CCM Data & Business Intelligence

Market Research on Paraquat in China

The Tenth Edition

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1. Introduction

CCM's tenth edition report on Chinese paraquat industry, *Market Research on Paraquat in China*, was finished in August 2018. This report attaches importance to the following parts:

- supply of paraquat (capacity, output and key manufacturers) and demand by volume & value in China in 2013–H1 2018;
- 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 2013–H1 2018 and export of paraquat products in 2013–Jan.-May 2018;
- forecast on paraquat's supply & demand in China in 2018–2022;
- 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 cover:
- paraquat manufacturers
- agricultural experts & researchers
- traders
- farmers
- industrial associations.

CCM carried out extensive telephone interviews with almost all paraquat TK producers and some formulations producers. From those active producers and even producers who have idled or stopped production, CCM 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
- professional databases from other sources

- 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

China's herbicide industry has kept developing stably in recent years, reflected by the sharply increasing output and enriching varieties. As the largest supplier of herbicides in the world, China produced about XXX tonnes of herbicides (calculated by 100% technical) in 2017, retaining its top position in the world.

As one of the key non-selective herbicides in the world, paraquat has witnessed a fast development in the past few years in China, which has been playing an increasingly important role in the world.

- **Production**

China is the largest manufacturer of paraquat TK and formulations in the world. As of May 2017, its paraquat TK capacity has reached XXX t/a (calculated by 42% TK). The output of paraquat TK was XXX tonnes in 2017, up by XXX% year on year.

The output of China's paraquat formulations (calculated by 200g/L AS, similarly hereinafter) has grown fast from XXX tonnes in 2007 to XXX tonnes in 2011 and XXX tonnes in 2016, mainly attributed to the rapid growth of overseas demand. XXX tonnes in 2017.

- **Manufacturer**

There were XXX active paraquat TK producers in China as of H1 2018. Key production regions include Shandong, Jiangsu, Hubei and Anhui, whose output accounting for around XXX% of the domestic total in 2017.

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 Hubei Sanonda Co., Ltd. (XXX t/a).

- **Price**

The price of paraquat TK in China stopped rising and started to drop in H2 2014. The average ex-works price of paraquat 42% TK reached USDXXX/t in 2014 but dropped to USDXXX/t in H1 2018.

Affected by the anti-dumping investigation into imported pyridine, the average ex-work price of 99.9% pyridine in China has been increasing sharply since 2013, reaching USDXXX/t in 2013 and USDXXX/t in 2014. But due to the steady domestic supply, the price dropped to USDXXX/t in H1 2018.

- **Export**

A large proportion of paraquat produced in China is exported annually, with the share of about XXX% in 2017, a historical record high. China's export volume of paraquat TK and formulations were XXX tonnes and XXX tonnes in 2017, seeing a yearly growth rate of XXX% and XXX% respectively.

Indonesia was the largest export destination of Chinese paraquat TK in 2017 in terms of export volume, followed by Thailand and the US. And the total export volume of paraquat TK to these three destinations reached XXX% of the national total export volume in 2017. It was XXX% in 2015 and XXX% in 2016 respectively.

The top five destinations of China's paraquat formulations are Nigeria, Australia, Ghana, Thailand and Brazil, with their export volume together accounting for XXX% of the national total in 2017.

- **Technology**

As of June 2018, 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 2018, respectively.

- **Consumption**

The consumption of paraquat in China kept decreasing in 2016 and 2017, reaching XXX tonnes and XXX tonnes respectively, as influenced by the Notice No. 1745 of ban on sales and use of paraquat AS formulations from June 2016.

In China, paraquat formulations are mainly consumed in orchards and corn fields, with their consumption volume taking up of about XXX% of China's total consumption volume of the products in 2017.

4. What's in this report?

Note: Key data/information in this sample page is hidden, while in the report it is not.

