

Market Research on Paraquat in China

The Eleventh Edition

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Kcomber Inc.

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1. Introduction

CCM's eleventh edition report on Chinese paraquat industry, *Market Research on Paraquat in China*, was finished in November 2019. This report attaches importance to the following parts:

- supply of paraquat (capacity, output and key manufacturers) and demand by volume & value in China in 2014–H1 2019;
- detailed study of paraquat's upstream industry (pyridine's supply, manufacturers, import, price, technology, etc.);
- production technology and production cost of paraquat;
- price of paraquat in 2014–Q3 2019 and export of paraquat products in 2014–Jan.-Jul. 2019;
- forecast on paraquat's supply & demand in China in 2019–2023;
- key factors influencing development of paraquat in China.

2. Approach for this report

This report has been drafted by diverse methods which are as follows:

➤ Desk research

Sources of desk research are various including published magazines, journals, governmental statistics, industrial statistics, customs statistics, associated seminars as well as information from the internet. A lot of works have been done to compile and analyze the information obtained. When necessary, checks were made with Chinese market players regarding market information such as production, demand, consumption and competition.

➤ Telephone interview

The interviewees include paraquat manufacturers, agricultural experts & researchers, traders, farmers and industrial associations.

CCM carried out extensive telephone interviews with almost all paraquat TK producers and some formulations producers, and sourced and verified the detailed production and market situation as well as players' comments on paraquat.

In a bid to understand the application of paraquat formulations in China, CCM also made contact with domestic traders, distributors and farmers as well. To directly analyse the export situation of paraquat TK and formulations, many exporters were contacted whenever the verification was needed.

Raw material & intermediate suppliers were also contacted to get the price, supply as well as government policies on raw materials and their impact on paraquat.

➤ Data processing and presentation

The data collected and compiled are sourced from:

- published articles from Chinese periodicals, magazines, journals and third-party databases
- governmental statistics & customs statistics
- telephone interviews with Chinese manufacturers, traders, government and farmers
- comments from industrial experts
- CCM's innovative database
- information from the internet

The data from various channels have been combined to make this report as precise and scientific as possible. Throughout the process, a series of internal discussions have been held in order to analyse the data and draw conclusions from it.

3. Executive summary

As the largest supplier of herbicides in the world, China produced about XXX tonnes of herbicides (calculated by 100% technical) in 2018, remained basically stable compared to that in 2017.

As one of the key non-selective herbicides, paraquat kept playing an important role in the world, though more and more countries will ban it in the future.

- Production

China is the largest manufacturer of paraquat TK and formulations in the world. As of H1 2019, its paraquat TK capacity stayed XXX t/a (calculated by 42% TK). The output of paraquat TK was XXX tonnes in 2018, down by XXX% year on year.

The output of China's paraquat formulations (calculated by 200g/L AS, and non-AS formulations excluded, similarly hereinafter) has grown fast from XXX tonnes in 2014 to XXX tonnes in 2017, mainly attributed to increasing overseas demand, but decreased to XXX tonnes in 2018, mainly because Vietnam banned paraquat thus stopped importing China's paraquat formulations and Thailand's import volume decreased greatly.

- Manufacturer

There were XXX active paraquat TK producers in China as of H1 2019. Key production regions include Shandong, Jiangsu, Hubei and Anhui, whose output accounted for around XXX% of the domestic total in 2018.

The top four producers of paraquat TK in China include Nanjing Red Sun Co., Ltd. (XXX t/a), Syngenta Nantong Crop Protection Co., Ltd. (XXX t/a), Shandong Luba Chemical Co., Ltd. (XXX t/a) and ADAMA Ltd. (XXX t/a).

