	0.000	94.776
19	Bangladesh	25.080	147.051	0.000	0.000	0.000	0.000	0.000	0.000
20	Kenya	0.000	9.398	0.000	149.999	0.000	0.000	0.000	0.000
	Others	0.000	319.663	0.000	0.000	0.000	25.623	0.000	144.576
	<b>Total</b>	<b>772.621</b>	<b>8,002.679</b>	<b>72.004</b>	<b>2,528.465</b>	<b>19.200</b>	<b>756.193</b>	<b>30.000</b>	<b>31,404.080</b>

Source: Tranalysis

Table 3.2.1-6 Export volume of 2,4-D technical and formulations from China by destination in 2020, tonne

No.	Country	2,4-D amine salt 600g/L SL	2,4-D amine salt 720g/L SL	2,4-D amine salt 80% SG	2,4-D amine salt 860g/L SL	2,4-D amine salt 96% SG	95% 2,4-D TC	96% 2,4-D TC	98% 2,4-D TC
1	Brazil	240.000	4,028.411	0.000	2,454.405	0.000	0.000	489.000	13,742.022
2	Argentina	0.000	0.000	0.000	0.000	0.000	0.000	0.000	5,741.604
3	The US	0.000	0.000	0.000	0.000	0.000	0.000	0.000	5,122.486
4	Indonesia	99.200	121.718	0.000	1,047.040	0.000	49.000	32.000	3,489.600
5	Nigeria	14.400	4,113.011	0.000	0.000	0.000	0.000	0.000	0.000
6	Mexico	1,187.226	181.400	40.000	49.700	0.000	0.000	68.000	656.000
7	Ghana	240.000	1,761.681	0.000	0.000	0.000	0.000	0.000	0.000
8	India	0.000	0.000	0.000	0.000	0.000	0.000	0.000	1,998.000
9	Russia	0.000	0.000	0.000	0.000	0.000	0.000	0.000	1,860.720
10	Colombia	0.000	415.919	20.000	160.087	0.000	0.000	0.000	1,134.400
11	Peru	3.600	1,417.552	9.600	132.638	0.000	0.000	0.000	0.000
12	Ecuador	19.760	964.285	0.000	233.448	0.000	0.000	0.000	244.075
13	Paraguay	0.000	126.416	0.000	298.000	19.200	0.000	0.000	851.400
14	Uganda	0.000	1,126.520	0.000	0.000	0.000	0.000	0.000	145.675
15	Guatemala	0.000	425.339	0.000	213.075	0.000	0.000	0.000	460.000
16	The Philippines	232.875	109.504	0.000	0.000	0.000	0.000	10.120	728.800
17	Chile	0.000	880.236	0.000	90.805	0.000	0.000	0.000	0.000
18	Kazakhstan	252.000	399.934	0.000	0.000	0.000	0.000	0.000	200.000
19	Thailand	0.000	177.980	0.000	660.616	9.600	0.000	0.000	0.000
20	Sudan	96.000	659.235	0.000	0.000	0.000	0.000	0.000	0.000
Others		1,010.483	4,609.261	68.400	472.703	0.000	0.000	0.000	1,397.783
<b>Total</b>		<b>3,395.545</b>	<b>21,518.401</b>	<b>138.000</b>	<b>5,812.517</b>	<b>28.800</b>	<b>49.000</b>	<b>599.120</b>	<b>37,772.565</b>

Source: Tranalysis

**-By exporter**

Table 3.2.1-7 Export volume of 2,4-D technical and formulations from China by exporter in H1 2022, tonne