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Table 1.2-1 Output and consumption of paraquat and corresponding share of all total herbicides in China, 2008–2017

Year	Output, tonne		Share	Consumption, tonne		Share
	Herbicide	Paraquat 42% TK		Herbicide (by 100% technical)	Paraquat (by 100% TK)	
2008	XXX	XXX	XXX	XXX	XXX	XXX
2009	XXX	XXX	XXX	XXX	XXX	XXX
2010	XXX	XXX	XXX	XXX	XXX	XXX
2011	XXX	XXX	XXX	XXX	XXX	XXX
2012	XXX	XXX	XXX	XXX	XXX	XXX
2013	XXX	XXX	XXX	XXX	XXX	XXX
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

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

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Table 2.2.1-1 Capacity and output of pyridine manufacturers in China, 2013–H1 2018

No.	Company	Abbreviation	Status, as of H1 2018	Capacity, t/a						Output, tonne					
				H1 2018	2017	2016	2015	2014	2013	H1 2018	2017	2016	2015	2014	2013
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

Note: Nanjing Red Sun Co., Ltd. has two pyridine production plants, namely Anhui Costar Biochemical Co., Ltd. and Nanjing Red Sun Biochemical Co., Ltd. with the capacities of XXX t/a and XXXt/a respectively.

Source: CCM

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Table 2.2.1-2 China's imports of pyridine by origin, 2013–April 2018

Region	2013		2014		2015		2016		2017		Jan.–April 2018	
	Quantity, tonne	Price, USD/kg	Quantity, tonne	Price, USD/kg	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	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

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Table 2.2.1-3 Apparent consumption of pyridine in China, 2010–2017, tonne

Year	Output	Export	Import	Apparent consumption
2010	XXX	XXX	XXX	XXX
2011	XXX	XXX	XXX	XXX
2012	XXX	XXX	XXX	XXX
2013	XXX	XXX	XXX	XXX
2014	XXX	XXX	XXX	XXX
2015	XXX	XXX	XXX	XXX
2016	XXX	XXX	XXX	XXX
2017	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, 2010–2017

Year	Output, tonne			Consumption, tonne				Apparent consumption of pyridine, tonne
	Paraquat	Diquat	Chlorpyrifos (by pyridine route)	Paraquat	Diquat	Chlorpyrifos (by pyridine route)	Others	
2010	XXX	XXX	XXX	XXX	XXX	XXX	XXX	XXX
2011	XXX	XXX	XXX	XXX	XXX	XXX	XXX	XXX
2012	XXX	XXX	XXX	XXX	XXX	XXX	XXX	XXX
2013	XXX	XXX	XXX	XXX	XXX	XXX	XXX	XXX
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

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

Source: CCM

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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

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Table 3.2.3-2 Manufacturing cost of paraquat 42% TK in China by AC process, H1 2018

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

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Table 3.4.1.2-1 Capacity and output of paraquat TK manufacturers in China, 2013–H1 2018

No.	Company	Abbreviation	Status H1 2018	Capacity, t/a						Output, tonne					
				H1 2018	2017	2016	2015	2014	2013	H1 2018	2017	2016	2015	2014	2013
1	XXX	XXX	Active	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
3	XXX	XXX	Active	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
5	XXX	XXX	Active	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	Active	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
…			Active	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

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Table 3.4.1.2-2 Geographical distribution of paraquat TK manufacturers in China, 2017

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

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Table 3.4.2-1 Output of paraquat formulations in China by manufacturer, 2013–H1 2018, tonne

No.	Manufacturer	H1 2018	2017	2016	2015	2014	2013
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
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

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Table 3.5.2-9 China's exports of paraquat by destination, Jan.-May 2018

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
…	XXX	XXX	XXX	XXX	XXX	XXX	XXX	XXX	XXX
…	XXX	XXX	XXX	XXX	XXX	XXX	XXX	XXX	XXX
24	XXX	XXX	XXX	XXX	XXX	XXX	XXX	XXX	XXX
25	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

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Table 3.5.2-15 China's exports of paraquat by manufacturer, 2017

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

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Table 3.5.2-21 China's exports of paraquat by exporter, 2017

