

Endosulfan Phasing-Out in China

Promoting Sustainable Agricultural Practices in the Cotton Sector

Endosulfan is an insecticide that has been phasing out globally due to its acute toxicity, potential for bioaccumulation, and its role as an endocrine disrupter that can cause cancerous tumors, birth defects, and other developmental disorders. Because of its threats to human health and the environment, a global ban on the manufacture and use of endosulfan was negotiated under the Stockholm Convention in April 2011.

The Chinese government, as one of the first contracting parties, signed the Stockholm Convention on May 23, 2001. The State Council approved the National Implementation Plan (NIP) of the Convention in April 2007. This clearly highlighted that [Persistent Organic Pollutants \(POPs\)](#) should be fully banned on production and application aside from for acceptable purposes. Although China and India have successfully banned the use of endosulfan for fruit and tea tree pests in 2002, endosulfans are still used extensively in cotton and tobacco production in China.

Current Policies on Controlling Endosulfan

The mandate of Chinese plant protection has been shifting during the past decade towards an increasing awareness and knowledge on agricultural product safety. In the 1970s, emphasis was mainly placed upon pest prevention, and later move to “Understand the crop ecosystem, major pests and their natural enemies” in the mid-1980s. Since the 1990s, the government has shifted the emphasis of the national Integrated Pesticide Management (IPM) programs, to either the banning or rejecting of the highly toxic pesticides including POPs pesticides. In addition, investment in research and industrialization of biological control agents have been increasing.

To manage the new challenges on pest control caused by climate change, cultivar improvement and excessive use of agricultural chemicals, China has included IPM as part of the concept of “public plant protection and Green plant protection”. This update aims to strengthen the twofold functions of IPM, i.e. supporting social management and public service for the sake of rural development and also safeguarding ecological and sustainable agriculture.

During the past 20 years, the Government of China has issued 5 decrees, in which 38 highly toxic pesticides including several kinds of POPs have been banned and registration stopped. Meanwhile, in 2008, the Ministry of Agriculture also issued 6 new regulations on pesticide management, which placed tighter control on the pesticide name, label requirement and the registration procedure. Most recently the policy environment has shifted towards supporting green pest control initiatives by significantly increasing investments both on technical and innovations of non-chemical pest control approaches.

Integrated Pest Management (IPM) for Sustainable Agriculture



Figure 1 Monitoring the insecticidal effect via physical trapping

The Integrated Pest Management (IPM), also known as Integrated Pest Control (IPC), is a broad-based approach that integrates practices for the economic control of pests. IPM emphasizes the healthy growth of crops while encouraging the use of natural pest control mechanisms that can minimize the impact of pest control measures on the agro-ecosystem and human health. This in turn will bring benefits such as a reduced amount of broad-spectrum pesticide use in the environment, a reduced chance of pests developing resistant towards a specific pesticide, a reduced risks to human health animals and organism, alongside less harm for the environment.

China, as the world’s largest producer of cotton, with 24 out of 31 provinces in the mainland involved in production and around 300 million people engaging in the process, possess about 4.22 million hectares of cotton farmland, which yielded 6.16 million tons of cotton in 2016. In 2011, the annual production of Endosulfan in China was around 3000 metric, with 2850 tons applied to control cotton bollworm. In addition, every year 85% is used on the farmlands in the Xinjiang Autonomous Region. Effective as it is in controlling cotton pests, as a highly toxic POPs, Endosulfan generates significant environmental and health problems.

During the past 2 decades, cotton IPM strategies have been developed and implemented alongside the adoption of transgenic BT Cotton. Cotton IPM strategies consist of the conservation of natural enemies early in the season, killing over-winter pupae by plough and irrigation immediately before the freeze of cotton fields. Furthermore, IPM encourages planting trap crop, using light traps and spraying high effective pesticides. Recently, biological control methods like bio-pesticide Nuclear Polyhedrosis Virus (NPV) formulations, bacon wasps, insect sex pheromone and

olfactory traps have been introduced and applied to control cotton pests. However, with over 150 million small cotton growers, China faces an enormous challenges with endosulfan substitutes and advanced IPM approaches.

Currently, the use of endosulfan in the tobacco sector is under control. All the pesticides used on tobacco are purchased and supplied by the tobacco companies to the tobacco farmers, with the use of endosulfan in the tobacco sector stopped in 2008. As the tobacco industry is state-monopolized, the pest management of tobacco has followed a strictly a unique top-down approaches. This includes specialists who work in the technical department of the tobacco companies being responsible for pest monitoring, pesticide supplying and controlling pest control actions. Tobacco farmers follow the recommendations from the experts to conduct the pest-controlling procedures.



Figure 2 Pesticide sparing via drones

Existing Barriers to Promote Sustainable Agriculture and Phasing Out Endosulfan

Despite preliminary progress on phasing out highly toxic pesticides like Endosulfan and other POPs and the advancement in the implementation of IPM on the cotton and tobacco industry, the existing barriers listed below need to be tackled with the goal to expand the efforts on biological pest control:

Gaps in the Technology Advancement and Users buy-in

Despite great achievements in biological control research programs, the farmers rarely enjoy the advance technology and latest trend. Currently the system lacks an effective robust system for information sharing and technology introduction. In addition, without proper guidance and training, the farmers could not master the needed knowledge to apply the technology in the field.

Lack of policy framework to support action

Policy makers are uninformed about the latest update in IPM and relevant government agencies lack the capacities to practice IPM, in particular biological control for sustainable agriculture production.

Backlash from the pesticide industry

The pesticide industrial sector have a strong influence on the policy makers, researchers and extension system therefore affected regulations, productions and sales of pesticide. In addition, the chemical pesticide companies' aggressive marketing strategies

have vast negative impacts on the farmers for adopting biological control technology

The Way Forward:

In order to expedite the process of phasing out endosulfan and facilitate the wider adoption of IPM practices in the cotton and tobacco sectors, it is suggested that the following steps can be adopted:

- I. Strengthen the current institutional capacity and establish an effective coordination mechanism and management mechanism among the key stakeholders. This will reinforce the policy framework that can facilitate the endosulfan eliminating process and promote the biological control methods. In addition, policies on both the pesticide management as well as on the agro-technical should be established to eliminate endosulfan and promote biological control and alternatives.
- II. In addition, in order to promote the use of IPM such as biological control techniques among the farmers, it is important to, on the one hand, evaluate the available practices and demonstrate the economic feasibility and environmental benefits of such measures, and on the other hand, provide training and technical support to the farmers to smooth the technique adaptation process.
- III. Moreover, upon the successful demonstration of the IPMs, it is important to evaluate the available, especially biological control in pilot areas on cotton and tobacco and then can initiate further replications. Such experience should be well-monitored and well-documented, which could be shared to relevant policy makers, government agencies as well as local communities to replicate the best practices nation-wide.

To summarize, promoting Integrated Pest Management in the cotton and tobacco sectors in China would facilitate the process of phasing out Endosulfan and help China to fulfill its commitment in the Stockholm Convention and eventually contribute to ensuring more people enjoy a cleaner, healthier environment.

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