No.	Exporter	2,4-D Amine salt 600g/L SL	2,4-D Amine salt 720g/L SL	2,4-D Amine salt 80% SG	2,4-D Amine salt 860g/L SL	304g/L 2,4-D SL	98% 2,4-D TC	Total
1	Nufarm Chemical (Shanghai) Co., Ltd.	0.000	0.000	0.000	0.000	0.000	7,772.000	7,772.000
2	Shandong Weifang Rainbow Chemical Co., Ltd.	553.581	921.374	173.326	39.495	309.360	3,538.334	5,535.470
3	Jiangxi Tianyu Chemical Co., Ltd.	0.000	0.000	0.000	0.000	0.000	2,639.600	2,639.600
4	Thai Harvest Ltd.	89.200	713.324	0.000	0.000	0.000	1,240.000	2,042.524
5	Ningxia Gerui Fine Chemical Co., Ltd.	0.000	0.000	0.000	0.000	0.000	1,320.640	1,320.640
6	Shenzhen Baocheng Chemical Industry Co., Ltd.	0.000	892.150	0.000	0.000	0.000	0.000	892.150
7	Red Surcos Trade (Shanghai) Co., Ltd.	0.000	0.000	0.000	0.000	0.000	578.000	578.000
8	CAC Shanghai International Trade Co., Ltd.	0.000	0.000	0.000	0.000	0.000	461.600	461.600
9	Shanghai Safechem International Trade Co., Ltd.	0.000	0.000	0.000	0.000	0.000	354.000	354.000
10	Wynca (Hong Kong) Limited	0.000	279.936	0.000	0.000	0.000	0.000	279.936
11	ECOM Agroindustrial Corp. Ltd.	0.000	266.625	0.000	0.000	0.000	0.000	266.625
12	CAC Nantong Chemical Co., Ltd.	0.000	258.720	0.000	0.000	0.000	0.000	258.720
13	Weihai Hanfu Biochemical Medicine Co., Ltd.	0.000	0.000	0.000	0.000	0.000	252.000	252.000
14	Ningbo Double Fusion Import and Export Co., Ltd.	0.000	211.120	0.000	0.000	0.000	0.000	211.120
15	Ningbo Sunjoy Bioscience Co., Ltd.	0.000	190.800	0.000	0.000	0.000	0.000	190.800
16	Nanjing Peters Farm Biotechnology Co., Ltd.	0.000	184.320	0.000	0.000	0.000	0.000	184.320
17	Nanjing Bioagriland Crop Care Co., Ltd.	0.000	0.000	0.000	0.000	128.000	0.000	128.000
18	Zhejiang Chemicals Import and Export Corp.	0.000	74.160	0.000	0.000	0.000	50.400	124.560
19	Jiangsu Trustchem Co., Ltd.	0.000	24.000	0.000	0.000	0.000	100.000	124.000
20	Jixi Qingfeng Tianying Biochemical Co., Ltd.	0.000	93.600	0.000	0.000	0.000	0.000	93.600
21	Others	101.507	549.106	0.000	324.832	24.678	2,770.500	3,770.623
<b>Total</b>		<b>744.288</b>	<b>4,659.235</b>	<b>173.326</b>	<b>364.327</b>	<b>462.038</b>	<b>21,077.074</b>	<b>27,480.288</b>

Source: Tranalysis

Table 3.2.1-8 Export volume of 2,4-D technical and formulations from China by exporter in 2021, tonne

No.	Exporter	2,4-D Amine salt 600g/L SL	2,4-D Amine salt 720g/L SL	2,4-D Amine salt 80% SG	2,4-D Amine salt 860g/L SL	2,4-D Amine salt 96% SG	304g/L 2,4-D SL	95% 2,4-D TC	98% 2,4-D TC	Total
1	Jiangxi Tianyu Chemical Co., Ltd.	0.000	0.000	0.000	0.000	0.000	0.000	0.000	16,580.348	16,580.348
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	4,931.947
3	Ningxia Gerui Fine Chemical Co., Ltd.	0.000	0.000	0.000	0.000	0.000	0.000	0.000	3,379.402	3,379.402
4	CAC Nantong Chemical Co., Ltd.	0.000	2,937.012	0.000	0.000	0.000	0.000	0.000	0.000	2,937.012
5	CAC Shanghai International Trade Co., Ltd.	0.000	64.390	0.000	0.000	0.000	0.000	0.000	2,682.400	2,746.790
6	Weihai Hanfu Biochemical Medicine Co., Ltd.	0.000	140.717	0.000	0.000	0.000	0.000	0.000	1,070.000	1,210.717
7	Red Surcos Trade (Shanghai) Co., Ltd.	0.000	0.000	0.000	0.000	0.000	0.000	0.000	1,117.000	1,117.000
8	Qingdao Greenfield Imp & Exp Co., Ltd.	0.000	0.000	0.000	107.760	0.000	0.000	0.000	234.000	341.760
9	Ningbo Generic Chemical Co., Ltd.	39.215	36.540	0.000	198.400	0.000	18.034	0.000	0.000	292.190
10	NGC Agrosiences International Co., Ltd.	0.000	47.391	0.000	190.720	0.000	0.000	0.000	0.000	238.111
11	Zhejiang Chemicals Import and Export Corp.	0.000	232.984	0.000	0.000	0.000	0.000	0.000	0.000	232.984
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	232.601
13	Shenzhen Iprochem Co., Ltd.	0.000	31.285	0.000	149.799	0.000	0.000	0.000	50.000	231.083
14	Ningbo Sunjoy Bioscience Co., Ltd.	0.000	187.296	0.000	0.000	0.000	33.517	0.000	0.000	220.813
15	Sh-Inform Chemical Co., Ltd.	0.000	49.850	0.000	158.720	0.000	0.000	0.000	0.000	208.570
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	205.358
17	Shanghai Safechem International Trade Co., Ltd.	0.000	0.000	0.000	0.000	0.000	0.000	0.000	204.000	204.000
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	197.638
19	Jiangsu Joc Great Wall Corp.	0.000	196.798	0.000	0.000	0.000	0.000	0.000	0.000	196.798