- Price

The price of paraquat was high in 2014, with the average ex-works price of paraquat 42% TK of USDXXX/t. The price of paraquat kept decreasing in 2015 and 2016, and the annual average ex-works price of paraquat 42% TK was USDXXX/t in 2016, the lowest level over the years. The price of paraquat 42% TK increased significantly in 2017, nearly XXX% up on previous year in terms of annual average, mainly due to four aspects: tight supply of raw materials caused by the strengthening of environmental protection, lack of new capacity of paraquat, large overseas demand and intensified integration in the paraquat industry resulted from long-term losses. Following this trend, the average price in 2018 leaped further to USDXXX/t. The average price in the first three quarters of 2019 dropped a little to USDXXX/t.

- **Export**

China's export volume of paraquat reached a historical high in 2017, with the TK and formulations export volume of XXX tonnes and XXX tonnes respectively. The export volume of paraquat TK and formulations decreased to XXX tonnes and XXX tonnes in 2018, seeing a yearly growth rate of XXX% and XXX% respectively.

The US became the top export destination of Chinese paraquat TK in 2018 in terms of export volume, followed by Indonesia, Brazil, Thailand and Australia, and the combined export volume of paraquat TK to the five countries took up about XXX of total export volume of paraquat TK in 2018.

Major export destinations of China's paraquat formulations in 2018 were Nigeria and Brazil with the volume of over XXX tonnes, Australia and Argentina with the volume of around XXX tonnes, Ghana and Thailand with the volume of XXX tonnes, Paraguay, Columbia, Chile, Cameroon, Bangladesh and South Africa with the volume of XXX tonnes.

- **Technology**

Only cyanide method was adopted in China. According to different solvents used, the cyanide methods can be classified into three types of processes, including the ammonia-cyanide (AC) process, the methanol-cyanide (MC) process and the water-cyanide (WC) process.

The WC process has been eliminated in China due to its lack of competitiveness compared with the other two processes. Among the XXX active paraquat TK manufacturers in China, XXX adopt AC process and XXX adopts MC process at present. The capacity adopting AC process and MC process were XXX t/a and XXX t/a as of H1 2019, respectively.

- **Consumption**

Paraquat GW is the only paraquat formulation that allowed to be consumed in China, with the consumption volume of XXX tonnes (42% TK equivalent) in 2017 and 2018.

Nowadays, paraquat is mainly consumed in orchards and corn fields, with combined consumption volume taking up about XXX % of China's total consumption volume of the products in 2018.

4. What's in this report?

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Table 1.2-1 Output and consumption of paraquat and corresponding share of all total herbicides in China, 2014–2018

Year	Output, tonne		Share	Consumption, tonne		Share
	Herbicide	Paraquat 42% TK		Herbicide (by 100% technical)	Paraquat (by 100% TK)	
2014	XXX	XXX	XXX	XXX	XXX	XXX
2015	XXX	XXX	XXX	XXX	XXX	XXX
2016	XXX	XXX	XXX	XXX	XXX	XXX
2017	XXX	XXX	XXX	XXX	XXX	XXX
2018	XXX	XXX	XXX	XXX	XXX	XXX

Note: Output is calculated by the most frequently used technical.

Herbicide output is sourced from the China Crop Protection Industry Association (CCPIA).

Source: CCPIA and CCM

...

Table 2.2.1-1 Capacity and output of pyridine manufacturers in China, 2014–H1 2019

No.	Company	Abbreviation	Status, as of H1 2019	Capacity, t/a						Output, tonne					
				H1 2019	2018	2017	2016	2015	2014	H1 2019	2018	2017	2016	2015	2014
1	XXX	XXX	XXX	XXX	XXX	XXX	XXX	XXX	XXX	XXX	XXX	XXX	XXX	XXX	XXX
2	XXX	XXX	XXX	XXX	XXX	XXX	XXX	XXX	XXX	XXX	XXX	XXX	XXX	XXX	XXX
3	XXX	XXX	XXX	XXX	XXX	XXX	XXX	XXX	XXX	XXX	XXX	XXX	XXX	XXX	XXX
4	XXX	XXX	XXX	XXX	XXX	XXX	XXX	XXX	XXX	XXX	XXX	XXX	XXX	XXX	XXX
5	XXX	XXX	XXX	XXX	XXX	XXX	XXX	XXX	XXX	XXX	XXX	XXX	XXX	XXX	XXX
6	XXX	XXX	XXX	XXX	XXX	XXX	XXX	XXX	XXX	XXX	XXX	XXX	XXX	XXX	XXX
7	XXX	XXX	XXX	XXX	XXX	XXX	XXX	XXX	XXX	XXX	XXX	XXX	XXX	XXX	XXX
8	XXX	XXX	XXX	XXX	XXX	XXX	XXX	XXX	XXX	XXX	XXX	XXX	XXX	XXX	XXX
Others				XXX	XXX	XXX	XXX	XXX	XXX	XXX	XXX	XXX	XXX	XXX	XXX
Total				XXX	XXX	XXX	XXX	XXX	XXX	XXX	XXX	XXX	XXX	XXX	XXX