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

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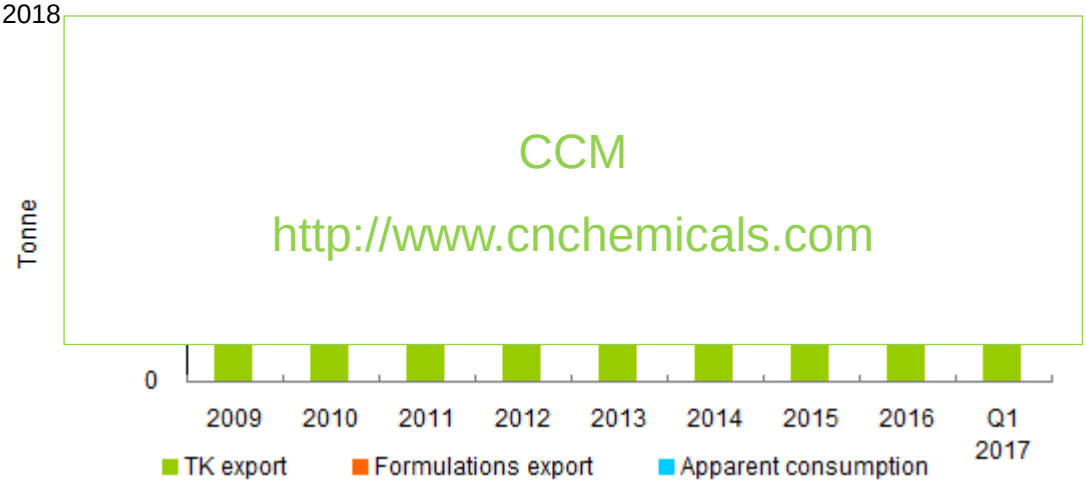
Figure 3.6.1-1 Consumption pattern of paraquat TK (calculated by 42% TK) in China, 2010–H1 2018



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

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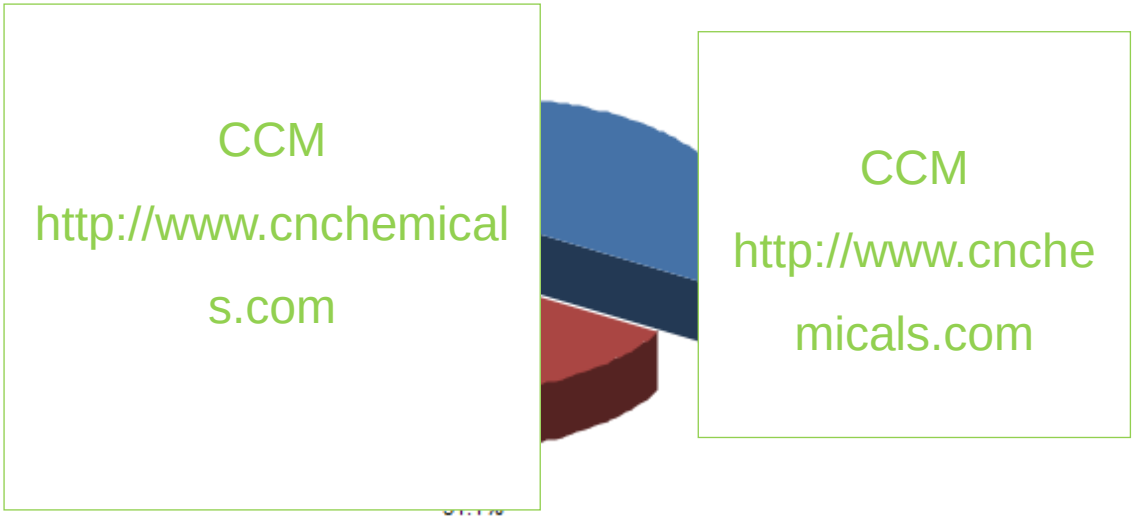
Figure 3.6.3.2-1 Consumption structure of paraquat in China by crop, 2017



Source: CCM

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