No.	Exporter	2,4-D Amine salt 600g/L SL	2,4-D Amine salt 720g/L SL	2,4-D Amine salt 80% SG	2,4-D Amine salt 860g/L SL	2,4-D Amine salt 96% SG	304g/L 2,4-D SL	95% 2,4-D TC	98% 2,4-D TC	Total
20	Nanjing Red Sun Co., Ltd.	0.000	23.560	0.000	141.360	0.000	0.000	0.000	0.000	164.920
21	Others	79.608	1,601.628	0.000	460.025	0.000	330.876	30.000	5,213.062	7,715.198
<b>Total</b>		<b>772.621</b>	<b>8,002.679</b>	<b>72.004</b>	<b>2,528.465</b>	<b>19.200</b>	<b>756.193</b>	<b>30.000</b>	<b>31,404.080</b>	<b>43,585.241</b>

Source: Tranalysis

Table 3.2.1-9 Export volume of 2,4-D technical and formulations from China by exporter in 2020, tonne

No.	Exporter	2,4-D amine salt 600g/L SL	2,4-D amine salt 720g/L SL	2,4-D amine salt 80% SG	2,4-D amine salt 860g/L SL	2,4-D amine salt 96% SG	95% 2,4-D TC	96% 2,4-D TC	98% 2,4-D TC	Total
1	Jiangxi Tianyu Chemical Co., Ltd.	0.000	0.000	0.000	0.000	0.000	0.000	0.000	14,903.451	14,903.451
2	Shandong Weifang Rainbow Chemical Co., Ltd.	1,993.759	5,644.188	98.000	4,155.032	28.800	9.000	338.600	1,296.326	13,563.705
3	CAC Shanghai International Trade Co., Ltd.	0.000	1,003.139	0.000	100.000	0.000	0.000	0.000	7,021.402	8,124.541
4	Ningxia Gerui Fine Chemical Co., Ltd.	0.000	0.000	0.000	0.000	0.000	0.000	0.000	6,186.801	6,186.801
5	Weihai Hanfu Biochemical Medicine Co., Ltd.	0.000	117.120	0.000	0.000	0.000	0.000	0.000	4,394.333	4,511.453
6	CAC Nantong Chemical Co., Ltd.	0.000	3,155.033	0.000	135.488	0.000	0.000	0.000	0.000	3,290.521
7	Agricore Chemical Industry Co., Ltd.	0.000	1,060.030	0.000	0.000	0.000	0.000	0.000	0.000	1,060.030
8	Shandong Kesai Eagrow Co., Ltd.	0.000	849.714	0.000	0.000	0.000	0.000	0.000	0.000	849.714
9	Ningbo Generic Chemical Co., Ltd.	45.815	628.267	0.000	0.000	0.000	0.000	0.000	135.000	809.082
10	Shanghai E-tong Chemical Co., Ltd.	193.740	361.872	0.000	71.045	0.000	0.000	0.000	54.000	680.657
11	Zhejiang Chemicals Import and Export Corp.	102.494	278.053	0.000	0.000	0.000	0.000	0.000	218.075	598.622
12	Jiangsu Trustchem Co., Ltd.	0.000	318.293	0.000	272.000	0.000	0.000	0.000	0.000	590.293
13	Agrohao Co., Ltd.	0.000	539.231	0.000	0.000	0.000	0.000	0.000	36.000	575.231
14	Eastchem Co., Ltd.	0.000	0.000	0.000	533.220	0.000	0.000	0.000	36.000	569.220
15	Zhuochen Industries (Shanghai) Co., Ltd.	0.000	190.638	0.000	0.000	0.000	0.000	0.000	370.000	560.638