Source: CCM

...



Table 2.2.1-2 China's imports of pyridine by origin, 2016–July 2019

Region	2016		2017		2018		Jan.–Jul. 2019	
	Quantity, tonne	Price, USD/kg	Quantity, tonne	Price, USD/kg	Quantity, tonne	Price, USD/kg	Quantity, tonne	Price, USD/kg
XXX	XXX	XXX	XXX	XXX	XXX	XXX	XXX	XXX
XXX	XXX	XXX	XXX	XXX	XXX	XXX	XXX	XXX
XXX	XXX	XXX	XXX	XXX	XXX	XXX	XXX	XXX
XXX	XXX	XXX	XXX	XXX	XXX	XXX	XXX	XXX
XXX	XXX	XXX	XXX	XXX	XXX	XXX	XXX	XXX
XXX	XXX	XXX	XXX	XXX	XXX	XXX	XXX	XXX

Source: CCM

Table 2.2.1-3 Apparent consumption of pyridine in China, 2014–2018, tonne

Year	Output	Export	Import	Apparent consumption
2014	XXX	XXX	XXX	XXX
2015	XXX	XXX	XXX	XXX
2016	XXX	XXX	XXX	XXX
2017	XXX	XXX	XXX	XXX
2018	XXX	XXX	XXX	XXX

Note: Apparent consumption = Output + Import - Export

Source: China Customs and CCM

Table 2.2.1-4 Apparent consumption of pyridine in China by downstream industry, 2014–2018

Year	Output, tonne			Consumption, tonne				Apparent consumption of pyridine, tonne
	Paraquat	Diquat	Chlorpyrifos (by pyridine route)	Paraquat	Diquat	Chlorpyrifos (by pyridine route)	Others	
2014	XXX	XXX	XXX	XXX	XXX	XXX	XXX	XXX
2015	XXX	XXX	XXX	XXX	XXX	XXX	XXX	XXX
2016	XXX	XXX	XXX	XXX	XXX	XXX	XXX	XXX
2017	XXX	XXX	XXX	XXX	XXX	XXX	XXX	XXX
2018	XXX	XXX	XXX	XXX	XXX	XXX	XXX	XXX

Note: Output of the three pesticides is calculated by the most frequently used TC/TK respectively.

Source: CCM

Table 3.2.3-1 Unit consumption of pyridine in production of paraquat TK in China

Process	Unit consumption (t/t)	Yield rate
AC process	XXX	XXX
MC process	XXX	XXX

Note: Unit consumptions are calculated by 99.9% pyridine.

Source: CCM

Table 3.2.3-2 Manufacturing cost of paraquat 42% TK in China by AC process, H1 2019

No.	Raw material	Content	Unit consumption (t/t)	Price (USD/t)	Unit cost (USD/t)
1	Pyridine	99.9%	XXX	XXX	XXX
2	Sodium cyanide	99.5%	XXX	XXX	XXX
3	Methyl chloride	99.0%	XXX	XXX	XXX
4	Liquid Chlorine	99.6%	XXX	XXX	XXX
Other raw materials		/	/	/	XXX
Other costs		/	/	/	XXX
Waste treatment cost		/	/	/	XXX
Total		/	/	/	XXX

