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

2 Market of major insecticides

2.1 Chlorpyrifos

- Introduction to chlorpyrifos industry

Chlorpyrifos is a broad-spectrum organophosphorus insecticide, whose sales volume ranks first among all organophosphorus insecticides in the world at present. It has the effects of contact killing, stomach poisoning and certain fumigation killing against many kinds of pests. Chlorpyrifos is an insecticide with moderate toxicity and it has no toxicity to most crops if properly used except tobacco.

First registered in 1965 and marketed by Dow AgroSciences (Dow) under the trade names of Dursban and Lorsban, chlorpyrifos was one of the most widely-used household pesticides in the US. However, under the pressure of the Environmental Protection Agency (EPA), Dow has withdrawn the registration of chlorpyrifos for the use in houses and other places where children could be exposed. And EPA has strictly restricted its use on crops since Dec. 31, 2001. Dow is the largest producer of chlorpyrifos in the world, whose total capacity of chlorpyrifos technical was [redacted]t/a in 2010.

Since 1993 when the first variety of chlorpyrifos was registered in China, chlorpyrifos has become more and more important to domestic insecticide industry. Nowadays, chlorpyrifos is a key insecticide protecting crops in China, especially after 1 January, 2007 when Chinese government banned the application of five highly toxic organophosphorus insecticides–parathion, methamidophos, parathion-methyl, etc. Chlorpyrifos has become a competitive substitute for the banned insecticides, thanks to its advantages of high efficacy, broad pest control spectrum, competitive price, etc. According to the Institute for the Control of Agrochemicals, Ministry of Agriculture (ICAMA), chlorpyrifos is now widely registered for agricultural pest control, covering about [redacted] species of pests on approximately [redacted] kinds of crops like rice, brassicaceous vegetables and corn.

In addition, with China's increasing attention paid to optimizing domestic pesticide industrial structure and strengthening environmental protection, much more highly toxic insecticides are expected to be phased out, providing more room for the further development of chlorpyrifos industry in domestic market.

Besides, chlorpyrifos is an important export-oriented product, with annual export volume exceeding [redacted] tonnes (including technical and formulations) since 2008. With the advantages of relatively high quality and low quotation, China's chlorpyrifos technical shows more competitiveness in overseas market. Robust overseas demand has been driving up its export continuously these years, which eases the overcapacity situation domestically.

However, chlorpyrifos formulations face great difficulties in overseas market expansion due to strong competitiveness of the products from MNCs, especially Dow, and a lack of well-known brands of Chinese producers. But this situation would turn better, with domestic producers' improvement in production technology and consciousness of constructing international competitiveness. In domestic market, chlorpyrifos is now facing a huge challenge from other competitive insecticides such as pyrethroids and abamectin, and MNCs' new products such as chlorantraniliprole and flubendiamide with excellent pest control efficacy.

- Registration situation of chlorpyrifos in China

The number of chlorpyrifos products' registrations in China grew very slowly before 2004 due to chlorpyrifos' high price and strong competition from highly toxic organophosphorus insecticides. Only [redacted] companies have registered chlorpyrifos technical as of the end of 2003. But the number of chlorpyrifos technical registration increases rapidly since five highly toxic organophosphorus insecticides were phased out in 2007.

With increase in domestic demand for chlorpyrifos, together with the six New Regulations on Pesticide Management continuously released by Chinese government in 2007 to upraise domestic standards for pesticide registration in the coming years, the number of chlorpyrifos registrations significantly increased in 2008. The number of formal registrations of chlorpyrifos technical, specially, soared to [redacted] in 2008, among which 29 were changed from temporary registrations.

Entering 2010, the number of registrations showed a decreasing trend toward the level in 2007. Up to Aug. 2012, there have been totally [redacted] effective registrations of chlorpyrifos products in China, including [redacted] technical, [redacted] single formulations and [redacted] mixed formulations.

Among all chlorpyrifos formulations, EC is the largest formulation category, accounting for [redacted]% of the total. Although the number of registrations of environmentally friendly formulations such as GR and ME has seen some growth in recent years, their proportions are still small. Single formulations of chlorpyrifos registered mainly include [redacted], [redacted], [redacted], [redacted], etc. Among these formulations, EC accounts for the largest proportion, and their AI concentrations tend to be high, such as [redacted] and [redacted], while the number of lower-concentration ones sees reduction due to pressure from environmental protection. Basically, [redacted] is registered to be applied on many crops, such as rice, vegetables and fruits. And [redacted] is registered for the control of underground pests in China.

With the improvement in chlorpyrifos formulations' application technology, mixed formulations of chlorpyrifos have been developing rather quickly in recent years. For instance, phoxim•chlorpyrifos and cyhalothrin•chlorpyrifos have been developed to improve chlorpyrifos' quick efficacy against pests. Besides, chlorpyrifos•chlorfluazuron and abamectin•chlorpyrifos have been applied to prolong its persistent action. Other mixed formulations of chlorpyrifos, mainly including dimehypo/monosultap•chlorpyrifos, cypermethrin•chlorpyrifos, malathion•chlorpyrifos, etc, have been developed to reduce control cost. Overall, the

application of mixed formulations of chlorpyrifos has promoted the development of domestic chlorpyrifos industry.