No.	Exporter	2,4-D amine salt 600g/L SL	2,4-D amine salt 720g/L SL	2,4-D amine salt 80% SG	2,4-D amine salt 860g/L SL	2,4-D amine salt 96% SG	95% 2,4-D TC	96% 2,4-D TC	98% 2,4-D TC	Total
16	Shanghai Hui Song (H&S) Agro-Solution Co., Ltd.	0.000	557.226	0.000	0.000	0.000	0.000	0.000	0.000	557.226
17	Shenzhen Baocheng Chemical Industry Co., Ltd.	352.000	180.000	0.000	0.000	0.000	0.000	0.000	0.000	532.000
18	Shanghai Safechem International Trade Co., Ltd.	0.000	0.000	0.000	0.000	0.000	0.000	0.000	488.000	488.000
19	Ningbo Sunjoy Bioscience Co., Ltd.	46.800	415.288	0.000	0.000	0.000	0.000	0.000	0.000	462.088
20	Shandong Binnong Technology Co., Ltd.	0.000	356.466	0.000	4.810	0.000	0.000	0.000	0.000	361.276
Others		660.936	5,863.843	40.000	540.922	0.000	40.000	260.520	2,633.178	10,039.399
<b>Total</b>		<b>3,395.545</b>	<b>21,518.401</b>	<b>138.000</b>	<b>5,812.517</b>	<b>28.800</b>	<b>49.000</b>	<b>599.120</b>	<b>37,772.565</b>	<b>69,313.949</b>

Source: Tranalysis

**-By manufacturer**

Table 3.2.1-10 Export volume of 2,4-D technical and formulations from China by producer in H1 2022, tonne

No.	Producer	2,4-D Amine salt 600g/L SL	2,4-D Amine salt 720g/L SL	2,4-D Amine salt 80% SG	2,4-D Amine salt 860g/L SL	304g/L SL	98% TC	Total
1	Jiangxi Tianyu Chemical Co., Ltd.	0.000	0.000	0.000	0.000	0.000	12,569.600	12,569.600
2	Shandong Weifang Rainbow Chemical Co., Ltd.	553.581	921.374	0.000	39.495	0.000	3,538.334	5,052.784
3	Ningxia Gerui Fine Chemical Co., Ltd.	0.000	0.000	0.000	0.000	0.000	1,320.640	1,320.640
4	Jiangsu CF Agrochemical Co., Ltd.	0.000	931.082	0.000	0.000	0.000	0.000	931.082
5	Weihai Hanfu Biochemical Medicine Co., Ltd.	0.000	0.000	0.000	0.000	0.000	606.000	606.000
6	CAC Nantong Chemical Co., Ltd.	0.000	258.720	0.000	0.000	0.000	121.600	380.320
7	Shandong Avilive Chemical Co., Ltd.	0.000	0.000	0.000	0.000	128.000	0.000	128.000
8	Trust Crop Protection Technology Co., Ltd.	0.000	0.000	0.000	0.000	0.000	100.000	100.000
9	Changzhou Wintafone Chemical Co., Ltd.	0.000	19.200	0.000	0.000	0.000	0.000	19.200
10	Others	190.707	2,528.859	173.326	324.832	334.038	2,820.900	6,372.662
<b>Total</b>		<b>744.288</b>	<b>4,659.235</b>	<b>173.326</b>	<b>364.327</b>	<b>462.038</b>	<b>21,077.074</b>	<b>27,480.288</b>

Source: Tranalysis

Table 3.2.1-11 Export volume of 2,4-D technical and formulations from China by producer in 2021, tonne