Source: CCM

Table 3.4.1.2-1 Capacity and output of paraquat TK manufacturers in China, 2014–H1 2019

No.	Company	Abbreviation	Status	Capacity, t/a						Output, tonne						
				H1 2018	H1 2019	2018	2017	2016	2015	2014	H1 2019	2018	2017	2016	2015	2014
1	XXX	XXX	Active	XXX	XXX	XXX	XXX	XXX	XXX	XXX	XXX	XXX	XXX	XXX	XXX	XXX
2	XXX	XXX	Active	XXX	XXX	XXX	XXX	XXX	XXX	XXX	XXX	XXX	XXX	XXX	XXX	XXX
3	XXX	XXX	Active	XXX	XXX	XXX	XXX	XXX	XXX	XXX	XXX	XXX	XXX	XXX	XXX	XXX
4	XXX	XXX	Active	XXX	XXX	XXX	XXX	XXX	XXX	XXX	XXX	XXX	XXX	XXX	XXX	XXX
...	XXX	XXX	Active	XXX	XXX	XXX	XXX	XXX	XXX	XXX	XXX	XXX	XXX	XXX	XXX	XXX
...	XXX	XXX	Active	XXX	XXX	XXX	XXX	XXX	XXX	XXX	XXX	XXX	XXX	XXX	XXX	XXX
...	XXX	XXX	Active	XXX	XXX	XXX	XXX	XXX	XXX	XXX	XXX	XXX	XXX	XXX	XXX	XXX
...			Active	XXX	XXX	XXX	XXX	XXX	XXX	XXX	XXX	XXX	XXX	XXX	XXX	XXX
Others				XXX	XXX	XXX	XXX	XXX	XXX	XXX	XXX	XXX	XXX	XXX	XXX	XXX
Total				XXX	XXX	XXX	XXX	XXX	XXX	XXX	XXX	XXX	XXX	XXX	XXX	XXX

Source: CCM

Table 3.4.1.2-2 Geographical distribution of paraquat TK manufacturers in China, 2018

Province	Manufacturer	Capacity		Output	
		Volume, t/a	Share	Volume, tonne	Share
Shandong	XXX	XXX	XXX	XXX	XXX
Jiangsu	XXX	XXX	XXX	XXX	XXX
Anhui	XXX	XXX	XXX	XXX	XXX
Hubei	XXX	XXX	XXX	XXX	XXX
Hebei	XXX	XXX	XXX	XXX	XXX
Zhejiang	XXX	XXX	XXX	XXX	XXX
Total		XXX	XXX	XXX	XXX

Note: Anhui Costar Biochemical Co., Ltd. is one of the wholly-owned subsidiaries of Nanjing Red Sun.

Nanjing Red Sun owns 70% of Shandong Kexin's shares.

Source: CCM

Table 3.4.2-1 Output of paraquat formulations in China by manufacturer, 2014–H1 2019, tonne

No.	Manufacturer	H1 2019	2018	2017	2016	2015	2014
1	XXX	XXX	XXX	XXX	XXX	XXX	XXX
2	XXX	XXX	XXX	XXX	XXX	XXX	XXX
3	XXX	XXX	XXX	XXX	XXX	XXX	XXX
4	XXX	XXX	XXX	XXX	XXX	XXX	XXX
5	XXX	XXX	XXX	XXX	XXX	XXX	XXX
6	XXX	XXX	XXX	XXX	XXX	XXX	XXX
...	XXX	XXX	XXX	XXX	XXX	XXX	XXX
...	XXX	XXX	XXX	XXX	XXX	XXX	XXX
...	XXX	XXX	XXX	XXX	XXX	XXX	XXX
...	XXX	XXX	XXX	XXX	XXX	XXX	XXX
...	XXX	XXX	XXX	XXX	XXX	XXX	XXX
...	XXX	XXX	XXX	XXX	XXX	XXX	XXX
...	XXX	XXX	XXX	XXX	XXX	XXX	XXX
Others		XXX	XXX	XXX	XXX	XXX	XXX
Total		XXX	XXX	XXX	XXX	XXX	XXX

Note: 1) Outputs include those of 200g/L AS and 250g/L AS.