No.	Producer	2,4-D Amine salt 600g/L SL	2,4-D Amine salt 720g/L SL	2,4-D Amine salt 80% SG	2,4-D Amine salt 860g/L SL	2,4-D Amine salt 96% SG	304g/L 2,4-D SL	95% 2,4-D TC	98% 2,4-D TC	Total
1	Jiangxi Tianyu Chemical Co., Ltd.	0.000	0.000	0.000	0.000	0.000	0.000	0.000	17,769.348	17,769.348
2	CAC Nantong Chemical Co., Ltd.	0.000	3,049.402	0.000	0.000	0.000	0.000	0.000	2,706.400	5,755.802
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	4,376.780
4	Ningxia Gerui Fine Chemical Co., Ltd.	0.000	0.000	0.000	0.000	0.000	0.000	0.000	3,711.710	3,711.710
5	Weihai Hanfu Biochemical Medicine Co., Ltd.	0.000	66.650	0.000	0.000	0.000	0.000	0.000	1,294.000	1,360.650
6	Nanjing CF Agrochemical Co., Ltd.	0.000	477.716	0.000	0.000	0.000	0.000	0.000	0.000	477.716
7	Jiangsu CF Agrochemical Co., Ltd.	0.000	39.265	0.000	308.519	0.000	0.000	0.000	0.000	347.783
8	Shandong Keyuan Chemical Industry Co., Ltd.	0.000	0.000	0.000	52.080	0.000	0.000	0.000	258.000	310.080
9	Lier Chemical Co., Ltd.	0.000	0.000	0.000	0.000	0.000	119.925	0.000	0.000	119.925
10	Jingma Chemicals Co., Ltd.	0.000	0.000	0.000	111.360	0.000	0.000	0.000	0.000	111.360
11	Changzhou Wintafone Chemical Co., Ltd.	0.000	85.201	0.000	0.000	0.000	0.000	0.000	0.000	85.201
12	Anhui Xinglong Chemical Co., Ltd.	0.000	0.000	0.000	0.000	0.000	50.233	0.000	0.000	50.233
13	Zhejiang Funong Biological Technology Co., Ltd.	0.000	0.000	0.000	0.000	0.000	20.050	0.000	0.000	20.050
14	Jiangsu Wintafone Crop Science Co., Ltd.	0.000	17.920	0.000	0.000	0.000	0.000	0.000	0.000	17.920
15	Others	118.823	2,264.427	72.004	934.825	0.000	444.940	30.000	5,205.662	9,070.682
<b>Total</b>		<b>772.621</b>	<b>8,002.679</b>	<b>72.004</b>	<b>2,528.465</b>	<b>19.200</b>	<b>756.193</b>	<b>30.000</b>	<b>31,404.080</b>	<b>43,585.241</b>

Source: Tranalysis



Table 3.2.1-12 Export volume of 2,4-D technical and formulations from China by producer in 2020, tonne

No.	Producer	2,4-D amine salt 600g/L SL	2,4-D amine salt 720g/L SL	2,4-D amine salt 80% SG	2,4-D amine salt 860g/L SL	2,4-D amine salt 96% SG	95% 2,4-D TC	96% 2,4-D TC	98% 2,4-D TC	Total
1	Jiangxi Tianyu Chemical Co., Ltd.	0.000	39.675	0.000	0.000	0.000	0.000	0.000	15,401.651	15,441.326
2	Shandong Weifang Rainbow Chemical Co., Ltd.	2,090.367	5,705.864	98.000	4,155.032	28.800	9.000	0.000	942.126	13,029.189
3	CAC Nantong Chemical Co., Ltd.	0.000	2,316.927	0.000	100.000	0.000	0.000	0.000	5,896.402	8,313.329
4	Ningxia Gerui Fine Chemical Co., Ltd.	0.000	0.000	0.000	0.000	0.000	0.000	0.000	6,595.001	6,595.001
5	Weihai Hanfu Biochemical Medicine Co., Ltd.	33.600	575.731	0.000	0.000	0.000	0.000	0.000	5,182.433	5,791.764
6	Nantong Taihe Chemical Industry Co., Ltd.	0.000	2,025.264	0.000	135.488	0.000	0.000	0.000	1,125.000	3,285.752
7	Shandong Keyuan Chemical Industry Co., Ltd.	0.000	1,107.140	0.000	73.000	0.000	0.000	0.000	358.000	1,538.140
8	Jiangsu CF Agrochemical Co., Ltd.	355.600	931.726	0.000	0.000	0.000	0.000	0.000	60.000	1,347.326
9	Changzhou Wintafone Chemical Co., Ltd.	16.800	702.700	0.000	63.920	0.000	0.000	10.120	36.000	829.540
10	Jingma Chemicals Co., Ltd.	0.000	287.252	0.000	533.220	0.000	0.000	0.000	0.000	820.472
	Others	899.178	7,826.122	40.000	751.857	0.000	40.000	589.000	2,175.953	12,322.110
	<b>Total</b>	<b>3,395.545</b>	<b>21,518.401</b>	<b>138.000</b>	<b>5,812.517</b>	<b>28.800</b>	<b>49.000</b>	<b>599.120</b>	<b>37,772.565</b>	<b>69,313.949</b>

Source: Tranalysis

## 4 Consumption of 2,4-D in China, 2019–2022

### 4.1 Consumption overview, 2019–2022

In 2019–2021, over 70% 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 2,4-D amine salt 720g/L SL and 2,4-D amine salt 860g/L SL.

In China, the consumption of 2,4-D in China will rise slightly for more crop-growing areas as expected in 2022. 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.