2) Others refer to those who produce paraquat formulations only, such as XXX, XXX, Jilin Bada Pesticide Co., Ltd. and XXX

Source: CCM

Table 3.5.2-9 China's exports of paraquat by destination, Jan.-Jul. 2019

No.	Destination	Paraquat 42% TK		Paraquat 45% TK		Paraquat 20% AS		Paraquat 25% AS	
		Quantity, tonne	Price, USD/kg	Quantity, tonne	Price, USD/kg	Quantity, tonne	Price, USD/kg	Quantity, tonne	Price, USD/kg
1	XXX	XXX	XXX	XXX	XXX	XXX	XXX	XXX	XXX
2	XXX	XXX	XXX	XXX	XXX	XXX	XXX	XXX	XXX
3	XXX	XXX	XXX	XXX	XXX	XXX	XXX	XXX	XXX
...	XXX	XXX	XXX	XXX	XXX	XXX	XXX	XXX	XXX
...	XXX	XXX	XXX	XXX	XXX	XXX	XXX	XXX	XXX
...	XXX	XXX	XXX	XXX	XXX	XXX	XXX	XXX	XXX
Others		XXX	XXX	XXX	XXX	XXX	XXX	XXX	XXX
Total		XXX	XXX	XXX	XXX	XXX	XXX	XXX	XXX

Source: China Customs & CCM

Table 3.5.2-15 China's exports of paraquat by manufacturer, 2018

No.	Manufacturer	Paraquat 42% TK		Paraquat 45% TK		Paraquat 20% AS		Paraquat 25% AS	
		Quantity, tonne	Price, USD/kg	Quantity, tonne	Price, USD/kg	Quantity, tonne	Price, USD/kg	Quantity, tonne	Price, USD/kg
1	XXX	XXX	XXX	XXX	XXX	XXX	XXX	XXX	XXX
2	XXX	XXX	XXX	XXX	XXX	XXX	XXX	XXX	XXX
3	XXX	XXX	XXX	XXX	XXX	XXX	XXX	XXX	XXX
...	XXX	XXX	XXX	XXX	XXX	XXX	XXX	XXX	XXX
...	XXX	XXX	XXX	XXX	XXX	XXX	XXX	XXX	XXX
...	XXX	XXX	XXX	XXX	XXX	XXX	XXX	XXX	XXX
Not sure		XXX	XXX	XXX	XXX	XXX	XXX	XXX	XXX
Total		XXX	XXX	XXX	XXX	XXX	XXX	XXX	XXX