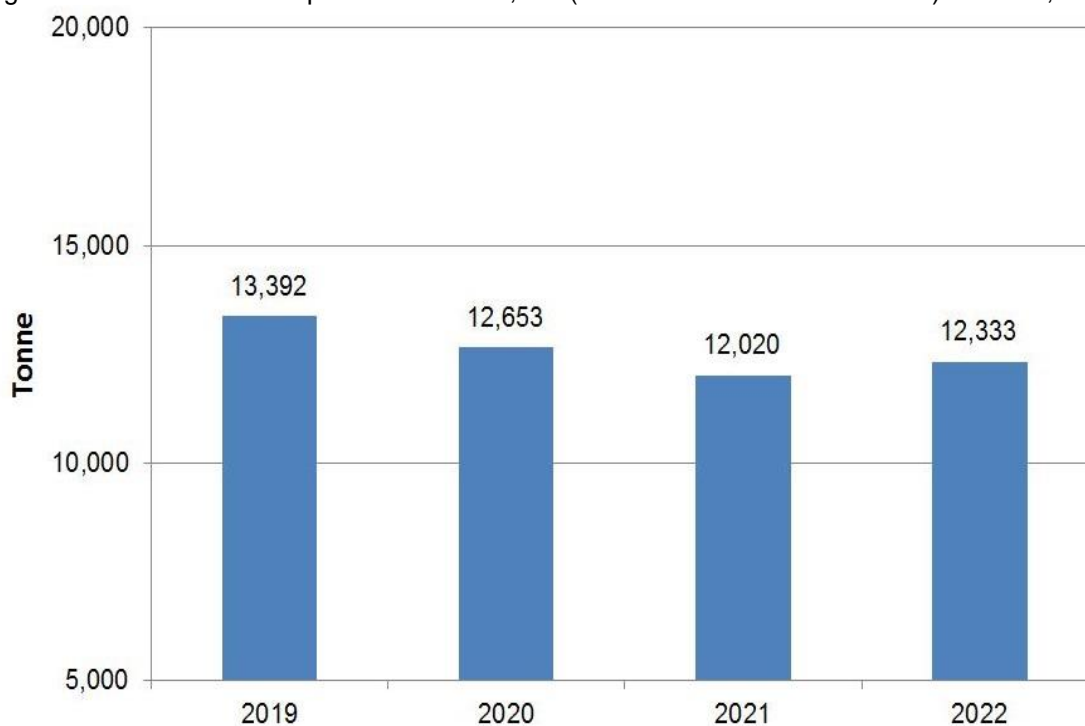
Table 4.1-1 Production, export, import and apparent consumption of 2,4-D in China, 2019–2022E

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
2022E	250,700	61,870	0	50,340	11,530

Note: The export for 2022 is estimated.

Source: China Customs & CCM

Figure 4.1-1 Actual consumption volume of 2,4-D (converted into 100% technical) in China, 2019–2022E



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

Source: CCM

## 4.2 Share by crop, 2022

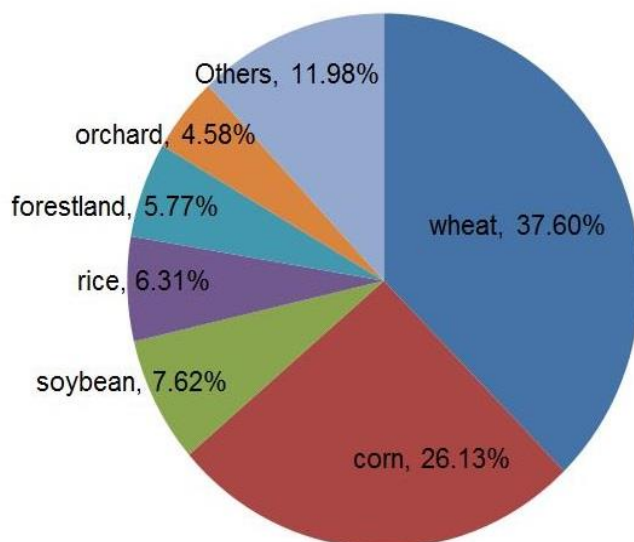
In 2013–2016, 2,4-D formulations witnessed stable growth in domestic consumption, with the application volume growing on corn, forestland, rice, etc. From 2017 to 2021, influenced by the zero-growth policy in pesticide use, domestic consumption experienced a year-on-year decline. However, in 2022 planting areas of main crops have been expanded and 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 plant. 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, 2022E