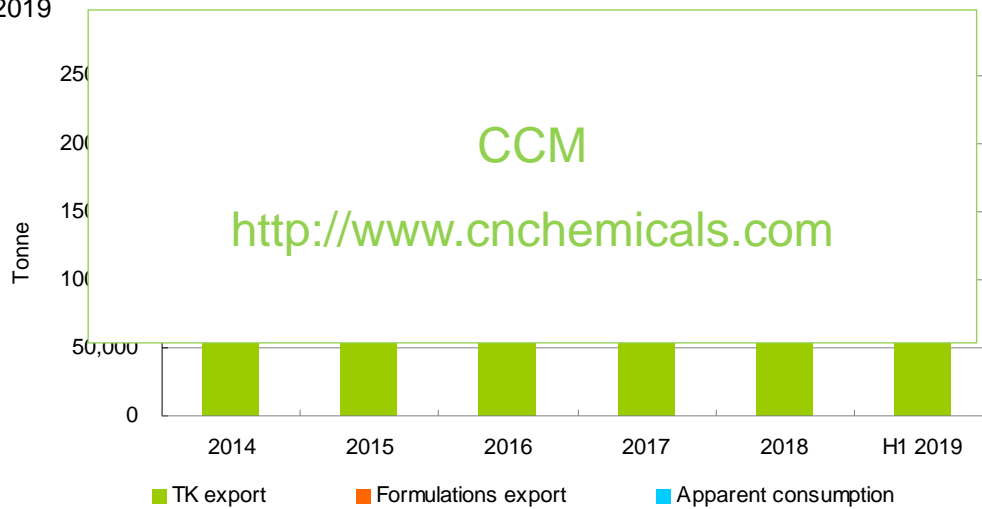
Source: China Customs & CCM

Table 3.5.2-21 China's exports of paraquat by exporter, 2018

No.	Manufacturer	Paraquat 42% TK		Paraquat 45% TK		Paraquat 20% AS		Paraquat 25% AS	
		Quantity, tonne	Price, USD/kg	Quantity, tonne	Price, USD/kg	Quantity, tonne	Price, USD/kg	Quantity, tonne	Price, USD/kg
1	XXX	XXX	XXX	XXX	XXX	XXX	XXX	XXX	XXX
2	XXX	XXX	XXX	XXX	XXX	XXX	XXX	XXX	XXX
3	XXX	XXX	XXX	XXX	XXX	XXX	XXX	XXX	XXX
...	XXX	XXX	XXX	XXX	XXX	XXX	XXX	XXX	XXX
...	XXX	XXX	XXX	XXX	XXX	XXX	XXX	XXX	XXX
...	XXX	XXX	XXX	XXX	XXX	XXX	XXX	XXX	XXX
Not sure		XXX	XXX	XXX	XXX	XXX	XXX	XXX	XXX
Total		XXX	XXX	XXX	XXX	XXX	XXX	XXX	XXX

Source: China Customs & CCM

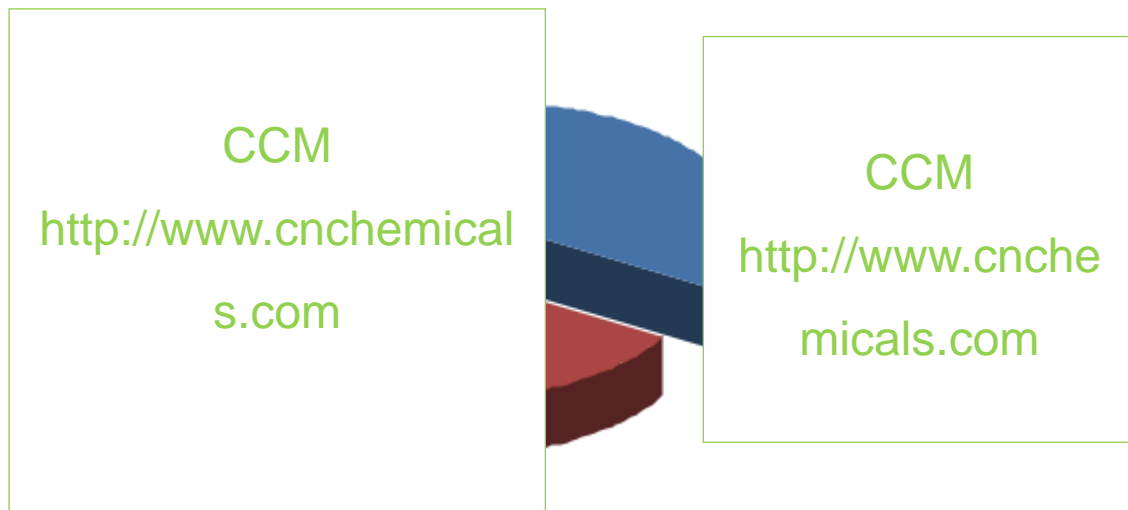
Figure 3.6.1-1 Consumption pattern of paraquat TK (calculated by 42% TK) in China, 2014–H1 2019



- Note: 1) TK here includes 42% TK and 45% TK.
 2) Formulations here include 200g/L AS and 250g/L AS.
 3) Apparent consumption = Output + Import - Export.

Source: China Customs and CCM

Figure 3.6.3.2-1 Consumption structure of paraquat in China by crop, 2018



Source: CCM

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