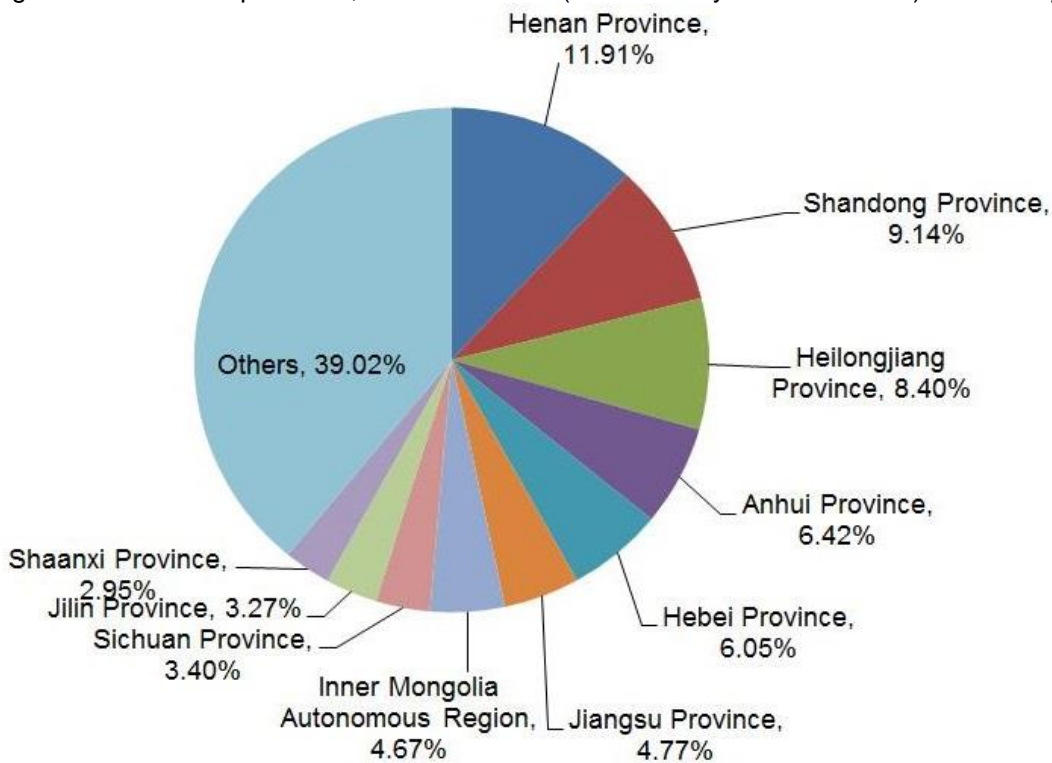


Note: Due to rounding, the total may not equal 100.00%.  
Source: CCM

### 4.3 Share by region, 2022

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 2013–2022; 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, 2022E



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

## 5 Forecast on 2,4-D industry in China, 2023–2027

### 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

Given jumping price of its raw materials over 2021 and tough restrictions on electricity use and production in Q3 2022, production cost of 2,4-D technical is growing in China. In the short term, it is expected that domestic supply of 2,4-D technical would stay under pressures from the 2022 Beijing Winter Olympics, "2+26" air pollution prevention and control initiative (covering Beijing, Tianjian, and other 26 cities in surrounding areas), COVID-19 involvement risk in winter and early spring, etc. Besides, uncertainties around the world, especially escalating geopolitical tensions in East Europe, 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 now in China. Most 2,4-D products, including 96% TC, 98% TC, 2,4-D amine salt 720g/L SL and 2,4-D amine salt 860g/L SL, are for export; and 2,4-D butylate EC is mainly consumed in the domestic market. In 2022, with increasing soybean-growing areas in China, the demand for pesticides, including 2,4-D went up apparently.

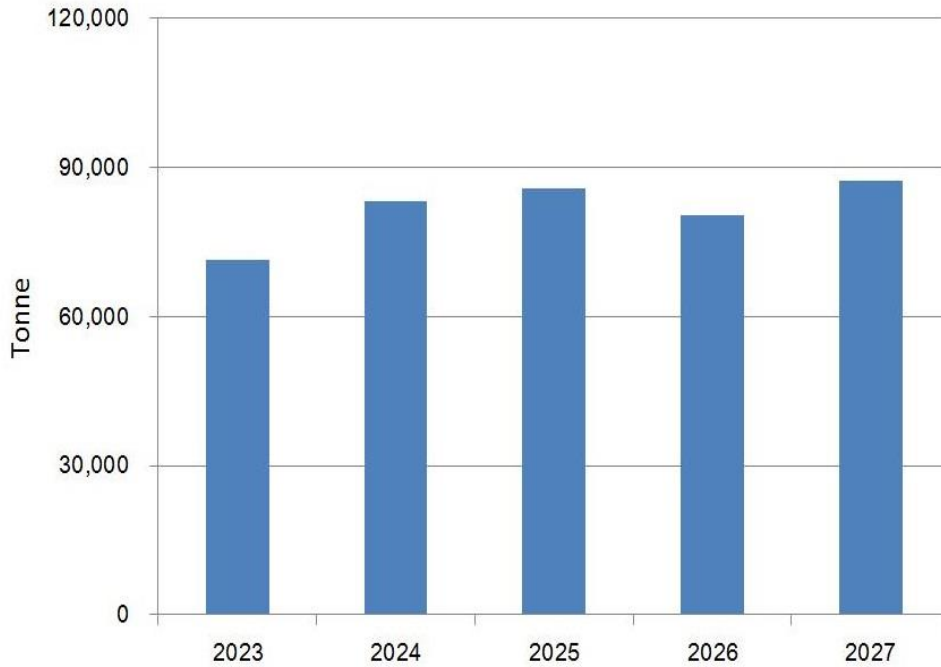
The overseas market provides an important outlet for the consumption of China's superfluous output. In early 2022, overseas demand is expected to recover for the following reasons:

- Rising grain prices greatly boosting farmers' enthusiasm for grain cultivation.
- The urgent needs of distributors for replenishing inventory.
- The upcoming sales season in South America and the farming season in the north hemisphere in the spring.

## 5.2 Forecast on supply and demand

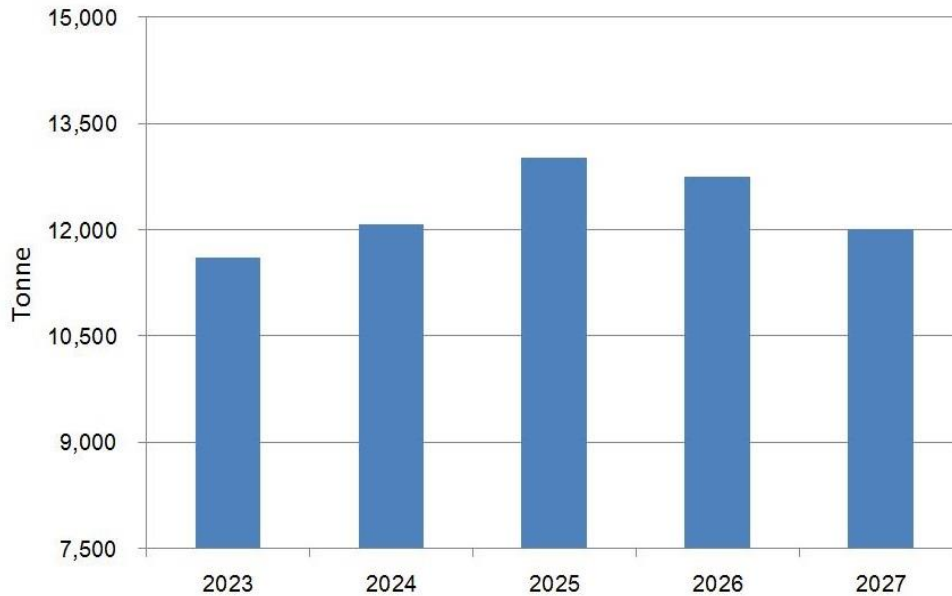
Despite 2,4-D butylate to be withdrawn from Chinese market from Jan. 2023, demand for 2,4-D is stable from home and abroad, since the domestic demand for 2,4-D butylate would be completely replaced by other products, such as 2,4-D-ethylhexyl. Therefore, 2,4-D still enjoys a promising prospect in China.

Figure 5.2-1 Forecast on supply of 2,4-D technical (calculated by 100% technical) in China, 2023–2027



Source: CCM

Figure 5.2-2 Forecast on demand for 2,4-D formulations (calculated by 100% technical) in China, 2023–2027



Source: CCM

## 6 Conclusions

In 2022, China's 2,4-D industry is likely to obtain growth for the following reasons:

- Obvious growth of crop-growing and soybean-corn compound areas in China;
- Increased off-season demand since May from foreign market;
- Introduction and industrialisation of GM crops in China

Specifically, the compounding formulation with 2,4-D and glyphosate has been widely recognised in China and the market share is climbing. Moreover, since China has expanded overall crop-growing areas to guarantee food supply in 2021-2025, 2,4-D demand in the local farmlands won't drop but rise slightly in 2022.

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, in Feb. 2021, Jiangxi Tianyu Chemical Co., Ltd., 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 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

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